School of Finance

University of St.Gallen

DO PRIVATE EQUITY FUNDS ALWAYS PAY LESS? A SYNERGY-RELATED EXPLANATION BASED ON ADD-ON ACQUISITIONS

STEFAN MORKÖTTER
THOMAS WETZER

WORKING PAPERS ON FINANCE NO. 2015/22

SWISS INSTITUTE OF BANKING AND FINANCE (S/BF – HSG)

OCTOBER 2015
THIS VERSION: SEPTEMBER 2016

Do Private Equity Funds Always Pay Less? A Synergy-Related Explanation Based on Add-on Acquisitions

Stefan Morkoetter* and Thomas Wetzer**

September 2016

Abstract

We assess the pricing of transactions undertaken by private equity (PE) funds in comparison to the transactions of strategic acquirers and sellers and focus on synergy gains as an explanatory factor. Controlling for company and deal characteristics, we show that PE funds pay 20% less, on average, than strategic buyers for comparable target corporations (we refer to this as the PE discount). Supplementing the existing literature on the PE discount in M&A transactions, we show that in add-on transactions, this PE discount disappears. When PE funds benefit from synergies, they are willing to pay the same price level as strategic acquirers would do in comparable transactions. In line with this synergy-related explanation, we find that PE funds sell their portfolio companies to strategic acquirers at prices comparable to those of strategic sellers. In divestitures to other PE funds (secondary deals), the PE discount prevails.

Keywords: Private Equity, Corporate Finance, Mergers and Acquisitions, Takeover Premiums, Synergies, Add-on Acquisitions

JEL Codes: G15, G30, G32, G34

---

*Corresponding Author: University of St.Gallen, 111 Amoy Street, 069931 Singapore, Singapore; phone: +6568507338; mail: stefan.morkoetter@unisg.ch, ** University of St.Gallen, (mail: thomas.wetzer@unisg.ch).

This paper was previously circulated under the title *How well do GPs bargain? Empirical Evidence on Private Equity Discounts in M&A Transactions*. We thank Manuel Ammann, Martin Brown, Roland Fuess, Conor Kehoe, Markus Schmid, two anonymous referees, and the participants in the EFMA Annual Conference 2015 for their helpful comments.

1 Introduction

Private equity (PE) funds are active participants in the mergers and acquisitions (M&A) market. Acquisitions and divestments of portfolio companies belong to the very core of the PE business model. In contrast to targets in strategic acquisitions, each individual PE portfolio company typically operates on a stand-alone basis. A major reason why strategic acquirers, in turn, engage in M&A activity is to benefit from synergies. Strategic acquirers buy companies to benefit from economies of scale, to foster the growth of existing businesses, or to steer their product portfolios. Thus, a major difference between PE funds and strategic acquirers/sellers is that the latter buy and sell for their existing businesses, whereas PE funds usually have no existing businesses linked directly to their stand-alone acquisitions. Along this line of argumentation, the existing literature suggests that PE funds generally do not benefit from (operational) synergies when acquiring a company. It argues that missing synergy opportunities are the reason for the price discounts enforced by PE funds in M&A transactions (see, e.g., Bargeron *et al.* (2008), Gorbenko and Malenko (2014)).

Strategic acquirers often seek to create operational synergies[1] between existing and newly acquired businesses. In light of such synergy gains, strategic acquirers are likely to pay a premium for their acquisition targets in contrast to PE buyers. In the medium to long term, they expect these premiums to amortize through cost reductions (e.g., production costs, overhead costs) and/or revenue increases that arise from the acquisitions. Instead, PE funds can create value at three different points in time: (i) when acquiring a portfolio company, (ii) when holding a portfolio company, or (iii) when selling a portfolio company. During the holding period, general partners or GPs (the fund managers of PE firms) create value for their funds' investors by improving operational performance (e.g., EBITDA increases) or by using a company's cash flow to repay its debt (which increases the equity stake) (see, e.g., Cumming *et al.* (2007)_ENREF_2_2, Achleitner *et al.* (2010), Axelson *et al.* (2013)). With respect to value creation before and after acquisitions, the existing literature has shown that PE funds positively influence returns by buying when multiples are low and by selling when multiples are high(er) (see, e.g., Guo *et al.* (2011), Puche *et al.* (2014)).

So far the finance literature has largely ignored the possibility that PE funds also create synergies through M&A transactions. Supplementing the literature, this paper focuses on so-called add-on transactions undertaken by PE funds and argues that there are takeover situations in which PE funds can also benefit from (operational) synergy gains. Add-on transactions occur when a PE

[1] In the following, we refer to *operational* synergies mostly as *synergies*.

portfolio company acquires – with the explicit financial and managerial backing of the underlying PE fund – another company to fuel further growth or to boost operational excellence. By analyzing acquisition prices in add-on acquisitions, we investigate whether PE funds pay the same price as strategic acquirers, ceteris paribus, for companies when they may also benefit from synergy gains. If the absence of synergy gains is in fact an explanation for PE discounts in M&A transactions, we would assume that PE discounts disappear in add-on acquisitions.

Based on 21,617 M&A transactions (including 16,241 strategic transactions and 5,376 PE transactions[2]), we compare the M&A performance of PE funds vs. strategic firms in acquisitions and divestments and focus specifically on add-on situations. The potential synergy gains resulting from these add-on acquisitions will directly impact the returns of PE funds. In line with related research, we use the actual deal-level enterprise value (EV)[3]/EBITDA multiples[4] to assess the acquisition performance of PE funds in comparison to strategic buyers/sellers (see, e.g., Wang (2012), Axelson *et al.* (2013)). The use of these deal multiples allows us to assess the M&A performance not only on the entry side but also on the exit side (i.e., at the sale of a portfolio company), and we can also extend our analysis to private (non-listed) M&A targets. In addition, deal multiples allow us to directly identify M&A performance by analyzing the exact transaction value paid rather than to indirectly identify it via abnormal stock returns in an event study (see, e.g., Bargeron *et al.* (2008)).

Controlling for target company and deal characteristics, we find, in line with the existing literature, that PE buyers do impose a discount when purchasing their portfolio companies relative to purchases by strategic buyers. In addition, we find evidence that the PE discount disappears with the prospect of synergy gains: in add-on acquisitions PE funds do not receive discounts and pay prices comparable to what other strategic acquirers would pay. We conclude that when PE funds identify the potential for a synergy gain, they are willing to pay the same synergy premium as strategic bidders. Our synergy-based argumentation also helps explain what we observe on the sell side: when PE funds sell to strategic acquirers, we observe neither a PE discount nor a premium, assuming that strategic acquirers typically expect to benefit from synergy gains, regardless of whether the seller is a PE or strategic firm. However, because PE funds sell at market values

[2] When referring to *PE transactions/deals*, we include add-on acquisitions of PE portfolio companies unless otherwise stated. To separate acquisitions *of* PE portfolio companies from acquisitions *by* PE portfolio companies, we refer to the former as *PE entry deals* and the latter as *PE add-on deals*.

[3] In the following, we use *EV* in the context of multiples and *enterprise value* when referring to the stand-alone (control) variable.

[4] In the following, we refer to *EV/EBITDA multiples* also as *deal multiples* or *transaction multiples*.

(and not at a discount), they are able to lock in the discount generated on the entry side. In secondary deals, however, acquirers (which are also PE funds) do not benefit from synergies. As a result, the PE discount prevails in such deals.

The existing literature often argues that comparing PE and strategic targets is problematic due to their fundamentally different characteristics (see, e.g., Bargeron *et al.* (2008), Fidrmuc *et al.* (2012), Axelson *et al.* (2013)). Our data support this argument, showing that PE funds and strategic acquirers target different companies. As a result, the choice of being acquired by a PE fund or a strategic acquirer is not exogenous. To absorb any confounding factors, we control for all relevant target company and deal characteristics that are typically the source of differences between PE and strategic deals according to the existing literature (target performance and accounting figures as well as deal characteristics).

We contribute to the existing financial literature by offering a synergy-related explanation for the observed PE discount in M&A transactions. By including takeover situations in our analysis, we observe that the PE discount disappears when PE funds have the opportunity to benefit from synergy gains. Additionally, we complement the existing literature by extending the empirical analysis both to private firms and to PE exits. For our analysis, we use a global data sample (North America, Western Europe, and the rest of the world), while most of the related literature focuses on US buyouts.

The remainder of this paper is organized as follows. Section 2 discusses the relevant literature. Section 3 outlines the potential for synergy gains through PE add-on acquisitions. Section 4 presents the sample and explains the methodology. Section 5 provides and discusses the empirical results. Section 6 concludes.

2 Literature Review

Our study relates to two strands of the M&A literature that focus on PE funds: (i) empirical studies that compare the M&A performance of PE buyers vs. that of strategic buyers, in particular in light of potential synergy gains and (ii) studies that use entry and exit EV/EBITDA multiples to investigate the determinants of pricing in buyout transactions. We will use the first strand to link our analysis to the discussion on the role of synergies in the pricing of PE transactions and the second strand to embed our methodology into existing empirical studies.

In the first strand of literature, studies such as Bargeron *et al.* (2008) document that public target shareholders receive significantly higher takeover premiums – controlling for deal characteristics – when a company is acquired by a public operating company instead of a PE fund. At the

same time, the premiums paid by public operating companies are not significantly higher than the premiums paid by private operating (non-listed, strategic) companies. The authors conclude from this that PE funds pay less for their targets as they cannot benefit from synergy gains. The premiums to target shareholders are defined as abnormal returns experienced over a period of time prior to the transaction date. Bargeron *et al.* (2008) further find that the pricing difference from PE buyers is highest for public firms with low managerial ownership. Gorbenko and Malenko (2014) focus on the behavior of strategic vs. PE bidders in auctions and show that a typical takeover target is valued higher when a strategic firm is buying. However, a more differentiated analysis reveals that this is not the case for all deals: in approximately one-fifth of all transactions, financial buyers are willing to pay a higher premium. These companies are typically mature and poorly performing. The same authors also reveal that the valuations of financial buyers are more correlated with overall economic conditions. They conclude that strategic buyers do not necessarily pay more with the prospect of synergy gains, but financial and strategic buyers target different types of companies. Fidrmuc *et al.* (2012) focus on the selling process of public companies and compare in this context PE funds and strategic acquirers. They show that the type of selling process (e.g., auctions) affects the buyer type (PE funds vs. strategic acquirers). Additionally, the authors outline that PE funds tend to acquire companies that have more tangible assets, lower market-to-book ratios, and lower research and development expenses. However, these target characteristics affect the buyer type only indirectly through the selling process. Controlling for the selling process, Fidrmuc *et al.* (2012) do not find any significant differences in the takeover premiums paid by PE funds and strategic acquirers.

The principal contribution of our study to this strand of literature is to show that the business model of PE funds does not generally oppose paying a premium for synergies. There are takeover situations (namely, add-on acquisitions) in which PE funds are willing to pay for potential synergy gains. So far add-on deals have largely been disregarded by the finance literature. We use the relative delta between strategic and buyout EV/EBITDA multiples actually paid in takeovers for the pricing assessment. Most studies apply an event-study approach using target (abnormal) stock returns as a measure to identify price discounts. The use of EV/EBITDA multiples allows us to extend the data sample to private (non-listed) targets and overcomes the downside of an event study. In an event study, the way the information of a transaction is revealed to the markets may impact the abnormal returns to target shareholders (see also Bargeron *et al.* (2008)).

In the second strand of literature, Axelson *et al.* (2013) demonstrate based on transaction multiples that the capital structure of buyout transactions impacts the prices paid by financial sponsors: higher leverage ratios drive entry multiples up and deal returns down. They also show that

the leverage of buyout deals is driven by debt market conditions: if credit is cheap and abundant, entry multiples for PE transactions tend to increase (see also Demiroglu and James (2010)). In a study focusing on the factors that drive entry and exit buyout valuations, Achleitner *et al.* (2011) show that EV/EBITDA levels have a significant impact on the performance of PE funds: multiple expansion (when exit deal multiples exceed entry deal multiples) correlates with the positive deal-level performance of the underlying fund. They Achleitner *et al.* (2011) further state that industry-specific public market valuations (measured by trading multiples) have a positive impact on buy-out pricing at entry. Reflecting on the different sources of value creation in buyout transactions, Guo *et al.* (2011) show that multiple expansion is as important as tax benefits as a driver of deal returns. The former accounts for up to 20% of overall value creation. In line with Achleitner *et al.* (2011), they also document a significant and positive correlation between changes in comparable strategic deal multiples and returns. In a more recent study, Puche *et al.* (2014) estimate that 15% of an investment's value creation is from multiple expansion. Wang (2012) uses deal multiples to show that secondary buyouts are priced higher than first-time buyouts, as debt market conditions are usually favorable (and market multiples are high) when PE funds engage in secondary buyouts. Also focusing on secondary buyouts, Arcot *et al.* (2015) find that PE funds that are under pressure to buy (e.g., as they have to spend their dry powder) are willing to pay higher multiples, whereas PE funds that are under pressure to sell (e.g., as they have reached the end of their lifecycles) tend to accept lower multiples.

This strand of the literature is the foundation for the methodological framework of our study, as we also use EV/EBITDA multiples for our pricing analysis. In that sense, we complement the existing literature by comparing the relative delta between strategic and buyout deal multiples with regard to premiums/discounts paid in takeover situations.

3 Introduction to Synergy Gains in PE Add-on Acquisitions

PE funds are believed to regard acquisition opportunities solely from a stand-alone perspective. According to the existing literature, funds do not seek operational synergy gains with buyout investments, as portfolio companies are typically not merged with one another (see, e.g., Bargeron *et al.* (2008)). Each portfolio company is treated on a stand-alone basis and remains legally independent. The impact of potential parenting effects between portfolio companies is limited and not comparable to the operational synergies from which strategic acquirers may benefit. In light of a near exit, PE funds focus more on financial improvements and operational excellence.

However, would the PE discount potentially disappear if PE funds also had the opportunity to benefit from synergy gains? We know that strategic acquirers incorporate (operational) synergies in their estimation of target future cash flows. This, in turn, affects their discounted-cash-flow analysis and results in higher company valuations, encouraging them to pay a higher price for potential target companies. Following this argumentation, PE funds would be willing to pay a higher price if they could also benefit from operational synergies after an acquisition.

Increasingly, PE fund managers can no longer rely on a buy-and-hold approach to create value for their investors. The PE landscape has become more competitive during the last few years. Low-hanging fruits like target companies with low leverage ratios, which are subsequently leveraged up and eventually sold to a third party with high profits, are rare. Nowadays, PE funds need to apply more diverse value creation strategies to generate the expected returns for their investors. In addition to enhancing the operational performance of their portfolio companies, PE fund managers also engage in add-on acquisitions in which the portfolio companies acquire other companies for strategic reasons. The underlying M&A process of such add-on acquisitions is either directly executed or closely accompanied by the PE funds that own the portfolio companies. In these deals, a PE fund's portfolio company acts as an acquirer that will eventually integrate the target company's operations into its existing business. Typically, these add-on acquisitions take place in the first one to three years of the holding period. In contrast to the initial acquisition of a portfolio company, PE funds may benefit from synergies in these add-on deals. The required equity to execute such add-on deals is provided by the PE funds. Some PE funds even follow explicit buy-and-build strategies in which portfolio companies are acquired to serve as platforms to facilitate multiple add-on investments.

Why are PE funds keen to engage in add-on investments? In fragmented industries, add-on investments can initiate consolidation processes, which will lead to higher margins and faster growth rates (through economics of scale). A further argument that explains the attractiveness of add-on investments is the positive correlation between transaction prices and a company's EBITDA figures: across industries, companies with higher EBITDAs are sold for higher valuation levels. Thus, if a PE fund is able to increase the EBITDA of its portfolio company significantly, it will be able to sell the company for a higher multiple. A PE fund can increase a portfolio company's EBITDA either through organic growth (by improving the operational performance or top-line growth) or inorganic growth (via add-on investments). Add-on acquisitions can also help portfolio companies to acquire future growth potential or even position the companies closer to higher-valued industries. Both the portfolio companies as well as the PE funds (as their parent companies) usually intend these acquisitions to be synergistic. If the lack of synergy potential is, indeed, an

explanation for PE discounts in M&A transactions, we would observe the PE discount decrease or completely disappear in add-on acquisitions.

4 Data and Methodology

4.1 Sample and statistics

We analyze the transaction pricing of a sample of 21,617 M&A deals, of which 5,376 are PE deals and 16,241 are strategic deals. We source our M&A transaction information from Capital IQ and Thomson One.[5] Overall, we obtain data for deals executed between January 1, 1985 and July 31, 2013. We follow the existing literature and remove deals with negative EV/EBITDA multiples (approximately 400 deals) to exclude restructuring cases from our PE and strategic deal sample (see also Achleitner *et al.* (2011)). We also delete real estate firms, financial institutions, and targets from the public services sector (approximately 800 deals) (see also Jenkinson *et al.* (2013)). In all PE deals, we ensure that financial sponsors only include PE funds and exclude other funds such as hedge funds (approximately 1,000 deals). We also exclude cancelled deals and deals that are announced but not completed (approximately 500 deals). Finally, we delete all repurchases and self-tenders (approximately 150 deals). Following this deal filter, we end up with our set of 5,376 PE deals along with 16,241 strategic deals.

Table 1 provides an overview of our data sample of 21,617 PE and strategic transactions.[6] In the PE deal sample, we include *2,347 entry deals (44% of all PE deals), 262 add-on deals (5%), 2,055 exit deals (38%), and 712 secondary deals (13%).*[7] *Entry deals* are deals in which a PE fund buys a target from a strategic seller (not from a PE fund). *Exit deals* are transactions in which a PE fund sells a target to a strategic buyer (not to a PE fund).[8] *Secondary deals* are a combination of entry and exit deals: a PE fund sells a portfolio company to another PE fund. We keep entry and

[5] PE-related information is derived from Thomson One and Capital IQ, whereas all of the 16,241 strategic deals are exclusively from Thomson One: sourcing our strategic deals from both Thomson One and Capital IQ would certainly strengthen the comparison with PE deals (as they are also sourced from Thomson One and Capital IQ). However, the M&A databases use proprietary keys; thus, the probability of including redundant deals when combining two databases with such a large number of deals is excessive. We assume that this is less of a problem for the smaller sample of PE deals. To ensure comparability between the two databases, we decompose all variables (e.g., EV/EBITDA multiples) into their individual components and ensure that their definitions are identical across the two databases.

[6] In unreported descriptive statistics, we list the characteristics of a broader sample of deals (which includes deals for which we have no deal multiples). The deal characteristics of this broader sample (almost 40,000 deals are comparable to the 21,617 deals of the sample that we use for our analysis.

[7] For the remainder of this paper, we include all four types of PE deals when referring to *PE deals* unless otherwise stated.

[8] To make our control group (strategic acquisitions) on the entry and exit sides comparable, we limit our sample on the exit side to trade sales only (and remove other exit types such as IPOs). As our analysis is based on relative prices, it would not be advisable to compare strategic trade sales with PE-backed IPOs because their exit processes are not comparable.

exit deals separate from secondary deals in all our regressions and do not mix them (a transaction in which a PE fund sells to another PE fund is not listed as an exit deal but as a secondary deal). Every *add-on deal* in our sample is conducted by a portfolio company that was previously acquired in one of the 2,347 entry deals or 712 secondary deals.[9] The portfolio companies conduct these acquisitions while they are owned by PE funds, which acquired the portfolio companies prior to the add-on acquisitions. We find 197 portfolio companies that engage in a total of 262 add-on acquisitions[10], of which 80% (209) occurred in the first three years after the acquirers were taken over by the PE funds. In technical terms, we manually link each add-on acquisition (which we obtain from a list of deals from Capital IQ and Thomson One) to the corresponding portfolio company in our PE deal database and control for the PE ownership and time: (i) the acquirer in the add-on acquisition must be one of the PE portfolio companies of the PE database, (ii) the ultimate parent of the add-on acquirer must be the PE fund that previously acquired this acquirer as a portfolio company, and (iii) the add-on acquisition must occur during the holding period of the portfolio company. In all of the add-on acquisitions that we yield, the acquiring portfolio companies operate in the same industries as their acquisition targets.[11] Thus, we assume that the portfolio companies can benefit from operational synergy gains following the add-on acquisitions.

Our deal spectrum comprises different industries, with consumer product transactions constituting the largest industry group in both PE and strategic deals (29% and 22%, respectively). North America is by far the largest market for both the PE industry (46% of all deals) and strategic acquisitions (40%). The vast majority of the deals (both PE and strategic) in our sample occur in developed markets, while emerging markets account for only 10% of PE deals and 14% of strategic deals. Most of the existing literature on PE pricing focuses on North America; only a few studies cover the same, broader geographic range as our study (see also Axelson *et al.* (2013)). Most of our PE and strategic deals are majority takeovers (75% and 88%, respectively). Both PE and strategic buyers have a friendly attitude in most deals (90% and 84%, respectively). The number of private targets (which are not listed on a stock exchange) is lower in our PE target group than in the strategic target group (62% vs. 84%). The listed portfolio companies that are sold in exit and secondary deals (1,128 and 389, respectively) are sold in so-called partial exits: they are partially listed on a stock exchange and partially held (and sold) by PE funds. These transactions are of particular interest because they are often deemed to be proprietary deals (transactions with no competition from a third bidder), while public transactions are rarely regarded as proprietary deals

[9] The majority of portfolio companies (75%) were acquired from strategic sellers in PE entry deals.
[10] For some portfolio companies, we find more than one add-on acquisition.
[11] Industries are defined based on NAIC and SIC codes (see also Madura *et al.* (2012)).

due to specific disclosure requirements. PE fund managers often argue that transaction prices are lower in proprietary deal situations than in deals with several bidders and are therefore particularly attractive from a pricing perspective. A total of 27% of our PE deals are club deals, in which two or more parties collaborate to acquire a target firm.

The deal characteristics of add-on deals are generally comparable to the characteristics of the other PE deals. The share of North American deals is slightly smaller, and emerging market deals are more common in the add-on subsample.

[Insert Table 1 about here]

The existing M&A research shows that the nature of acquisitions varies significantly with respect to transaction and financial characteristics. As outlined above, PE and strategic acquirers tend to bid for different types of target companies (Gorbenko & Malenko 2014). According to Fidrmuc *et al.* (2012), target profitability (although often negative) and total assets are significantly larger in PE deals, whereas transaction values are only slightly larger. Other deal characteristics that differ between PE and strategic targets are the takeover type (majority/minority), the deal attitude (friendly/hostile), and the target status (listed/private) (see, e.g., Flanagan and O'Shaughnessy (2003), Bargeron *et al.* (2008)). Table 2 shows that our data support the existing literature: PE deals differ significantly in terms of their deal characteristics (most noticeably, deal multiples, enterprise values, and EBITDAs).

It is important for our analysis to mitigate the endogeneity concern, which arises from the differences shown in Table 2: the differences suggest that PE funds only target certain types of targets. Consequently, we include several company-specific control variables in our multivariate analysis to ensure that we assess the M&A performance of PE vs. strategic acquirers on the basis of comparable takeover candidates. The outliers in our sample explain why mean and median figures differ significantly for some of the characteristics. To control for these outliers, we winsorize all continuous deal characteristics at the 1% significance level in our regressions. Following the financial literature on M&A transactions, we also control for target industry, target country, and deal year (see, e.g., Madura *et al.* (2012)).

[Insert Table 2 about here]

Table 3 follows the same methodology as Table 2, but it compares the 262 add-on acquisitions undertaken by 197 different PE portfolio companies with the 197 initial PE deals (i.e., the transactions in which the portfolio companies were acquired by the PE funds). This allows us to

make a direct comparison between initial PE deals (entry/secondary deals)[12] (in which no synergy gains are expected) and PE add-on deals (in which synergy gains can be expected). According to Table 3, there are few but significant differences between the company characteristics of the initial PE deals and the subsequent add-on deals. Differences in terms of deal multiples, enterprise value, transaction value, EBITDA margin, and 3-year net sales growth are (nearly) insignificant. EBITDA, leverage, and total assets are larger in PE deals, while return on assets (i.e., profitability) of the acquisition targets in add-on acquisitions are larger. The table suggests that it is important to control for company-specific variables in the multivariate comparison of deal multiples of entry, secondary, and add-on deals to absorb confounding factors.

[Insert Table 3 about here]

4.2 Benchmarking of M&A deals (PE vs. strategic firms)

To compare PE deals with transactions undertaken by strategic acquirers, we first apply a univariate comparison based on a benchmark approach. We match each PE deal to a peer group of M&A transactions that are undertaken by strategic acquirers and compare their relative prices. Accurate benchmarking is vital for the credibility of our findings. Thus, to ensure comparability, we construct the individual peer groups for each PE deal according to matching criteria. The benchmark for each PE deal then consists of a set of strategic deals that matches the following four criteria:

1) Same deal year
2) Same target country
3) Same type of market (developed vs. emerging)
4) Same target industry (consumer products, energy, healthcare, industrials, materials, technology, and telecommunications, based on NAIC and SIC codes[13]).

In the subsequent multivariate analysis, we control for target and deal characteristics that affect pricing and the probability that a transaction is a PE deal. However, this univariate benchmarking process already gives us initial insight into whether PE funds, indeed, pay/receive less/more for the companies they acquire/sell (for both initial PE deals and add-on deals) compared with strategic players: Figure 1 shows that PE funds tend to buy cheaper than their respective strategic peers in entry deals (Figure 1A) and to a lesser extent also in secondary deals (Figure 1D)

[12] An unreported analysis shows that the target characteristics of the 197 PE entry deals and our larger sample of 2,347 entry deals do not differ significantly.

[13] See also Madura *et al.* (2012).

(over the time period 2000 to 2013). There is no observable pattern showing that PE funds pay lower premiums than strategic firms in add-on acquisitions (Figure 1B). To the same extent, there is no visible trend that PE funds sell their portfolio companies to strategic firms at higher valuations than do their strategic counterparts in exit deals (Figure 1C). The number of PE deals (all four types) peaked in 2007 (before the financial crisis) and has decreased since.[14] Only secondary deals seem to have further increased in number (with the exception of the financial crisis in 2009). In unreported robustness tests, we validate our benchmarking methodology by modifying the set of benchmarking criteria: (i) we add a 6-month time-smoothing factor – i.e., a deal in October 2010 would account for 8 months in 2010 and 4 months in 2011 – and (ii) include the enterprise value (with a transition corridor of +/- 50%) in addition to the four existing criteria. Both tests yield the same results as our principal benchmarking method.

[Insert Figure 1 about here]

4.3 Regression model

We use an OLS-based regression model with various control variables to conduct the required analysis that answers our research question:

$$log(M) = \beta_0 + \beta_1 \cdot PE + \beta_2 \cdot CV + \alpha_I + \alpha_C + \alpha_T + \varepsilon, \qquad (4.1)$$

where *log(M)* is the log[15] of the EV/EBITDA multiple (see also Achleitner *et al.* (2011)). The independent variable is the dummy *PE*, which is zero for strategic deals and one for PE deals. We are interested in the price discount of each individual PE deal type in comparison to a benchmark group of strategic deals; the regressions are performed separately for the PE deal types entry, add-on, exit, and secondary deals. In further regressions, we create subsamples of the target and deal characteristics to investigate the individual effects of these characteristics on pricing. In all our regressions, the vector of control variables CV refers to the seven target and deal control variables: enterprise value, EBITDA margin, return on assets (ROA), leverage, takeover type (majority/minority), deal attitude (friendly/hostile), and target status (listed/private).[16] In separate regressions, we add a control variable for 3-year net sales growth; we lose approximately 20% of our observations when including this variable. We control for this large group of variables to ensure that our results are not biased by the composition of our deal sample or by the acquirer type (see, e.g.,

[14] 2013 only includes deals until July 31.

[15] We logarithmize the deal multiples, as we observe that they are highly skewed (see also Achleitner *et al.* (2011)).

[16] Please refer to Appendix 1 for a detailed definition of each of the seven characteristics.

Gorbenko and Malenko (2014)). To further mitigate concerns that our results are driven by factors unrelated to our independent variables, we include fixed effects for target industry (α_I), target country (α_C), and deal year (α_T). β_n represents the coefficients, and ε, which is normally distributed, is the standard error.

We use propensity score matching (Kernel matching) as a robustness test of equation 4.1 (see Appendix 5).[17] Kernel matching is a proximity search that takes a treated unit (a PE deal) and matches it with a weighted propensity score average of all controls (strategic deals) based on their characteristics. The closer the propensity score of a control unit to the treated unit, the higher its weighting is. In our analysis, we explicitly restrict the matching to observations in the region of common support. For the matching, we use the same target and deal characteristics and fixed effects as in equation 4.1. Regressions also control for confounders, but they give greater weighting to observations of the control sample that are less relevant due to their characteristics. In equation 4.1, we consecutively compare smaller groups of PE deals with a sample of 16,241 strategic M&A transactions. In the case of add-on acquisitions, the sample of strategic deals is 62 times larger than the group of PE deals (16,241 vs. 262). This raises concerns that many of the observations in the strategic sample (control sample) are not relevant for the PE sample; matching is a useful tool to overcome this concern.

5 Empirical Results

In our multivariate analysis, we segment our total PE deal sample into four subsamples: PE entry deals, PE add-on deals, PE exit deals, and PE secondary deals (see Table 4). Each subsample is separately combined with the sample of strategic transactions to control for pricing differences based on the deal multiples paid in the transactions. The results of Table 4 confirm our preliminary findings of the univariate analysis presented in Figure 1. We see that multiples are, indeed, generally significantly lower in PE *entry deals* than in comparable strategic deals. Controlling for company- and deal-specific characteristics[18], PE funds pay, on average, significantly less for a comparable company when buying from a strategic seller than do their strategic peers (Column 1). We

[17] In their early work, Rosenbaum and Rubin (1983) introduce propensity score matching as a means to reduce the bias in the estimation of treatment effects with observational datasets. Matching is beneficial in situations when the effect of the treatment may be biased by the existence of treated-specific characteristics. It proposes summarizing the target and deal characteristics (pretreatment characteristics) of each deal into a single-index variable: the propensity score p(X). Rosenbaum and Rubin (1983) define the propensity score as the conditional probability of receiving a treatment (i.e., being an add-on acquisition) given the pretreatment (target and deal) characteristics.

[18] In unreported regressions, we replace the control variable *enterprise value* with *total assets*. The results remain stable.

obtain a significant discount of approximately 20%. This result remains significant when we include 3-year net sales growth as a control variable, although the economic magnitude decreases (Column 2). The existing literature finds even more extreme results: based on stock market returns, Bargeron *et al.* (2008) state that publicly listed strategic acquirers pay a 63% premium over PE funds and a 14% premium over private operating firms.

In Columns 3 and 4, we observe that in the case of add-on deals, the PE discount vanishes: portfolio companies of PE funds that acquire targets for strategic reasons do not pay significantly lower prices compared with other strategic M&A transactions (which are not backed by PE funds) conducted in the same time period. We conclude from these findings that in light of potential synergy gains, PE funds are willing to pay comparable prices as strategic buyers. In an add-on acquisition, the very same PE fund that acquired the initial portfolio company at a discount is willing to pay the same price for a target as the strategic acquirers are. In an unreported analysis, we find evidence that the deal multiples of the 262 add-on deals are significantly higher in relative terms than the multiples of the 197 entry and secondary deals in which the portfolio companies were originally acquired. One may argue that the observed PE discount of the subset of 197 portfolio companies is not representative of the larger PE deal sample used in the analysis in Columns 1 and 2. In a robustness test, we therefore check whether the discount observed for this subset of 197 initial PE deals is representative of the larger sample (Appendix 2): we compare the 197 PE deal multiples with the deal multiples of the large sample of strategic deals and find, in line with our results of Columns 1 and 2 in Table 4, that these PE funds also pay less for their targets than do strategic acquirers (approximately 20% vs. 20% and 12% in Columns 1 and 2, respectively).

The results that we find for *PE exit deals* further support our synergy-related explanation for the PE discount that we observe in entry deals. We find no empirical evidence for a price difference between exit deals and strategic deals (Columns 5 and 6): when controlling for deal- and company-related control variables, the significance of our PE dummy variable disappears. In addition, the economic magnitude is close to zero. Thus, PE acquirers pay a discount when initially acquiring a portfolio company but do not sell their portfolio companies to third parties for a higher price than what is observed in comparable strategic acquisitions. In exit deals, the counterparties of the PE funds are strategic acquirers that are willing to pay for future synergies (through a premium), regardless of whether they buy from PE funds or from strategic companies.[19]

[19] One may argue that the exit multiples are biased downward compared with strategic multiples, as PE funds are time-constrained with respect to when they have to sell their portfolio companies. Our data suggest that this is not the case: the average lifetime of PE funds is 10 to 12 years, with an investment period in the first one to five years followed by a divestment period of two to seven years. If multiples were biased, we would expect PE funds to sell their portfolio companies with a discount relative to strategic firms, which we do not observe. Moreover, PE funds

We run separate regressions for *secondary deals* (in which both the acquisition and sales parties are PE funds) and show that discounts prevail (Column 7), though they become insignificant when we control the target companies' growth capabilities (Column 8). The implication is that PE funds buy cheaper than strategic firms independently of who they buy from. In other words, buying parties in secondary deals do not expect synergy gains and are therefore not prepared to pay the same premiums as strategic acquirers. From a sell-side perspective, PE funds should therefore prefer to sell their assets to strategic acquirers as they will then receive (part of) the corresponding value of potential synergy gains through transaction premiums.

Appendix 3 shows that there are no specific firm- or fund-specific characteristics that drive the PE discount in entry deals; except for the fact that larger fund values drive discounts down. No firm or fund characteristics help PE firms and their funds to be especially successful in acquiring portfolio companies for a comparably low deal multiple. In addition, we find evidence that the PE discount is not correlated with the total funds raised by PE firms: Appendix 4 lists 10 top-tier PE firms (according to the total funds raised in the last 10 years[20]) and shows that only TPG Capital, Apax Partners, and Apollo Global Management achieve larger PE discounts than the average PE firm (the threshold is 18%) in entry deals. However, on average, top-tier PE firms still pay lower transaction prices for their target companies than do strategic acquirers (14% lower). Unreported regressions show that the PE discount is highly significant in North America and Western Europe, while it is weaker in the rest of the world (but still significant at the 10% level). A possible explanation is that strategic acquirers see less potential for synergy gains in less developed regions (most of the rest-of-the-world group in our database is part of the emerging market world).

As outlined above, we replicate the analysis reported in Table 4 in a propensity score matching framework (Appendix 5). The matching shows that PE discounts persist in entry and secondary deals, and we even find evidence for PE premiums in exit deals. The economic magnitude of our findings is also similar to that of the findings in Table 4. For secondary and exit deals, our results lose significance when we control for 3-year net sales growth, which is also in line with Table 4. Importantly, the pricing difference of add-on deals and strategic deals remains insignificant.

[Insert Table 4 about here]

are also confronted with a limited time frame when purchasing their companies during the investment period – but they still manage to buy their portfolio companies at a discount.

[20] This definition of top-tier PE firms is in line with the existing literature (see, e.g., Leslie and Oyer (2008)).

In Table 5, we investigate whether the observed pricing pattern in Table 4 is robust for different levels of target and deal characteristics: we construct subsamples of PE and strategic deals based on below- and above-median values[21] (for continuous variables) or on binary characteristics (for categorical variables). This analysis does not allow us to compare coefficient sizes between subsamples but it does allow us to determine the subsets of deals in which our results are strong or weak. Our results show that the discount in *entry* deals loses significance when the 3-year net sales growth is above median; however, the differences remain insignificant for add-ons (Table 5D). Overall, the pricing difference between *add-on* deals and strategic deals seems largely insignificant no matter the subsamples of target and deal characteristics in Table 5. However, PE funds and their portfolio companies seem to value targets with low leverage less than strategic acquirers in add-on deals (Table 5E). PE funds and strategic acquirers seem to value targets with high 3-year net sales growth more similarly. Interestingly, the economic magnitude of the *entry* deal discounts in minority takeovers is only approximately 10% (vs. 20% in the full sample) (Table 5F). Also, in *secondary* deals, we lose significance when the acquisition is a minority takeover. An explanation for this can be that strategic acquirers expect limited potential for synergy gains in minority transactions. In addition, we also lose significance in hostile bids (Table 5G), in both *entry* and *secondary* deals. In a hostile transaction, the relative delta between PE funds and strategic acquirers diminishes, and higher pricing pressure rests with the PE funds to complete the transaction. In contrast to most of the existing literature, our empirical set-up makes it possible to include private (non-listed) companies in the analysis. Controlling for target status (listed vs. private targets), we observe that the PE discount on the *entry* side does not hold for private (non-listed) companies (34% of all PE deals) (see Table 5H). We believe that this finding is in line with Bargeron *et al.* (2008), who find that the differences between the prices paid by private bidders and public bidders decrease the higher the (managerial) ownership of public bidders is. We apply this argumentation to the sell side and assume that managerial ownership should also impact price negotiations when selling a company to a PE fund. We argue that managerial ownership tends to be higher in private (non-listed) companies (e.g., family businesses). In addition, we assume stricter corporate governance policies in target companies that are part of multinational corporations. In both cases, owners are incentivized to actively steer the selling process of their companies and they will try to push for higher prices in sales to PE funds. Public targets without this managerial support, in turn, are sold for relatively lower prices.

[21] The median of PE target firms according to our data.

[Insert Table 5 about here]

Our empirical results suggest to the sell-side parties in M&A transactions that they should pay attention which PE funds to sell to. PE funds that are buying a target company in the context of an add-on acquisition for an existing portfolio company are likely to pay more for their target than PE funds that are buying a target on a stand-alone basis. The prospect of synergy gains allows the PE funds to pay a premium for their targets, as they can expect these premiums to amortize through cost reductions. As a result, for parent companies, selling to a PE fund that engages in an add-on acquisition is like selling to a strategic acquirer. In both cases, the seller earns on average 20% more (see Table 4) than when selling to a PE fund that has no prospect of synergy gains.

Why do PE funds manage to complete any investments in portfolio companies if they are typically not willing to compete with the prices offered by strategic acquirers (with the exception of add-on situations)? Gorbenko and Malenko (2014) disagree with the notion that strategic acquirers (and portfolio companies in add-on acquisitions) are systematically willing to pay more just because of synergies. According to them, different types of bidders may ascribe different values to different targets. They assert that financial bidders value some targets even higher than do strategic acquirers (mature, poorly performing companies); even in stand-alone investments. It is certainly fair to claim that there are targets in which mainly financial bidders are interested in investing. In addition, there are times when PE funds find it easier to finance their deals (Ivashina & Kovner 2011). In these cases, PE funds are often the only bidders. Additionally, there are situations in which the transaction price is not the most significant criterion for a deal to occur: when a party only sells a part of its shares, it may be interested in securing the participation of a PE fund rather than a competitor, even if doing so means that it has to accept a discount in the selling price. With our target and deal characteristics, we believe that we control for the different deal parameters that impact pricing.

6 Conclusion

In our paper, we find that synergies help to explain the PE price discount (the difference with what strategic acquirers pay) in M&A situations: when a PE fund acquires a portfolio company on a stand-alone basis, the PE investor typically does not benefit from synergies and therefore does not pay a synergy premium (hence, the price discount in comparison to strategic acquirers). We document that the PE discount diminishes in the acquisition of private (non-listed) firms and also find that managerial ownership (governance) is more concentrated in private firms, which leads to higher valuation levels to the benefit of a sell-side party. Importantly, we observe that the

price discount disappears when a PE fund can benefit from synergy gains in so-called add-on transactions. In exit deals (when portfolio companies are sold to strategic acquirers) all potential acquirers are willing to pay a premium for synergies. Therefore, we do not observe a price difference between strategic and PE sellers in such deals. Synergies are also the reason why PE discounts exist in secondary deals. Buyers (other PE funds) in these deals typically do not benefit from synergies and are therefore not willing to pay as much as strategic acquirers for comparable targets.

Our analysis extends the literature on the PE pricing puzzle in M&A transactions and further explores the impact of synergies on M&A pricing. The results are consistent for all PE fund- and PE firm-specific characteristics and also for top-tier and non-top tier PE firms.

References

Achleitner, A.-K., Braun, R., Engel, N., 2011. Value creation and pricing in buyouts: Empirical evidence from Europe and North America. Review of Financial Economics 20, 146-161

Achleitner, A.K., Betzer, A., Goergen, M., Hinterramskogler, B., 2010. Private equity acquisitions of continental European firms: the impact of ownership and control on the likelihood of being taken private. European Financial Management 19, 72-107

Arcot, S., Fluck, Z., Gaspar, J.-M., Hege, U., 2015. Fund managers under pressure: Rationale and determinants of secondary buyouts. Journal of Financial Economics 115, 102-135

Axelson, U., Jenkinson, T., Strömberg, P., Weisbach, M.S., 2013. Borrow cheap, buy high? The determinants of leverage and pricing in buyouts. The Journal of Finance 68, 2223-2267

Bargeron, L.L., Schlingemann, F.P., Stulz, R.M., Zutter, C.J., 2008. Why do private acquirers pay so little compared to public acquirers? Journal of Financial Economics 89, 375-390

Cumming, D., Siegel, D.S., Wright, M., 2007. Private equity, leveraged buyouts and governance. Journal of Corporate Finance 13, 439-460

Demiroglu, C., James, C.M., 2010. The role of private equity group reputation in LBO financing. Journal of Financial Economics 96, 306-330

Fidrmuc, J.P., Roosenboom, P., Paap, R., Teunissen, T., 2012. One size does not fit all: Selling firms to private equity versus strategic acquirers. Journal of Corporate Finance 18, 828-848

Flanagan, D.J., O'Shaughnessy, K.C., 2003. Core-related acquisitions, multiple bidders and tender offer premiums. Journal of Business Research 56, 573-585

Gorbenko, A.S., Malenko, A., 2014. Strategic and financial bidders in takeover auctions. The Journal of Finance 69, 2513-2555

Guo, S., Hotchkiss, E.S., Song, W., 2011. Do buyouts (still) create value? The Journal of Finance 66, 479-517

Ivashina, V., Kovner, A., 2011. The private equity advantage: Leveraged buyout firms and relationship banking. Review of Financial Studies 24, 2462-2498

Jenkinson, T., Sousa, M., Stucke, R., 2013. How fair are the valuations of private equity funds? Available at SSRN 2229547

Leslie, P., Oyer, P., 2008. Managerial incentives and value creation: Evidence from private equity. National Bureau of Economic Research

Madura, J., Ngo, T., Viale, A.M., 2012. Why do merger premiums vary across industries and over time? The Quarterly Review of Economics and Finance 52, 49-62

Puche, B., Braun, R., Achleitner, A.K., 2014. International Evidence on Value Creation in Private Equity Transactions. Available at SSRN 2496899

Rosenbaum, P.R., Rubin, D.B., 1983. The central role of the propensity score in observational studies for causal effects. Biometrika 70, 41-55

Wang, Y., 2012. Secondary buyouts: Why buy and at what price? Journal of Corporate Finance 18, 1306-1325

Tables and Figures

Table 1: Deal summary statistics

Table 1 reports the summary statistics for all 21,617 private equity (PE) and strategic deals between 01/01/1985 and 07/31/2013 in our sample. PE deals include entry deals, add-on deals, exit deals, and secondary deals. The total sample comprises realized M&A deals with positive EV/EBITDA multiples. Deals by industry are a combination of SIC codes, NAIC codes, and overall company business descriptions (real estate firms, financial institutions, and targets from the public services sector are excluded). Developed and emerging markets are grouped based on the FTSE country classification. Majority takeovers are deals in which the acquirer purchased at least 51% of the target. Friendly takeovers are deals in which the deal attitude is flagged as *friendly*. Listed targets are deals in which the target companies are publicly listed in one or more stock exchanges. Club deals are deals with at least two PE funds on the buyer and/or seller side. See Appendix 1 for variable definitions.

	PRIVATE EQUITY (PE)						**STRATEGIC**		**PE & STRAT.**	
	ENTRY	**ADD-ON**	**EXIT**	**SEC.**	**TOTAL**	***(TOTAL)***	**TOTAL**	***(TOTAL)***	**TOTAL**	***(TOTAL)***
DEALS	**2,347**	**262**	**2,055**	**712**	**5,376**	***(100%)***	**16,241**	***(100%)***	**21,617**	***(100%)***
share of total PE deals	44%	5%	38%	13%						
DEALS BY INDUSTRY										
Consumer products	797	52	463	244	1,556	*(29%)*	3,633	*(22%)*	5,189	*(24%)*
Energy	144	24	188	34	390	*(7%)*	1,997	*(12%)*	2,387	*(11%)*
Healthcare	198	17	256	64	535	*(10%)*	1,115	*(7%)*	1,650	*(8%)*
Industrials	474	65	349	181	1,069	*(20%)*	2,682	*(17%)*	3,751	*(17%)*
Materials	207	27	149	48	431	*(8%)*	2,284	*(14%)*	2,715	*(13%)*
Technology	341	47	534	107	1,029	*(19%)*	2,474	*(15%)*	3,503	*(16%)*
Telecommunications	186	30	116	34	366	*(7%)*	2,056	*(13%)*	2,422	*(11%)*
DEALS BY REGION										
North America (NA)	979	100	1,135	270	2,484	*(46%)*	6,463	*(40%)*	8,947	*(41%)*
Western Europe (WE)	609	97	375	322	1,403	*(26%)*	4,023	*(25%)*	5,426	*(25%)*
Rest of world (RoW)	759	65	545	120	1,489	*(28%)*	5,755	*(35%)*	7,244	*(34%)*
MARKET TYPE										
Developed markets (DM)	2,053	220	1,884	656	4,813	*(90%)*	14,032	*(86%)*	18,845	*(87%)*
Emerging markets (EM)	294	42	171	56	563	*(10%)*	2,209	*(14%)*	2,772	*(13%)*

Table 1: Deal summary statistics (continued)

	PRIVATE EQUITY (PE)						STRATEGIC		PE & STRAT.	
	ENTRY	ADD-ON	EXIT	SEC.	TOTAL	*(TOTAL)*	TOTAL	*(TOTAL)*	TOTAL	*(TOTAL)*
MAJORITY TAKEOVERS										
Yes	1,643	181	1,673	513	4,010	*(75%)*	14,222	*(88%)*	18,232	*(84%)*
No	539	61	382	163	1,145	*(21%)*	2,019	*(12%)*	3,164	*(15%)*
Unknown	165	20	-	36	221	*(4%)*	-	*(0%)*	221	*(1%)*
FRIENDLY TAKEOVERS										
Yes	2,030	222	1,955	642	4,849	*(90%)*	13,576	*(84%)*	18,425	*(85%)*
No	150	30	97	34	311	*(6%)*	2,611	*(16%)*	2,922	*(14%)*
Unknown	167	10	3	36	216	*(4%)*	54	*(0%)*	270	*(1%)*
LISTED TARGETS										
Yes	1,725	106	1,128	389	3,348	*(62%)*	13,585	*(84%)*	16,933	*(78%)*
No	451	156	924	287	1,818	*(34%)*	2,570	*(16%)*	4,388	*(20%)*
Unknown	171	-	3	36	210	*(4%)*	86	*(1%)*	296	*(1%)*
CLUB DEALS										
Yes	366	n/a	712	289	1,367	*(27%)*	n/a		1,367	(27%)
No	1,981	n/a	1,343	423	3,747	*(73%)*	n/a		3,747	(73%)

Table 2: Target company statistics for PE and strategic deals

Table 2 compares key transaction information and financial statement information for the target companies in our database (entry, add-on, exit, secondary, and strategic deals). All statistics are at deal announcement and are winsorized at the 1% level. The EBITDA margin is the ratio of EBITDA to net sales. Return on assets is the ratio of total income to total assets. 3-year net sales growth is the sales growth of the 3 years prior to the acquisition. Leverage is the ratio of total debt to enterprise value. The financial statement statistics are as of the last twelve months. All transaction statistics and the EBITDA, EBITDA margin, leverage, and total assets include positive figures only. We perform a t-test on the mean difference between PE entry, add-on, and exit deals with peer group deals. In the *Difference to strategic (t-test)* column *, **, and *** indicate p-values at the 10%, 5%, and 1% significance level, respectively. See Appendix 1 for variable definitions.

ENTERPRISE VALUE/ EBITDA MULTIPLE	**Observations**	**Mean**	***Difference to strategic (t-test)***	**Median**	**Std Dev**	**p5**	**p95**
PE Entries	2,347	15.1	***	8.4	31.5	2.9	40.3
PE Add-ons	262	16.4	**	9.0	32.0	3.4	49.0
PE Exits	2,055	20.8		11.3	32.6	3.8	67.8
PE Secondaries	712	12.9	***	9.2	22.6	4.0	25.8
Strategic	16,241	21.2		10.0	42.6	2.7	72.5
Total	21,617	20.2		9.9	40.2	2.8	66.6

ENTERPRISE VALUE (USD mn)	**Observations**	**Mean**	***Difference to strategic (t-test)***	**Median**	**Std Dev**	**p5**	**p95**
PE Entries	2,346	987	**	227	2,639	11	3,786
PE Add-ons	260	1,665	*	167	4,797	13	9,785
PE Exits	2,055	896	***	230	2,341	16	3,513
PE Secondaries	711	963	**	386	1907.0	28	3447
Strategic	16,241	1,127		170	3,010	8	5,504
Total	21,613	1,091		189	2,882	9	5,002

TRANSACTION VALUE (USD mn)	**Observations**	**Mean**	***Difference to strategic (t-test)***	**Median**	**Std Dev**	**p5**	**p95**
PE Entries	2,337	482		98	1,187	2	2,265
PE Add-ons	222	469		73	1,433	5	1,304
PE Exits	2,053	607	***	189	1,237	10	2,765
PE Secondaries	702	697	***	264	1218.7	12	2709
Strategic	16,238	476		56	1,319	2	2,506
Total	21,552	496		80	1,295	2	2,533

EBITDA (USD mn)	**Observations**	**Mean**	***Difference to strategic (t-test)***	**Median**	**Std Dev**	**p5**	**p95**
PE Entries	2,316	109		26	279	1	459
PE Add-ons	257	169	*	20	495	1	1,026
PE Exits	2,016	85	***	18	251	1	320
PE Secondaries	691	96	*	42	186.8	3	327
Strategic	16,241	110		16	308	1	526
Total	21,521	108		18	296	1	487

EBITDA MARGIN (%)	**Observations**	**Mean**	***Difference to strategic (t-test)***	**Median**	**Std Dev**	**p5**	**p95**
PE Entries	2,126	16.5		13.1	13.6	2.4	44.1
PE Add-ons	254	18.2		14.3	15.8	2.4	57.7
PE Exits	2,007	18.0	***	14.1	14.8	2.2	51.6
PE Secondaries	650	17.6		14.6	13.0	3.4	42.8
Strategic	16,069	16.8		11.9	15.5	1.8	51.3
Total	21,106	16.9		12.4	15.2	1.9	50.7

Table 2: Target company statistics of PE and strategic deals (continued)

RETURN ON ASSETS (%)	Observations	Mean	*Difference to strategic (t-test)*	Median	Std Dev	p5	p95
PE Entries	1,948	4.0		4.1	10.9	-13.1	19.3
PE Add-ons	228	9.4	***	8.2	11.7	-4.8	35.5
PE Exits	1,726	3.4	***	3.8	11.4	-13.0	19.1
PE Secondaries	521	4.0		3.6	8.5	-8.1	15.4
Strategic	16,056	4.2		3.8	10.2	-10.3	19.1
Total	20,479	4.1		3.9	10.3	-10.7	19.1

3-YR NET SALES GROWTH (%)	Observations	Mean	*Difference to strategic (t-test)*	Median	Std Dev	p5	p95
PE Entries	883	21.5		9.6	43.9	-12.8	100.8
PE Add-ons	57	21.6		6.3	46.8	-4.6	97.5
PE Exits	263	16.8		8.3	38.8	-15.1	66.1
PE Secondaries	87	10.2	***	8.4	19.4	-21.3	38.7
Strategic	13,616	19.1		9.2	40.8	-14.7	82.2
Total	14,906	19.1		9.2	40.9	-14.7	82.4

LEVERAGE (%)	Observations	Mean	*Difference to strategic (t-test)*	Median	Std Dev	p5	p95
PE Entries	1,824	31.2		23.1	30.1	0.0	87.2
PE Add-ons	215	24.2	***	17.9	23.9	0.0	72.1
PE Exits	1,681	22.4	***	16.0	24.2	0.0	68.4
PE Secondaries	516	30.1		26.5	26.7	0.0	81.2
Strategic	13,870	30.5		22.3	29.2	0.5	90.0
Total	18,106	29.8		21.9	28.9	0.2	87.7

TOTAL ASSETS (USD mn)	Observations	Mean	*Difference to strategic (t-test)*	Median	Std Dev	p5	p95
PE Entries	1,962	950		210	2,580	14	3,663
PE Add-ons	229	1,632	*	173	4,263	12	10,239
PE Exits	1,760	714	***	151	2,137	12	2,696
PE Secondaries	522	870		313	1909.3	30	3128
Strategic	16,112	950		151	2,603	6	4,498
Total	20,585	936		161	2,549	7	4,250

Table 3: Target company statistics of add-on acquisitions

Table 3 follows the same logic as Table 2, but it compares the key target transaction information and financial statement information of the 197 PE entry and secondary deals for which we find add-on deals with the key transaction information and financial statement information of exactly these 262 add-on deals.

ENTERPRISE VALUE/ EBITDA MULTIPLE	Observations	Mean	*Difference entries and add-ons (t-test)*	Median	Std Dev	p5	p95
PE Entries & Sec. (subsample)	197	17.4		9.2	44.6	2.9	36.3
PE Add-ons	262	16.4		9.0	32.0	3.4	49.0
Total	459	16.8		9.1	37.9	3.2	45.7
ENTERPRISE VALUE (USD mn)	**Observations**	**Mean**	***Difference entries and add-ons (t-test)***	**Median**	**Std Dev**	**p5**	**p95**
PE Entries & Sec. (subsample)	197	2,561	*	433	5,533	32	21,288
PE Add-ons	260	1,665		167	4,797	13	9,785
Total	457	2,052		257	5,141	17	16,091
TRANSACTION VALUE (USD mn)	**Observations**	**Mean**	***Difference entries and add-ons (t-test)***	**Median**	**Std Dev**	**p5**	**p95**
PE Entries & Sec. (subsample)	197	687		117	1,532	3	4,037
PE Add-ons	222	469		73	1,433	5	1,304
Total	419	571		98	1,482	4	3,335
EBITDA (USD mn)	**Observations**	**Mean**	***Difference entries and add-ons (t-test)***	**Median**	**Std Dev**	**p5**	**p95**
PE Entries & Sec. (subsample)	196	285	**	47	580	3	1,903
PE Add-ons	257	169		20	495	1	1,026
Total	453	219		30	536	2	1,250
EBITDA MARGIN (%)	**Observations**	**Mean**	***Difference entries and add-ons (t-test)***	**Median**	**Std Dev**	**p5**	**p95**
PE Entries & Sec. (subsample)	196	16.2		13.6	12.2	2.5	38.9
PE Add-ons	254	18.2		14.3	15.8	2.4	57.7
Total	450	17.3		13.9	14.3	2.5	44.6
RETURN ON ASSETS (%)	**Observations**	**Mean**	***Difference entries and add-ons (t-test)***	**Median**	**Std Dev**	**p5**	**p95**
PE Entries & Sec. (subsample)	179	3.8	***	3.9	7.4	-6.1	13.8
PE Add-ons	228	9.4		8.2	11.7	-4.8	35.5
Total	407	6.9		5.8	10.4	-5.5	24.8
3-YR NET SALES GROWTH (%)	**Observations**	**Mean**	***Difference entries and add-ons (t-test)***	**Median**	**Std Dev**	**p5**	**p95**
PE Entries & Sec. (subsample)	197	9.2	*	0.0	35.4	-4.6	55.4
PE Add-ons	57	21.6		6.3	46.8	-4.6	97.5
Total	254	12.0		0.0	38.5	-4.6	66.7
LEVERAGE (%)	**Observations**	**Mean**	***Difference entries and add-ons (t-test)***	**Median**	**Std Dev**	**p5**	**p95**
PE Entries & Sec. (subsample)	169	35.3	***	29.7	29.7	0.6	87.4
PE Add-ons	215	24.2		17.9	23.9	0.0	72.1
Total	384	29.1		22.9	27.1	0.0	81.8
TOTAL ASSETS (USD mn)	**Observations**	**Mean**	***Difference entries and add-ons (t-test)***	**Median**	**Std Dev**	**p5**	**p95**
PE Entries & Sec. (subsample)	179	2,670	**	427	5,348	31	20,443
PE Add-ons	229	1,632		173	4,263	12	10,239
Total	408	2,087		292	4,791	17	16,842

Figure 1: Deal multiples of PE deals 2000-2013

Figure 1 depicts the median deal multiples that PE funds paid from 2000 to 2013 (blue line). It also shows the median multiples of benchmark deals over the same time period (red line). The difference between the two lines is the delta between PE and benchmark multiples in each respective year (PE discount/PE premium). A benchmark group (a group of comparable strategic transactions) is defined as the peer group of each private equity deal based on four criteria: deal year, target country, type of market (developed vs. emerging), and target industry (consumer products, energy, healthcare, industrials, materials, technology, telecommunications). The green bars represent the number of acquisitions that PE funds completed in the respective year. See Appendix 1 for variable definitions.

Figure 1A: Deal multiples of PE entry deals

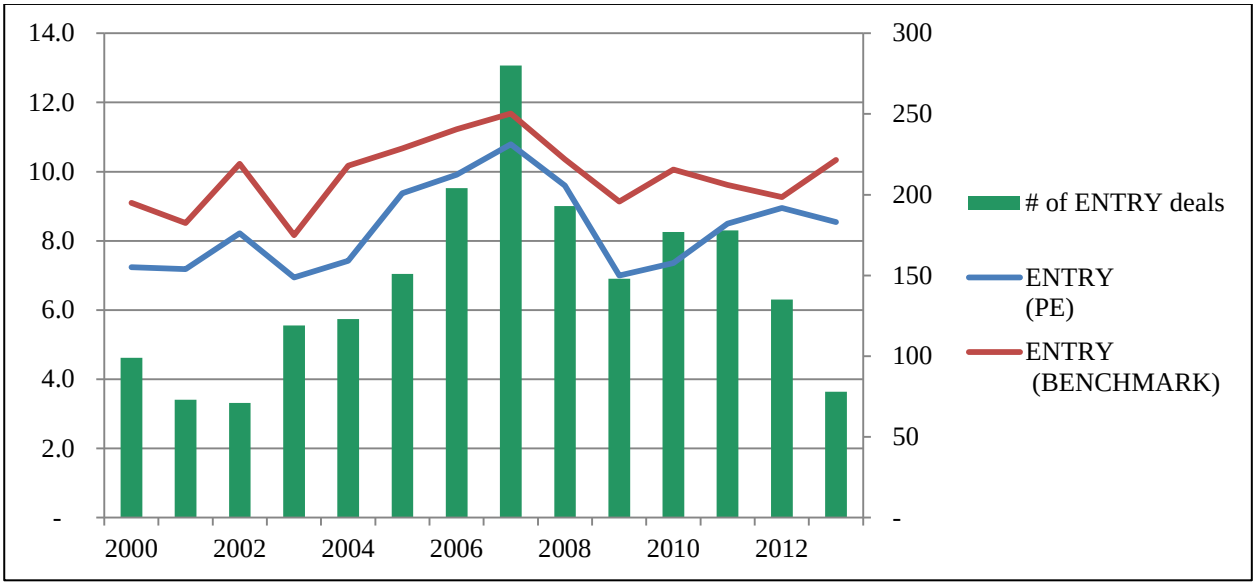

Figure 1B: Deal multiples of PE add-on deals

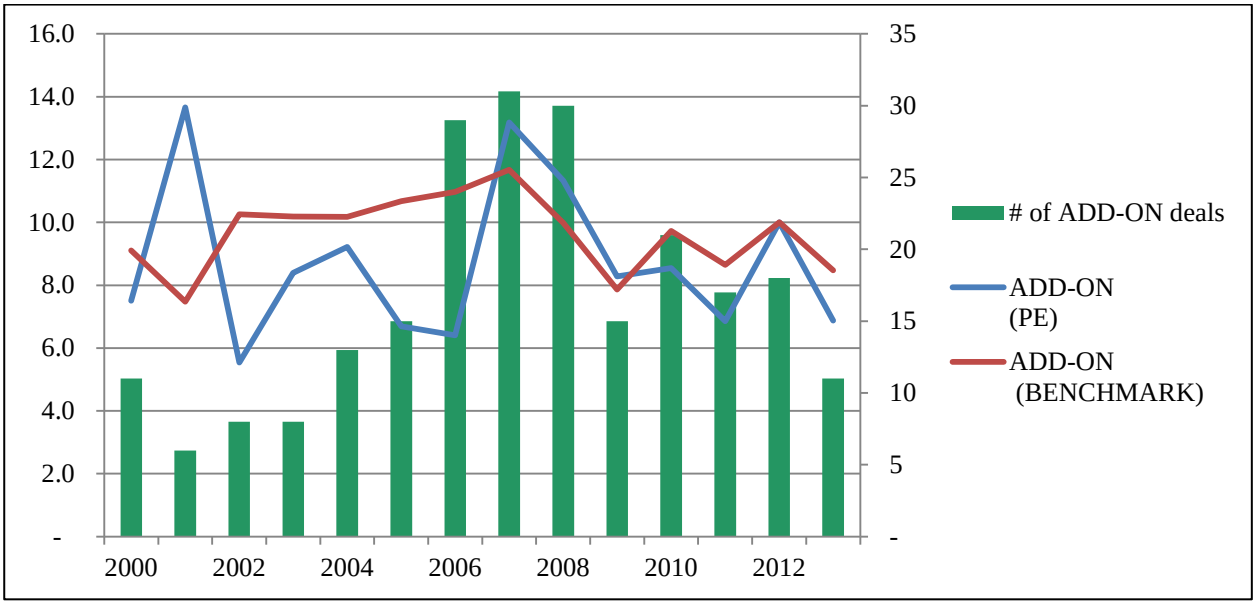

Figure 1C: Deal multiples of PE exit deals

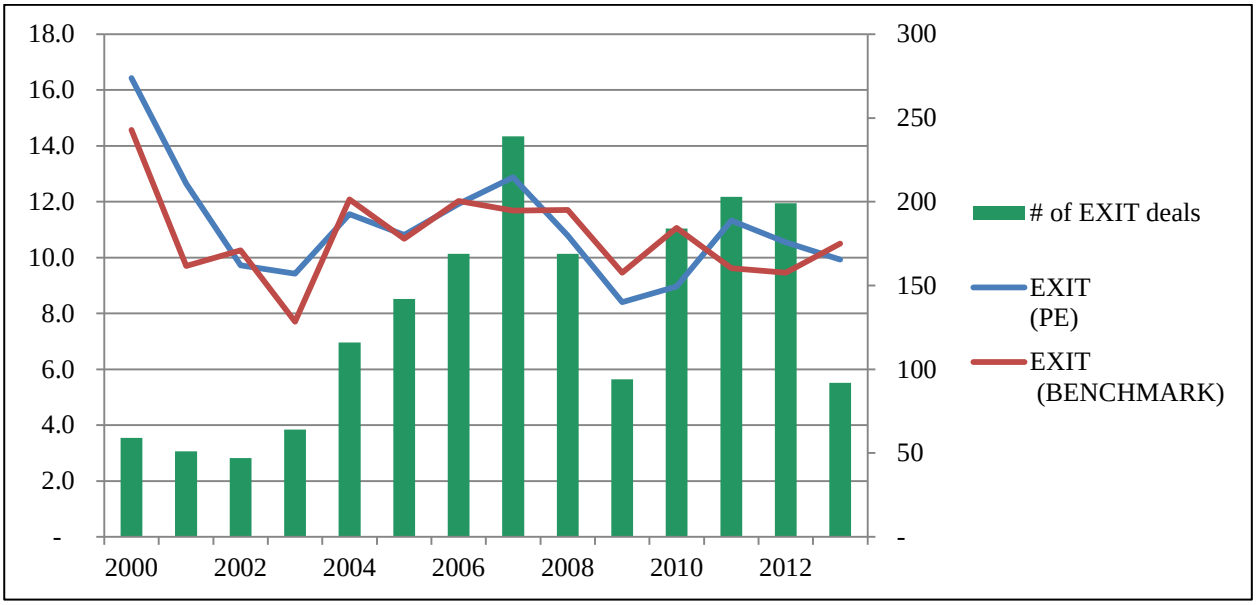

Figure 1D: Deal multiples of PE secondary deals

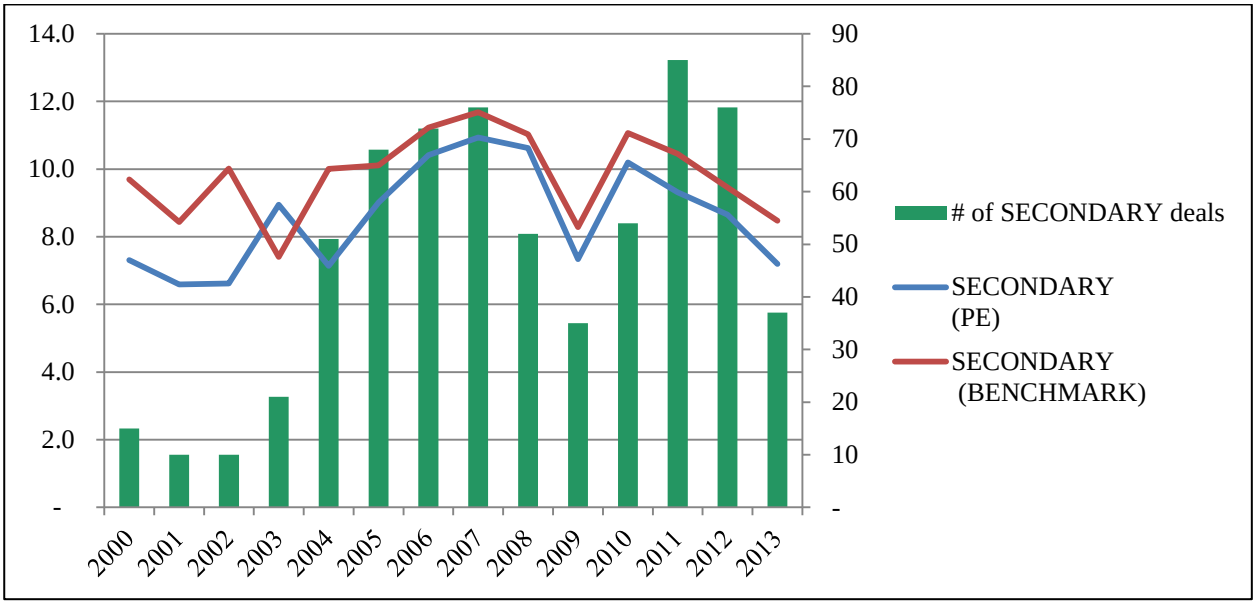

Table 4: Impact of deal types on deal multiples

Table 4 presents the results of ordinary least squares (OLS) regressions on the log of EV/EBITDA multiples. It shows the effect of PE deals (entry deals, add-on deals, exit deals, and secondary deals) in comparison to strategic deals on the EV/EBITDA multiple (winsorized at the 1% level). We conduct the analysis of each PE deal type with and without 3-year net sales growth as a control variable. We include fixed effects for target industry, target country, and deal year. The numbers in the upper rows represent the regression coefficients; the numbers in brackets in the lower row represent the respective standard errors. *, **, and *** indicate p-values at the 10%, 5%, and 1% significance level, respectively. See Appendix 1 for variable definitions.

	Dependent variable: log Deal multiples							
	PE ENTRY vs. strategic deals		**PE ADD-ON vs. strategic deals**		**PE EXIT vs. strategic deals**		**PE SECONDARY vs. strategic deals**	
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
PE ENTRIES	**-0.183*** **	**-0.129*** **						
	(0.019)	**(0.025)**						
PE ADD-ONS			**-0.081**	**-0.153**				
			(0.054)	**(0.146)**				
PE EXITS					**0.036**	**-0.020**		
					(0.022)	**(0.047)**		
PE SECONDARIES							**-0.148*** **	**-0.044**
							(0.033)	**(0.096)**
log(Enterprise value)	0.104***	0.107***	0.102***	0.102***	0.105***	0.109***	0.105***	0.109***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)
EBITDA margin	-0.016***	-0.019***	-0.017***	-0.017***	-0.017***	-0.019***	-0.017***	-0.019***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Return on assets	-0.028***	-0.028***	-0.030***	-0.030***	-0.027***	-0.028***	-0.028***	-0.029***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Leverage	-0.010***	-0.010***	-0.010***	-0.010***	-0.011***	-0.010***	-0.010***	-0.010***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Majority takeover	0.019	0.029	0.031	0.036	0.037*	0.025	0.034	0.031
	(0.021)	(0.024)	(0.023)	(0.023)	(0.021)	(0.024)	(0.023)	(0.024)
Friendly takeover	0.027	0.026	0.025	0.019	0.017	0.024	0.023	0.028
	(0.019)	(0.021)	(0.020)	(0.020)	(0.020)	(0.021)	(0.020)	(0.021)
Target is listed	-0.280***	-0.225***	-0.279***	-0.279***	-0.271***	-0.218***	-0.279***	-0.222***
	(0.023)	(0.029)	(0.024)	(0.025)	(0.021)	(0.029)	(0.024)	(0.029)
3-year net sales growth		0.001***		0.001***		0.001***		0.001***
		(0.000)		(0.000)		(0.000)		(0.000)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	2.167***	1.925***	2.146***	2.150***	2.092***	1.892***	2.112***	1.890***
	(0.125)	(0.122)	(0.125)	(0.127)	(0.124)	(0.122)	(0.129)	(0.124)
Observations	15,393	12,430	13,727	13,571	15,265	11,890	14,115	11,745
R-squared	0.281	0.287	0.282	0.284	0.291	0.285	0.278	0.284

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Impact of target characteristics on deal multiples

Table 5 presents the results of OLS regressions on the log of EV/EBITDA multiples. All regressions are for the investment period 1985-2013. For (i) enterprise value, (ii) EBITDA margin, (iii) return on assets, (iv) 3-year net sales growth, and (v) leverage, we divide the samples into below and above the median of the PE deals. We take the medians that we calculate in Table 2. For (vi) takeover type, (vii) deal attitude, and (viii) target status, we create subsamples based on their binary characteristics. We control for our key deal characteristics in all regressions, unless we create subsamples with them (e.g., no EV control in subsample 1). All continuous variables are winsorized at the 1% level. We take fixed effects for target industry, target country, and deal year into account. The numbers in the upper rows represent the regression coefficients; the numbers in brackets in the lower row represent the respective standard errors. *, **, and *** indicate p-values at the 10%, 5%, and 1% significance level, respectively. See Appendix 1 for variable definitions.

Table 5A: Enterprise value

	Dependent variable: log Deal multiples							
	ENTERPRISE VALUE							
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Variables	**<Median**	**>Median**	**<Median**	**>Median**	**<Median**	**>Median**	**<Median**	**>Median**
PE ENTRIES	**-0.203*** **	**-0.162*** **						
	(0.030)	**(0.025)**						
PE ADD-ONS			**-0.093**	**-0.008**				
			(0.076)	**(0.077)**				
PE EXITS					**0.060***	**0.036**		
					(0.034)	**(0.028)**		
PE SECONDARIES							**-0.127** **	**-0.108** **
							(0.051)	**(0.045)**
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	2.290***	2.914***	2.489***	1.355***	2.274***	2.806***	2.401***	2.834***
	(0.200)	(0.156)	(0.169)	(0.399)	(0.198)	(0.161)	(0.181)	(0.199)
Observations	8,057	7,336	6,443	7,284	8,016	7,248	8,791	5,323
R-squared	0.294	0.266	0.296	0.269	0.293	0.287	0.273	0.276
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1								

Table 5B: EBITDA margin

	Dependent variable: log Deal multiples							
	EBITDA margin							
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Variables	**<Median**	**>Median**	**<Median**	**>Median**	**<Median**	**>Median**	**<Median**	**>Median**
PE ENTRIES	**-0.239*** **	**-0.103*** **						
	(0.030)	**(0.024)**						
PE ADD-ONS			**0.004**	**-0.086***				
			(0.092)	**(0.050)**				
PE EXITS					**0.019**	**0.062** **		
					(0.034)	**(0.026)**		
PE SECONDARIES							**-0.278*** **	**0.025**
							(0.049)	**(0.040)**
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	2.092***	1.689***	2.043***	2.114***	2.098***	1.625***	2.112***	1.566***
	(0.163)	(0.181)	(0.124)	(0.747)	(0.153)	(0.196)	(0.158)	(0.211)
Observations	8,393	7,000	8,075	5,652	8,802	6,463	8,430	5,685
R-squared	0.267	0.321	0.265	0.331	0.271	0.337	0.266	0.327
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1								

Table 5C: Return on assets

	Dependent variable: log Deal multiples							
	RETURN ON ASSSETS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	<Median	>Median	<Median	>Median	<Median	>Median	<Median	>Median
PE ENTRIES	**-0.187*** **	**-0.152*** **						
	(0.030)	**(0.023)**						
PE ADD-ONS			**0.008**	**-0.075**				
			(0.090)	**(0.071)**				
PE EXITS					**0.065***	**0.048***		
					(0.035)	**(0.025)**		
PE SECONDARIES							**-0.186*** **	**-0.088** **
							(0.055)	**(0.035)**
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	2.472***	1.539***	1.727***	1.525***	2.475***	1.514***	2.517***	1.519***
	(0.191)	(0.178)	(0.161)	(0.237)	(0.205)	(0.165)	(0.214)	(0.166)
Observations	8,445	6,948	7,860	2,893	7,969	7,296	7,143	6,972
R-squared	0.254	0.339	0.273	0.376	0.260	0.355	0.250	0.343
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1								

Table 5D: 3-year net sales growth

	Dependent variable: log Deal multiples							
	3-YEAR NET SALES GROWTH							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	<Median	>Median	<Median	>Median	<Median	>Median	<Median	>Median
PE ENTRIES	**-0.141*** **	**-0.088** **						
	(0.034)	**(0.038)**						
PE ADD-ONS			**0.378**	**-0.060**				
			(0.249)	**(0.162)**				
PE EXITS					**-0.110***	**0.054**		
					(0.065)	**(0.070)**		
PE SECONDARIES							**0.100**	**-0.191** **
							(0.157)	**(0.096)**
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.998***	2.002***	1.731***	1.497***	2.014***	1.931***	2.000***	1.935***
	(0.174)	(0.168)	(0.472)	(0.173)	(0.180)	(0.168)	(0.185)	(0.168)
Observations	6,385	6,045	2,143	6,680	5,714	6,176	5,664	6,081
R-squared	0.253	0.362	0.253	0.274	0.253	0.359	0.250	0.360
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1								

Table 5E: Leverage

	Dependent variable: log Deal multiples							
	LEVERAGE							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	<Median	>Median	<Median	>Median	<Median	>Median	<Median	>Median
PE ENTRIES	**-0.225*** **	**-0.156*** **						
	(0.031)	**(0.027)**						
PE ADD-ONS			**-0.201** **	**0.093**				
			(0.084)	**(0.075)**				
PE EXITS					**0.024**	**0.075*** **		
					(0.033)	**(0.028)**		
PE SECONDARIES							**-0.202*** **	**-0.003**
							(0.048)	**(0.046)**
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.765***	1.547***	1.867***	1.535***	1.816***	1.540***	1.738***	1.527***
	(0.220)	(0.184)	(0.265)	(0.161)	(0.284)	(0.154)	(0.193)	(0.212)
Observations	7,818	7,575	5,899	7,828	6,208	9,057	7,840	6,275
R-squared	0.264	0.232	0.283	0.225	0.304	0.223	0.258	0.244
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1								

Table 5F: Takeover type

	Dependent variable: log Deal multiples							
	TAKEOVER TYPE							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Minority	Majority	Minority	Majority	Minority	Majority	Minority	Majority
PE ENTRIES	**-0.110** **	**-0.201*** **						
	(0.054)	**(0.021)**						
PE ADD-ONS			**0.159**	**-0.149** **				
			(0.117)	**(0.062)**				
PE EXITS					**-0.064**	**0.050** **		
					(0.052)	**(0.024)**		
PE SECONDARIES							**-0.140**	**-0.145*** **
							(0.089)	**(0.035)**
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	2.156***	2.069***	2.078***	2.087***	2.101***	2.022***	2.046***	2.054***
	(0.329)	(0.133)	(0.337)	(0.134)	(0.330)	(0.134)	(0.331)	(0.138)
Observations	2,217	13,176	1,781	11,946	2,077	13,188	1,879	12,236
R-squared	0.311	0.285	0.318	0.285	0.300	0.298	0.296	0.284
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1								

Table 5G: Deal attitude

	Dependent variable: log Deal multiples							
	DEAL ATTITUDE							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Friendly	Hostile	Friendly	Hostile	Friendly	Hostile	Friendly	Hostile
PE ENTRIES	**-0.181*** **	**-0.145***						
	(0.020)	**(0.075)**						
PE ADD-ONS			**-0.067**	**-0.129**				
			(0.059)	**(0.142)**				
PE EXITS					**0.047****	**-0.042**		
					(0.022)	**(0.091)**		
PE SECONDARIES							**-0.133*****	**-0.159**
							(0.034)	**(0.150)**
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	2.081***	2.532***	2.038***	2.481***	1.974***	2.436***	2.000***	2.462***
	(0.130)	(0.305)	(0.128)	(0.304)	(0.129)	(0.299)	(0.134)	(0.306)
Observations	12,931	2,462	11,377	2,350	12,850	2,415	11,755	2,360
R-squared	0.277	0.340	0.279	0.341	0.291	0.341	0.274	0.341
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1								

Table 5H: Company status

	Dependent variable: log Deal multiples							
	COMPANY STATUS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Listed	Private	Listed	Private	Listed	Private	Listed	Private
PE ENTRIES	**-0.183*** **	**-0.112**						
	(0.020)	**(0.075)**						
PE ADD-ONS			**-0.065**	**-0.150***				
			(0.080)	**(0.085)**				
PE EXITS					**0.057****	**-0.017**		
					(0.025)	**(0.050)**		
PE SECONDARIES							**-0.123*****	**-0.147****
							(0.038)	**(0.073)**
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.871***	2.449***	1.843***	2.443***	1.799***	2.559***	1.814***	2.793***
	(0.127)	(0.340)	(0.127)	(0.343)	(0.125)	(0.404)	(0.128)	(0.342)
Observations	13,410	1,983	11,841	1,886	12,917	2,348	12,197	1,918
R-squared	0.280	0.344	0.282	0.342	0.286	0.366	0.281	0.338
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1								

Appendix

Appendix 1: Variable definitions

Appendix 1 lists the definitions of the variables used in this paper. Note that in consolidating our databases, we devoted considerable attention to ensuring that the variable definitions were the same across all of our databases.

Variables	Descriptions
Deal specifications	
Deal multiple	Ratio of the target's enterprise value (see definition below) and its EBITDA (for the last 12 months, ending on the date of the most current financial information prior to the transaction).
PE deal	A private equity firm is the acquirer and/or the seller of a target company. For our deal sample, we identified PE funds either through their primary NAIC description or their primary VEIC code and/or if they were listed as PE funds in the Preqin database. Note that we excluded deals involving other financial sponsors, such as hedge funds, from our sample. All of our PE deals are realized deals.
PE entry deal	A PE fund is the acquirer of the target, with no PE fund on the target/seller side.
PE add-on deal	A strategic deal in which the acquirer is a PE-backed portfolio company. The ultimate acquirer parent is a PE fund.
PE exit deal	A PE fund is the seller of the target, with no PE fund on the acquisition side.
PE secondary deal	A PE fund is the acquirer of the target, with a PE fund also on the seller side.
Strategic deal	Any deal in our sample in which no PE fund is involved, i.e., for which the target is purchased for strategic reasons only. All our strategic deals are realized deals.
Club deal	More than one PE fund is acquiring and/or selling a target company.
Peer group/benchmark deal	A strategic deal that shares four main criteria with a respective deal: deal year, target country, type of market, and target industry.
Developed market deal	The target company is located in a developed market country. Our paper follows the developed market definition of the FTSE Country Classification.
Emerging market deal	The target company is located in an emerging market country. Our paper follows the emerging market definition of the FTSE Country Classification.
Proprietary deal	A specific buyer has the exclusive right to first purchase a target company before the company is presented to other buyers.
Transaction value	Total value of consideration paid by the acquirer, excluding fees and expenses, in USD.
Target industry	Industries are categorized based on SIC codes, NAIC codes and overall company business descriptions. Our deal sample includes consumer products, energy, healthcare, industrials, materials, technology, and telecommunications. Real estate firms, financial institutions, and targets from the public services sector are excluded.
Target country	Countries in which targets are domiciled.
Deal year	Deal effective year. We include deals between 1985 and 2013.
Target company statistics	
Log Enterprise value	Log of the target company's enterprise value at deal announcement in USD. Enterprise value is calculated by multiplying the number of actual target shares outstanding from the most recent balance sheet by the offer price and adding the cost to acquire convertible securities, short-term debt, straight debt, and preferred equity minus cash and marketable securities. Winsorized at the 1% level.

EBITDA	Earnings before interest, taxes, depreciation, and amortization
EBITDA margin	Target company's EBITDA (earnings before interest, taxes, and depreciation) margin of the last 12 months ending on the date of the most current financial information prior to the announcement of the transaction (LTM) - displayed as a percentage and winsorized at the 1% level. EBITDA margin is the ratio of EBITDA (LTM) and net sales (LTM).
Return on assets (ROA)	Target company's return on assets for the last 12 months ending on the date of the most current financial information prior to the announcement of the transaction (LTM) – displayed as a percentage and winsorized at the 1% level. Return on assets is the ratio of net income (LTM) and total assets (LTM).
3-year net sales growth rate	Growth, in percentage terms, of net sales over the 3-year period preceding the announcement of transaction. Winsorized at the 1%-level.
Leverage	Ratio of target company's total debt of the last 12 months ending on the date of the most current financial information prior to the announcement of the transaction (LTM) and its enterprise value at announcement – displayed as a percentage and winsorized at the 1% level.
Majority takeover	The acquirer purchased at least 51% of the target.
Friendly takeover	Deal attitude was explicitly friendly (as opposed to hostile, friendly-to-hostile, neutral, etc.).
Target is listed	Target was publicly listed on one or more stock exchanges.

PE fund information

Fund location	Location where the fund is registered.
Fund type	Funds are grouped into *buyout (BO)*, *venture capital (VC)*, and *other*. Deals are frequently labeled *BO&VC*. We considered these deals to be buyout deals.
Fund status	Funds in our sample are either *closed* or *closed&liquidated*. Few funds are open-ended *evergreen* funds.
Fund lifecycle	Time elapsed between fund vintage year and fund investment year.
Fund value	Fund value in USD as of July 2013.
Net IRR	Funds as of July 2013. We only included funds' net IRR prior to 2009 because younger funds are considered to still be in the investment phase.

Appendix 2: Impact of deal types on deal multiples (subsample of PE entry and secondary deals for which we find add-on acquisitions)

Appendix 2 is closely linked to the analysis in Table 4 in the main part of this study. However, it shows the effect of entry and secondary deals for which we have add-on deals in comparison to strategic deals on the EV/EBITDA multiple (winsorized at the 1% level). We include fixed effects for target industry, target country, and deal year. The numbers in the upper rows represent the regression coefficients; the numbers in brackets in the lower row represent the respective standard errors. *, **, and *** indicate p-values at the 10%, 5%, and 1% significance level, respectively. See Appendix 1 for variable definitions.

Dependent variable: log(deal multiples)		
Variables	**(1)**	**(2)**
PE ENTRIES & SEC.	**-0.205*** **	**-0.200*** **
(add-ons subsample)	**(0.056)**	**(0.056)**
log(Enterprise value)	0.102***	0.102***
	(0.004)	(0.004)
EBITDA margin	-0.017***	-0.017***
	(0.001)	(0.001)
Return on assets	-0.030***	-0.030***
	(0.001)	(0.001)
Leverage	-0.010***	-0.010***
	(0.000)	(0.000)
Majority takeover	0.037	0.037
	(0.023)	(0.023)
Friendly takeover	0.024	0.021
	(0.020)	(0.020)
Target is listed	-0.276***	-0.278***
	(0.024)	(0.024)
3-year net sales growth		0.001***
		(0.000)
Fixed effects	Yes	Yes
Constant	2.147***	2.146***
	(0.127)	(0.127)
Observations	13,697	13,697
R-squared	0.283	0.284
Robust standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Appendix 3: Impact of PE fund and firm characteristics on deal multiples

Appendix 3 presents the results of OLS regressions on the log of EV/EBITDA multiples for the investment period 1985-2013 for PE entry deals. PE fund and firm characteristics are independent variables. We control for our key deal characteristics in all regressions – winsorized at the 1% level. The numbers in the upper rows represent the regression coefficients; the numbers in brackets in the lower row represent the respective standard errors. We take fixed effects for industry, investment region, and deal year into account. *, **, and *** indicate p-values at the 10%, 5%, and 1% significance level, respectively. See Appendix 1 for variable definitions.

Dependent variable: log(deal multiples)		
Variables	**PE Entry (1)**	**PE Entry (2)**
PE fund characteristics		
Buyout	**0.165**	
	(0.199)	
Fund lifecycle (fund vintage to deal effective date)	**0.038***	
	(0.022)	
log(Fund value)	**-0.079****	
	(0.040)	
Multi-industry focus	**0.092**	
	(0.131)	
Multi-region focus	**0.148****	
	(0.069)	
Investment multiple	**0.001**	
	(0.002)	
Distr. DPI	**-0.001**	
	(0.001)	
Net IRR	**0.005**	
	(0.008)	
PE firm characteristics		
PE firm has office in target country		**-0.055**
		(0.130)
PE firm has HQ in target country		**-0.022**
		(0.128)
PE firm age at investment		**-0.001**
		(0.002)
Deal characteristics controls	Yes	Yes
Fixed effects	Yes	Yes
Constant	3.596***	1.888***
	(0.482)	(0.228)
Observations	465	1,112
R-squared	0.441	0.333
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1		

Appendix 4: PE discounts of top-tier PE firms

Appendix 4 shows whether top-tier PE firms achieve PE discounts in entry deals. We define 10 PE firms as top-tier based on the total funds raised in USD from 2003 to 2013 according to the Preqin database. We rank these 10 PE firms by PE discount. The PE discount is the percentage by which the multiples paid by these PE firms are lower/higher than the average multiple paid by their strategic peer groups. We also show the deal activity of each PE firm according to our deal sample.

#	PE firm	PE discount	Total funds raised last 10 yrs (USD bn)	Number of deals involved in
1	TPG Capital	-25%	53.8	64
2	Apax Partners	-21%	31.9	41
3	Apollo Global Management	-19%	53.6	21
4	CVC Capital Partners	-16%	48.5	37
5	The Carlyle Group	-15%	64.2	59
6	The Blackstone Group	-13%	41.9	45
7	Bain Capital	-13%	37.2	33
8	Kohlberg Kravis Roberts	-5%	60.7	60
9	Goldman Sachs	4%	52.2	32
10	Warburg Pincus	9%	34.2	34
	MEDIAN (TOP 10 PE FIRMS)	**-14%**	**50.4**	**39**
	MEDIAN (ALL PE FIRMS)	**-18%**	**1.0**	**2**

Appendix 5: Impact of deal types on deal multiples (propensity score matching)

Appendix 5 is a robustness test of Table 4 in the main part of this study. We use propensity score kernel matching (KM) with replacement to validate the findings of Table 4. We use the same variables as in Table 4 and conduct the analysis once with 3-year net sales growth and once without. We obtain standard errors through bootstrapping with 1,000 replications. We also explicitly restrict the analysis to the observations in the region of the common support. *, **, and *** indicate p-values at the 10%, 5%, and 1% significance level, respectively.

	Dependent variable: log(deal multiples)							
	Kernel matching							
	PE Entries		**PE Add-ons**		**PE Exits**		**PE Secondaries**	
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
PE ENTRIES	**-0.162*** **	**-0.087*** **						
	(0.018)	**(0.027)**						
PE ADD-ONS			**-0.080**	**-0.072**				
			(0.060)	**(0.177)**				
PE EXITS					**0.105*** **	**0.005**		
					(0.031)	**(0.056)**		
PE SECONDARIES							**-0.136*** **	**0.001**
							(0.033)	**(0.104)**
log(Enterprise value)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
EBITDA margin	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Return on assets	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Leverage	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Majority takeover	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Friendly takeover	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target is listed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3-year net sales growth		Yes		Yes		Yes		Yes
Target industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Deal year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,508	12,461	13,727	13,727	15,375	11,921	14,221	11,775
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1								