Do private equity investors trigger financial distress in their portfolio companies?

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Abstract

There is some controversy on the key sources of success in the private equity model and on how this business model affects the portfolio companies. We investigate operating performance and financial constraints of European companies around the buyout event in the period between 2000 and 2008. In addition, we analyze whether these companies go bankrupt more often than comparable non-buyout companies. Our paper suggests that private equity investors select companies which are less financially constrained than comparable companies and that financial constraints tighten after the buyout. This is true in particular for stand-alone transactions and in times in which cheap debt financing is available. Despite tighter financial constraints, private equity-backed companies do not suffer from higher mortality rates, unless they are backed by inexperienced private equity funds. Finally, we find only modest effects of private equity investors on changes in the companies' operating performance.

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Some financial investors do not waste any thoughts on the people whose jobs they destroy. They remain anonymous, do not have a face, pounce upon companies like swarms of locusts, graze on them and continue on their way. We are fighting against this form of capitalism.

Franz Muentefering (2005), former chairman of the Social Democratic Party (SPD) in Germany

1 Introduction

There is some controversy regarding the key sources of success in the private equity model. Does this success come from value creation, selection or value transfer? First, do private equity investors improve the performance of their portfolio companies and if so, how do investor experience or their syndication behavior affect this outcome? While most scholars agree that private equity investors create value (e.g., Kaplan, 1989a and Smith, 1990), some findings, second, indicate that the superior performance may rather be a selection effect as private equity investors are able to cherry-pick. As an example, Desbrierers and Schatt (2002) find that private equity-backed companies in France outperform comparable firms in operating performance both before and after the buyout, but their performance declines after the transaction. Do experienced investors or syndicates make better choices? Experienced investors may invest in companies that are inherently better (see Sorensen, 2007). Moreover, syndication may lead to a superior selection of investments (see Lerner, 1994) and to a superior value creation (see Brander et al., 2002).

Third, and more controversially, do private equity investors transfer value instead of creating it (e.g., Leslie and Oyer, 2009), in particular from employees and other stakeholders or from tax payers? In line with this argumentation, Davis et al. (2008) or Lichtenberg and Siegel (1990) demostrate wage cuts and dismissals after a buyout. An increase in leverage, which is typically related to these transactions, increases tax shields (Guo et al., 2011). Do these investors harm their portfolio companies, in particular by excessively increasing their leverage, financial distress, and bankruptcy risk (e.g., Kaplan and Stein, 1993)? And is this problem more pronounced when debt market conditions are favorable (e.g., Axelson et al., 2010)? Policy debates are often led by concerns about harmful ef-

fects of excessive leverage, financial constraints and increased mortality rates in companies which undergo buyout transactions and about potential broader negative implications on financial institutions and the stability of the financial system when large buyout credits fail.

We contribute to this discussion by investigating the performance, financial constraints and bankruptcies of European companies around their buyouts. Our results add to a growing literature documenting the real effects of private equity investors around the buyout event. We focus on largely neglected but important aspects, namely companies' financial constraints and the probability of their bankruptcy, whereas the existing literature typically focuses on the links between private equity investment and operating performance (e.g., Guo et al., 2011, Davis et al., 2009 or Kaplan, 1989a), private equity investment and employment (e.g., Davis et al., 2008, 2009, Cressy et al., 2007, Lichtenberg and Siegel, 1990) or private equity investment and innovation (e.g., Lerner et al., 2011, Popov and Roosenboom, 2008). Recently, some scholars investigate how debt market conditions affect the use of leverage in private equity transactions. Axelson et al. (2010) find that in favorable market conditions, private equity investors increase leverage and suggest that this can in turn lead to high subsequent mortality rates. We contribute to their research in that we investigate the impact of debt market conditions not only on leverage (and other measures that may indicate financial constraints), but also on actually realized bankruptcy rates.

Our paper is also related to a vast literature addressing the issue of how syndication behavior and investor experience are related to different aspects of portfolio companies' outcomes. As to syndication, a large body of literature suggests that syndication between venture capital or private equity investors gives rise to several benefits stemming from better selection, higher value creation and risk diversification. The flip side is that syndication not only has its benefits, but also comes at a certain cost. In particular, it gives rise to agency problems, which emerge from the information asymmetries within the syndicate (e.g., Wright and Lockett, 2003). These problems are potentially aggravated when private equity investors deal with highly financially constrained companies, which incur higher risks and higher potential for information asymmetry. We contribute to the literature on syndication in that we investigate whether or not syndicates are better able to handle financially constrained companies and to improve the performance of their port-

folio companies than stand-alone investors. As to experience, Hsu (2010) demonstrates that experienced venture capitalists positively affect innovative activity. Tykvová and Walz (2007) consider how experienced venture capitalists affect their portfolio companies' stock-market performance. We add to this literature by investigating whether experienced private equity investors are better able to create value or, on the contrary, better able to exploit the portfolio company.

Another contribution of our paper is that we provide a more comprehensive picture of the role of private equity than many other existing studies, which often analyze investors or companies from one country or which focus on listed companies only. In contrast to most of the aforementioned studies, our study includes several countries and we collect data on privately held companies. We start out with a sample covering more than 8 million companies from 15 countries, from which we consider all buyout transactions and from which we select comparable control firms. We focus on European transactions within the time horizon 2000-2008 because after the beginning of the new millennium private equity transactions spread more and more throughout Europe. According to Kaplan and Strömberg (2009), 49% of the target enterprise value in buyout transactions were concentrated in Europe, compared to 44% in the US and Canada between the years 2000 and 2004. A more technical reason for our focus on European companies is that we need accounting data for target companies to measure their operating performance, leverage and financial constraints. Unfortunately, most private equity transactions involve privately held companies, which are not required to disclose financial information in the US. In contrast, European companies have relatively stringent disclosure requirements.

Our results suggest that private equity investors select firms which are less financially constrained than comparable companies and that the financial constraints tighten after the transaction, in particular when debt markets conditions become favorable. However, the financial constraint levels in buyout companies are not significantly higher than the levels of comparable companies three years after the buyout. In addition, our findings indicate that buyout companies do not suffer from bankruptcy more often than comparable non-buyout companies. This seems to be true even for buyouts taking place under favorable debt market conditions. Our results lend support to the hypothesis that private equity investors only increase a company's bankruptcy probability when they are inexperienced. We find differences between syndicated and stand-alone transactions in terms of

financial constraints. While stand-alone investors pick companies which are not financially constrained, syndicates seem to be able to handle financially constrained companies well. We find weak evidence that syndicates reduce financial constraint levels of these highly constrained companies after the buyout. Finally, buyouts have no or only moderate effects on the portfolio operating performance. We interpret these results as an indication that a selection effect exists. All in all, we do not find clear evidence that private equity investors either create or destroy value.

The remainder of the paper is structured as follows. The next section summarizes the background and related literature. Section 3 describes measures of performance and financial constraints. Section 4 gives an overview of the data and of the matching methodology. Section 5 contains the empirical analyses of the operating performance and financial constraints. Section 6 offers an empirical analysis of bankruptcy rates. In Section 7 we describe various robustness checks that we have performed. Section 8 concludes.

2 Background and related literature

2.1 Changes in operating performance, financial constraints and bankruptcy probability

Private equity transactions are typically characterized by an increase in leverage (e.g., Kaplan, 1989a). Servicing the high debt leads to larger financial constraints in portfolio companies after the transaction, which can be viewed as a positive or a negative result.

On the positive side, financial constraints put discipline on managers who might otherwise have incentives to invest in projects with a negative net present value (e.g., Jensen, 1986). Private equity investors may limit the waste of free cash-flow and in this way "help" the portfolio companies. Moreover, beyond this "mechanical" improvement resulting from changes to the company capital structure, private equity investors apply governance and operational engineering to their companies (e.g., Kaplan and Strömberg, 2009, Wruck, 2008), which further improves the incentive alignment within these companies. Thus, all in all, when the distress risks remain manageable, company performance should increase after the buyout. The empirical evidence on the post-buyout operating performance largely

suggests that these transactions are related to performance improvements (e.g., Kaplan and Strömberg, 2009 for a literature survey on this topic).

Kaplan and Strömberg (2009) argue, however, that the positive results found in most studies related to post-buyout operating performance must be interpreted with some caution, due to a potential selection bias. Some authors argue that private equity investors do not create any operational value, but just profit from their superior information, bargaining power, negotiation skills, market timing and market mispricing. Extensive literature documents the impact of market and business cycles and, in particular, the relative price of debt vs. equity on the level of private equity activities, a fund's performance and use of leverage (e.g., Phalippou and Zollo, 2005, Guo et al., 2011, Axelson et al., 2010). When debt becomes cheaper relative to equity, private equity investors are able to increase their returns by raising leverage ratios (e.g., Kaplan and Strömberg, 2009). High leverage ratios may lead to difficulties especially if there is an unexpected negative development after the buyout, e.g., in the firm's product market. Kaplan and Stein (1993), who analyze large US buyouts completed in the late 1980s, show that greater amounts of leverage increased the likelihood of failure. Also, private equity investors seem to pay lower premiums than other bidders (e.g., Roosenboom et al., 2010 and Bargeron et al., 2008), which may be explained not only by market timing, but also by their superior information or negotiation skills. When private equity investors only exploit financial engineering, we may observe a worsening of performance and a higher bankruptcy risk after the buyout, in particular when debt risk premiums are low.

2.2 Impact of syndication and investor experience

There are several reasons to believe that syndication patterns and investor experience shape the choice of buyout targets with certain features and their development.

As to the former, we distinguish between syndicated and non-syndicated investments. We expect that syndicates will be willing to invest in more risky companies than stand-alone investors. Syndication is a device helping to combine various monetary and non-monetary resources of syndicate members (e.g., Bygrave, 1987, or Manigart et al., 2004). Through this combination, syndicates may be better able to manage high risks arising from investments in highly financially constrained companies than stand-alone investors for at

least three reasons. First, when investors have access to different sources of information, syndication delivers a second opinion on the future prospects of the company (e.g., Lerner, 1994, Casamatta and Haritchabalet, 2007), which leads to a better selection and may limit the risks of the respective company to fall into bankruptcy. Second, when investors combine their complementary skills, syndication may result in more intense monitoring and higher-quality support during the investment phase (e.g., Cumming and Walz, 2010, Brander et al., 2002, Tian, 2009), which further reduces the likelihood of bankruptcy. Third, when investors syndicate, they may spread their limited monetary resources across more companies (e.g., Manigart et al., 2004). In addition, better selection and value creation, which result from the combination of complementary non-monetary resources of different private equity investors, may lead to a higher operating performance in syndicated than in stand-alone deals.

Syndication is a complex process which usually gives rise to agency problems emerging from information asymmetries within the syndicate (Wright and Lockett, 2003). In some situations, one investor possesses more information about the quality of the deal. If this is the case, this investor may be inclined to take a less informed partner on board only for low-quality deals, which in turn leads to adverse selection. In other settings, syndication may result in moral hazard and free riding problems since the investors do not mutually observe their efforts in monitoring and support of the portfolio companies. All these problems are potentially aggravated when companies are financially constrained. Despite the existence of "drag along" and other covenants, coordination between private equity investors might thus be difficult when a restructuring of financially constrained buyouts is required (e.g., Citron et al., 2006). Therefore, syndicates might prefer to invest in less constrained companies. Agency problems arising in a syndicate may not only have effects on the investors' risk-taking behavior, but moral hazard and free riding problems may hinder the investors from fulfilling their value-creating tasks. This may negatively affect the companies' operating performance.

In addition, we distinguish between experienced and inexperienced investors. There is some empirical evidence suggesting that experienced private equity and venture capital investors are better able to increase value than their inexperienced counterparts. For example, Hsu (2010) shows that a venture capitalists' experience has an important effect on the patenting activity of their portfolio companies. Tykvová and Walz (2007) demon-

strate that companies backed by experienced venture capitalists perform better after their IPO than companies backed by inexperienced venture capital investors. Sorensen (2007) suggests that more experienced investors make more successful investments in terms of investing in better companies which are more likely to go public. Nahata (2008) shows that companies backed by more experienced and reputable venture capitalists are more likely to exit successfully (via trade sale or IPO), access public markets faster and have a higher asset productivity at the IPO. Inexperienced investors realize a higher fraction of unsuccessful exits, i.e. liquidations. This would imply that after the buyout (i) financial constraints are lower when investors are experienced than when they are inexperienced and that (ii) the operating performance of companies backed by experienced investors increases at a higher pace than that of companies backed by inexperienced investors.

Alternatively, according to the value transfer or value destroying hypothesis, experienced investors may be those who have a higher bargaining power, better negotiation skills and superior information and are thus better able to "exploit" the company and transfer or destroy value. This would imply that after the buyout (i) financial constraints are higher when investors are experienced than when they are inexperienced and that (ii) the operating performance of companies backed by inexperienced investors increases at a higher pace than that of companies backed by experienced investors.

3 Measures of performance and financial constraints

We employ the ratio of returns to total assets (return on assets, ROA) to capture companies' operating performance. We measure returns as the earnings before interest, taxes, depreciation, and amortization (EBITDA). It is important to measure the performance before interest and taxes because buyouts have a large effect on the interest and taxes payed by the buyout companies (Kaplan, 1989b). Our performance measure can be interpreted as an indicator for the efficiency with which a portfolio firm uses a given amount of assets (Kaplan, 1989a).

Leverage is the simplest measure indicating how financially constrained a company is. We measure leverage as the ratio of total debt to total assets. The literature suggests several more complex indices which capture financial constraints and are based on observable firm

characteristics from balance sheets and income statements or on stock market data. For listed firms, the Kaplan and Zingales (1997) index as well as the Whited and Wu (2006) score are the most prominent. For our sample of mostly private firms, we employ other indices which have been designed for or can easily be adapted to private firms. These are: O-score (Ohlson, 1980, Griffin and Lemmon, 2002), Z-score (Altman, 1968) and its extension for private firms (Altman, 2002) and Zmijewski-score (Zmijewski, 1984).

We follow the implementation of Ohlson (1980) by Griffin and Lemmon (2002) and compute the O-score as:

$$O = -1.32 - 0.407 \cdot \log TA + 6.03 \cdot \frac{TL}{TA} - 1.43 \cdot \frac{WC}{TA} + 0.076 \cdot \frac{CL}{CA} - 1.72 \cdot TLdummy - 2.37 \cdot \frac{NI}{TA} - 1.83 \cdot \frac{FFO}{TL} + 0.285 \cdot NLdummy - 0.521 \cdot \frac{NI_t - NI_{t-1}}{|NI_t| + |NI_{t-1}|},$$

with *TA* being inflation-adjusted total assets; *TL* total liabilities; *WC* working capital; *CL* current liabilities; *CA* current assets; *TLdummy* being 1 if total liabilities are higher than total assets, zero otherwise; *NLdummy* being 1 if the company realized a net loss in the last two years, zero otherwise; *NI* being net income (profit/loss for period); and *FFO* being funds from operations. The bankruptcy probability is $\frac{e^0}{1+e^0}$, i.e. a higher O-score value is associated with tighter financial constraints.

The Z-score equals:

$$Z = 0.717 \cdot \frac{WC}{TA} + 0.847 \cdot \frac{retEARNINGS}{TA} + 3.107 \cdot \frac{EBIT}{TA} + 0.420 \cdot \frac{MV}{TL} + 0.998 \cdot \frac{SALES}{TA},$$

with *WC* being working capital; *TA* total assets; *retEARNINGS* retained earnings; *EBIT* earnings before interest and taxes; *MV* market value of equity; *TL* total liabilities; and *SALES* sales. The five subratios which form this index reflect (i) liquid assets in relation to company size, (ii) profitability, (iii) operating efficiency apart from tax and leveraging factors, (iv) market dimension, (v) sales turnover. We lack data to calculate two of these subratios and employ other shareholder funds instead of retained retained earnings in (ii) and book value instead of market value in (iv). The higher the value of the Z-score, the less financially constrained the company.[1]

We compute the Zmijewski-score as:

$$ZM = -4.336 - 4.513 \cdot \frac{NI}{TA} + 5.679 \cdot \frac{TL}{TA} + 0.004 \cdot \frac{CA}{CL}$$

[1] Altman defines the following zones of discrimination: $Z > 2.9$ - safe zone, $1.23 < Z < 2.9$ - grey zone, $Z < 1.23$ - distress zone.

with NI being net income (profit/loss for period); TA being total assets; TL total liabilities; CL current liabilities; and CA current assets. A higher Zmijewski-score indicates tighter financial constraints.

4 Data and matching methodology

Our sample includes completed buyout transactions in the EU-15 countries during the period from January 1, 2000 to December 31, 2008. We obtain this data from Zephyr database, which contains information on over 600,000 mergers & acquisitions, private equity and venture capital transactions, and initial public offerings.[2] From this database, we extract all transactions from this period classified as "institutional buyout". We add all acquisitions with transaction financing described as "private equity" or "leveraged buyout", which have been undertaken either by a financial sponsor or by an acquirer whose business description includes the term "private equity". Next, we exclude minority deals. In addition, we remove secondary buyouts since these transactions may involve different types of companies and may also have different consequences for the operating performance, financial constraints and bankruptcy probability than primary buyouts. We end up with 4,143 buyouts.

We combine these transaction data with accounting data from Amadeus database, which contains detailed information from balance sheets and profit/loss accounts for European companies. We exclude companies for which we do not find accounting information. We consider exited firms only until the exit year. We remain with a cross-section of 1,929 buyouts and a panel of 13,777 buyout years.

In order to compare the development of the financial figures of firms which are involved in buyout transactions with non-buyout firms, we collect accounting data for all companies operating in EU-15 countries (except for companies from those country-industry-year groups in which we do not observe any private equity transactions; industries are 2-digit NACE Rev. 2 codes). In total, we end up with 3.7 million non-buyout firms for which we have accounting information.

[2]Researchers working in the field of private equity have become aware of the existence of this database in recent years (e.g., Goossens et al. 2008, Abdesselam et al. 2008, Bloom et al. 2009, Brav et al. 2009, Beuselinck et al. 2009, Prijcker et al. 2009, Tykvová and Schertler 2010).

To investigate the impact of debt market conditions on the behavior of buyout investors, we employ the high-yield spread (as Axelson et al., 2010), defined as the Europe high-yield rate for the corresponding year according to the Merrill Lynch High-Yield index minus Libor (both obtained through Datastream). For our analyses, we distinguish between buyouts in favorable vs. unfavorable conditions, which we measure as high-yield spreads below vs. above their sample period median.

4.1 Buyouts

Table 1 reports the composition of the buyout sample by year, country and industry. We split the sample into subsamples of syndicated and stand-alone transactions as well as subsamples of transactions by experienced and inexperienced private equity funds.

We classify a transaction as a syndicated transaction if the number of acquirers is disclosed and is larger than one. We classify it as a stand-alone transaction, if the number of acquirers is disclosed and equals one. Those buyouts for which we do not have information on the number of investors (since the names of the acquirers are not disclosed, e.g., when a management buyout team or private individuals buy the company) cannot be assigned to either of the subsamples. Therefore, the sum of both subsamples' counts is lower than the total number of buyouts.

We build the subsamples of experienced and inexperienced private equity funds by counting the number of all transactions each private equity fund carried out during the time period 1999-2008. We base our deal-specific experience measure on the average number of executed transactions of all private equity funds involved in a particular deal. If the average experience of the participating investors exceeds one, we allocate a buyout to the subgroup of buyouts by experienced private equity funds. We assign all transactions in which the average experience equals one or in which the names of acquirers are not disclosed (e.g., a management buyout team or private individuals are the acquirers) to the subsample of inexperienced private equity funds' buyouts.

Table 1 shows that the majority of buyouts take place in 2007 after a continuous increase since the beginning of our sample period. In 2008 the deal frequency dropped as a consequence of the financial crisis. More than 65% of deals take place in years in which debt market conditions are favorable (2004-2007). The largest buyout markets are the United

Kingdom and France. Most transactions (33%) take place in the manufacturing industry. Almost 15% of the transactions are syndicated and about 54% of the buyouts are carried out by experienced investors.

4.2 Control firms

To measure the effect of private equity funding on firms' operating performance, financial constraints and bankruptcy, we aim to analyze differences in the outcomes of the relevant variables of private equity-backed firms and the outcomes of these variables for comparable non-buyout firms. A crucial feature in the construction of the counterfactual is the selection of a valid control group. Private equity funds may select only certain types of companies to finance. This selection may affect operating performance, financial constraints and bankruptcy. In addition, companies may, at least to a certain extent, influence whether or not they obtain private equity. To take into account this selection and self-selection effect, we run a matching procedure and select "similar" control firms to each buyout.

4.2.1 Non-random buyout target selection

Randomization of treatment is infeasible in private equity investment decisions for several reasons. The geographical and industry distribution of private equity investments is not random. As Table 1 shows, more than one third of all European private equity transactions took place in manufacturing industries and nearly half of all buyouts are from France and the United Kingdom. As to the industry, there is evidence that private equity funds are usually specialized investors who prefer investments in certain industries over investments in others (e.g., Borell and Tykvová, 2010). After taking the decision in which country and industry to invest, private equity funds undertake an intensive screening and selection process in order to identify the right target firm with certain characteristics (see, Kaplan and Strömberg, 2004). Table 2, Panel A shows that buyouts (group (1)) are significantly larger and older than non-buyout companies (group (3)). Moreover, buyout companies have a median leverage of 57% and ROA of 5.72% in the years before the transaction. In contrast, firms which did not experience a buyout transaction show a significantly higher median leverage of nearly 65% and a lower ROA of 2.1%. Thus, the sample of buyouts

does obviously not consist of randomly chosen firms. In addition, companies may in some situations influence whether they receive private equity. This selection and self-selection lead to a statistical bias, if not corrected appropriately.

4.2.2 Description of the matching procedure

To correct these biases we employ propensity score matching (see, Rosenbaum and Rubin, 1983). The goal of this matching approach is to find "twin" firms which have similar characteristics as buyouts but were not acquired by a private equity fund during the period under study. In order to identify a set of companies which do not differ significantly from the sample of buyouts in specific criteria, we first split the whole sample into subsamples for each country, industry and year. By matching buyouts to controls in the same country and industry, year by year, we mitigate the concerns that a non-random country/industry/time distribution of the buyouts could affect the results. We employ one-digit NACE Rev. 2 industry codes in order to achieve a sufficiently high number of buyouts and potential matching companies in each subsample.

We use logit models to calculate the *propensity score* for each firm within these subsamples using, the log of total assets and age in the year prior to the buyout. The propensity score expresses the firms' conditional probability to be acquired by a private equity fund. We identify the matching partners for each buyout by minimizing the propensity score distance between the non-buyout and the buyout. Three main methodological issues arise in matching (see Dehejia and Wahba, 2002): whether to match with or without replacement, which matching method to apply and, finally, how many control firms to match to each buyout. We choose to match with replacement. Thus, each buyout can be matched to the nearest non-buyout firm, even if a control firm is matched more than once. Matching with replacement produces less-biased matches. We apply the nearest-neighbor method, and select the three best control firms whose propensity scores are closest to the buyout. The decision on how many control firms to match with each buyout results in a trade-off between bias and precision of the estimates. By using more comparison firms, the precision of the estimates increases, but the bias increases as well. As a robustness check, we use one-to-one matching and the caliper matching (see, Cochran and Rubin, 1973).

In order to meaningfully implement matching it is necessary to condition on the support common to both buyouts and non-buyout companies (Heckman et al., 1998). Implementing the common support condition ensures that any combination of characteristics observed in the buyout group can also be observed in the control group. As a common support approach we employ the minima and maxima comparison. The basic criterion of this approach is to delete all observations whose propensity score or variable of interest is smaller than the minimum and larger than the maximum in the opposite group (see, Caliendo and Kopeinig, 2005). In addition, we check whether the matching procedure is able to balance the distribution of the relevant variables in both the control and buyout group ("balancing property"). Thus, we compare the buyouts with a full sample of non-buyouts and with a matched control group. Table 2, Panel B shows that the balancing property is fulfilled regarding the propensity scores, i.e., the propensity scores for buyouts and non-buyouts do not differ significantly.

5 Empirical results: Financial constraints and performance

5.1 Buyouts vs. control firms

5.1.1 Descriptive statistics

Table 3 gives an overview of performance, leverage and our three financial constraints scores as well as their annual changes for buyouts and for control firms. Buyouts exhibit a significantly better operating performance, both before and after the transaction. There is no indication that private equity investors contribute to an improvement in performance since we do not observe significant differences in the annual changes between the buyout and the control group.

With respect to leverage, buyout and control companies have comparable levels in the year preceding the transaction. Leverage increases significantly after the buyout event, whereas control companies rather decrease their leverage over time. Three years after the buyout, however, the difference in leverage between the two groups does not seem to be significant anymore.

Regarding our financial constraints measures, all three indices indicate that buyout investors typically select less constrained companies. The constraints levels in the buyout group are always below the level of the control group in the year preceding the buyout year. For the O-score and the Z-score, but not for the Zmijewski-score, this is also true for the second and third year preceding the transaction. All three measures suggest that financial constraints become more pronounced after the buyout whereas financial constraints loosen in control companies they grow older. The difference between both groups thus becomes smaller after the buyout and, finally, three years after the transaction, the buyout and control companies reach similar levels of constraints, as O-score and Zmijewski-score indicate. According to the third measure, Z-score, buyout companies are even less financially constrained than their counterparts three years after the buyout.

5.1.2 Difference in differences

We now move to a more sophisticated approach and employ the difference in differences method within our buyout and matched control sample. We examine the effect of the private equity investor by comparing the buyout group after the transaction to both the buyout group before the transaction and to a control group. More specifically, the average change (in each of our variables of interest) in the control group is substracted from the average change in the buyout group. This removes biases in post-buyout period comparisons between the buyout and control group, which could be the result of permanent differences between these groups. It also removes biases from comparisons over time in the buyout group, which could be the result of a time trend.

We can write the model as $Y = \beta_0 + \beta_1 \cdot POST + \beta_2 \cdot BUYOUT + \beta_3 \cdot POST \cdot BUYOUT$, with Y being our variable of interest (ROA, leverage and three financial constraints' scores subsequently). POST is a dummy variable indicating pre (POST=0) vs. post (POST=1) buyout period. As pre-buyout period we consider the year preceding the transaction. As post-buyout period, we alternatively take the first, second or third year. BUYOUT is a dummy variable which equals 1 for buyouts and 0 for control firms. The coefficient of interest, β_3, multiplies the interaction term $POST \cdot BUYOUT$, which is the same as a dummy variable equal to one for those observations in the buyout group that are in the post-buyout period. We consider the possible serial correlation issues (e.g., Bertrand et al.,

2004) and cluster the standard errors by year, industry (one-digit NACE Rev. 2 industry codes) and country.

We report the results from these regressions in Table 4, Panel A. This table confirms most of our findings from descriptive statistics on financial constraints. Buyout companies generally exhibit lower financial constraints than the control group, as the coefficient on the dummy variable BUYOUT suggests. The financial situation significantly worsens after the buyout transaction for all three measures, as indicated by the coefficients on our interaction term. This effect seems to be persistent and to hold in all three post-buyout years. The results on ROA suggest that private equity investors do not considerably affect performance.

Next, we want to investigate whether the effects of private equity investors differ when debt market conditions differ. In particular, we want to analyze whether the buyout's financial situation deteriorates more when debt market conditions are favorable. To do this, we split the sample into two subsamples. The first subsample includes buyouts from years with favorable debt market conditions and the corresponding control firms. The second subsample includes buyouts from years with unfavorable debt market conditions and the corresponding control firms. For each of the subsamples, we perform the same regressions as in Panel A and depict the results in Panels B and C. The financial situation (expressed by our three scores) significantly worsens after the buyout, particularly for transactions carried out in favorable debt market conditions (Panel B). Here, the coefficient on the interaction term is significant in five out of nine cases whereas in unfavorable market conditions (Panel C), it is significant only once. These results indicate that the financial situation after the buyout worsens particularly for those transactions that are carried out when spreads reach low levels.

5.1.3 Multivariate regressions

In the next step we run multivariate panel regressions to investigate the impact of buyout investors in more detail. We include all years of all buyout and control companies in this analysis. We employ firm fixed effects to control for time-invariant and unobservable firm and industry characteristics. Moreover, we use year dummy variables to account for time-varying conditions such as the debt market situation. As errors are unlikely to be

independent, we cluster them by company. We also control for industry concentration by using a Herfindahl-Hirschman-index.

For each dependent variable of interest, we estimate four specifications. We alternatively include one dummy variable for the whole post-buyout period (POST) or for the first three post-buyout years separately (POST1, POST2, POST3). Moreover, we estimate regressions with and without a lagged dependent variable.

Our results, which we show in Table 5, indicate a slight improvement in performance immediately after the buyout (albeit only in the first year) as well as an increase in leverage and an increase in financial constraints after the buyout.

5.2 Syndicated vs. non-syndicated transactions

In this section we focus on the buyout sample only and investigate whether there are differences between syndicated and non-syndicated buyouts. Descriptive statistics on the pre-buyout levels for both subgroups separately (Table 6) suggest that syndicates are better able to cope with financially constrained companies than stand-alone investors who opt for companies with relatively low pre-buyout leverage and low levels of financial constraints. The pre-buyout difference is confirmed only for the Z-score when using the difference in differences approach (Table 7).

Regarding the impact of syndicates on changes in performance and financial constraints, we do not find any evidence in Table 7. To further investigate these issues, we also run panel regressions with firm fixed effects. We include a dummy variable POST, which indicates whether the company is in the pre-buyout or post-buyout phase. Alternatively, we include three dummy variables POST1, POST2, POST3, indicating whether the portfolio company is in its first, second or third year after the buyout transaction. To investigate the differences in changes between syndicated and non-syndicated investments, we interact the period dummy variable(s) described above with the syndication dummy variable SYND (which is not included as a separate regressor in the estimations since it is incorporated in firm fixed effects). We do not find any evidence on the differences in performance changes between syndicated and non-syndicated transactions.

We continue with the investigation of the changes in financial constraints. Consistently with the results of the previous section, the results clearly indicate a worsening of the

financial situation after the buyout. We further analyze whether this worsening can be found equally in non-syndicated and syndicated transactions (which, according to the previous analysis, seem to be more financially constrained). For Z-score and, if we include lagged dependent variable, for Zmijewski-score as well, we find an effect for the interaction term that goes in the opposite direction than the effect of the time dummy variable, i.e. the pure buyout effect. For example, in the third model Zmijewski-score increases (i.e., worsens) by 0.205 after a stand-alone transaction. In syndicated transactions, this effect is diminished by 0.175, resulting in a final increase in the Zmijewski-score of only 0.030 in syndicated buyouts. The difference in the "syndicate" effect seems to be particularly strong in the first year after the buyout where the positive effect of the interaction term more than outweighs the negative effect of the time dummy variable. This suggests that syndicates loosen financial constraints. We do not find such effect for the O-score. All in all, we find some weak hints that syndicates have a positive effect on a reduction in financial constraints, in particular in the first year after the transaction.

5.3 Experienced vs. inexperienced private equity funds

When we distinguish between experienced and inexperienced investors, the descriptive statistics (see Table 9) provide some indication that operating performance increases for experienced investors while it decreases for inexperienced investors, in particular in the second year after the transaction. Moreover, Table 9 suggests that experienced investors increase leverage and tighten financial constraints more than inexperienced investors do after the buyout. However, the difference in the financial constraints' change is only significant in the third post-buyout year and only for Zmijewski-score and O-score, but not Z-score. Using multivariate analyses we do not find any significant differences between the two subsamples (difference in differences in Table 10 and panel regressions in Table 11). All in all, we do not find much evidence related to differences between experienced and inexperienced private equity funds.

6 Empirical results: Bankruptcy

The main potential caveat with our analysis in the previous sections has been that we have only investigated distress levels based on accounting figures, but not the real distress. In other words, we have not checked whether companies end in bankruptcy more or less often after the buyout than comparable non-buyout companies. We address this issue in this section. More specifically, we analyze the probability of bankruptcy for buyouts and non-buyout companies, as well as for different subgroups of buyouts (syndicated transactions, non-syndicated transactions, buyouts of experienced and of inexperienced private equity funds). In addition, we check whether bankruptcies are more common in companies which realized a buyout in years with favorable debt market conditions.

To take into account the selection and self-selection effects, we adopt, in addition to matching, an instrumental variable approach as proposed by Ackerberg and Botticini (2002). This approach has been applied in a context of bankruptcy analysis by Bhattacharya et al. (2010). It controls for the effect arising from unobservable characteristics which may affect the relationship between private equity funding and bankruptcy. The starting point of this approach is the recognition that private equity investments are not random, but are concentrated in certain countries and industries. The availability of suitable buyout targets in certain countries and industries affects the intensity of private equity financing. Instead of using this recognition for the matching procedure, in this section we employ it as the basis on which we generate our instruments. Similar variables have been used as an instrument for venture capital financing by e.g., Bottazzi et al. (2008) or Du (2010). Following Bhattacharya et al. (2010) and Du (2010), we construct local market variables by combining industries and regions into pairs. By interaction between 9 (1-digit NACE Rev. 2) industries and 15 countries, we obtain 135 local markets which we use as instruments. Bhattacharya et al. (2010) argue that such instruments are valid because local characteristics should not directly affect the mortality of a single firm.

Table 12 depicts the results of the regressions with the dependent variable BANKRUPTCY. This variable is binary and takes a value of one if the firm goes bankrupt in the time period

1997-2010 and zero otherwise.[3] We control for a country fixed effect, an industry fixed effect (one-digit NACE Rev. 2 industry codes) as well as for portfolio company characteristics (age, size). Columns (1) to (6) show the results from logit estimations with buyouts and matching non-buyout (control) firms: (1) and (2) all buyout and control firms, (3) syndicated transactions and control firms, (4) stand-alone transactions and control firms, (5) transactions of experienced private equity funds and control firms and (6) transactions of inexperienced private equity funds and control firms. The last column (7) of Table 12 delivers the results from the instrumental variable regression including all buyouts and all other (non-buyout) companies. Our central variable of interest in regressions (1) and (3)-(7) is the buyout dummy variable, which equals one for buyouts and zero otherwise. We find that the impact of a buyout investor (in general) on a firm's mortality rate is insignificant, independently of whether we control for the potential selection and self-selection biases via a matching approach (1) or via an instrumental variable approach (7). The coefficient on the buyout variable is statistically and economically insignificant in all other regressions as well, with only one exception in the fifth column (for the sample of inexperienced private equity funds and control firms). These findings indicate that private equity investors in general do not increase the probability of bankruptcy in their portfolio firms, unless they are inexperienced. In addition, in line with the existing literature (e.g., Bhattacharya et al., 2010), smaller firms seem to suffer from a higher bankruptcy risk.

In Column 2, we investigate whether buyouts from the years with favorable market conditions suffer from a higher bankruptcy probability than other companies (i.e., buyouts from the years with unfavorable market conditions and non-buyout firms). To do this, we include a buyoutFAVORABLE dummy variable, which equals one for buyouts in favorable debt market conditions (below median spread years) and zero otherwise. The coefficient on this variable is statistically and economically insignificant, indicating that even for companies that are subject to buyouts in years when cheap financing is available, the bankruptcy risk does not increase over the risk of other buyouts and comparable non-buyout companies.

[3] In this section we extend the analyzed time period from initially 2000-2008 to now 1997-2010 (for 2010 we consider only the first nine months). This extension was not possible in the earlier sections due to problems with the availability of firms' accounting data in the databases.

7 Robustness analyses

This section briefly summarizes further analyses we undertake to examine whether our findings are robust towards various sources of changes.

First, to control for the endogeneity of the buyout target selection, we use alternative matching methods: one-to-one matching and the caliper matching (see, Cochran and Rubin, 1973). The former considers the first nearest neighbor, whereas the latter considers all control firms for which the propensity score difference is within a predefined radius. The caliper matching is more efficient as long as the distributions of the propensity scores of buyouts and non-buyouts overlap. The approach identifies as many control firms as are available within the calipers, which could be a large (small) number when many (few) good matches are available. Following Rosenbaum and Rubin's (1985) suggestion, we use a quarter standard deviation of the propensity scores as caliper width. Another alternative of how to control for endogeneity would be GMM estimations. Unfortunately, due to many lacks in the time structure of our data, GMM estimations would lead to the loss of many observations.

Second, we employ alternative coefficient values in our financial constraint measures. More specifically, some scholars argue that the original models no longer fit with more recent data and estimate more up-to-date coefficients. We follow the suggestions by Begley et al. (1996) and Hillegeist et al. (2004) for the Z-score and the O-score. Moreover, we use coefficients calculated by Shumway (2001), who uses hazard-rate models, for the Z-score and the Zmijewski-score.

Third, we check whether particular countries, industries or years drive our results. We remove one country or one industry or one year at a time from the sample and check whether the results change.

Fourth, in the regressions addressing bankruptcy probability, we restrict the buyout sample to companies which received private equity financing before 2008 in order to have at least three years after the buyout event, in which bankruptcy may potentially occur.

All in all, these robustness checks (not displayed, but available upon request) do not alter the main results of our previous analyses.

8 Conclusion

Our paper delivers evidence for the selection rather than value creation or value transfer effect in European buyouts from the period 2000-2008. We do not find many hints that private equity investors trigger excessive financial distress and lead their companies into bankruptcy. More specifically, the results suggest that private equity investors select firms which are less financially constrained than comparable companies. After the buyout, in particular when the buyout takes place under favorable debt market conditions, private equity investors tighten the companies' financial constraints. However, this tightening does not raise mortality rates over those of comparable non-buyout companies. Even those companies that are subject to buyouts in years when cheap debt financing is available, do not suffer from higher bankruptcy risks as compared to other buyouts and non-buyout companies. Only inexperienced private equity investors seem to increase mortality rates. In addition, syndicates seem to be better able to cope well with financially constrained companies than stand-alone investors. Finally, we find only modest effects of private equity investors on changes in the operating performance.

As our paper covers a dynamic and highly topical issue of private equity investors' impact, it contributes not only to the academic research, but also to the recent policy discussion on regulation. It sheds some light on the question whether private equity investors have, via tightening of financial constraints and increasing bankruptcy risk of their companies, potentially adverse effects on the financial system as a whole in case large buyout credits fail, leading to contagion in the financial system. In response to these fears and to the global financial crisis, governments around the world are rethinking their approach to the regulation of financial institutions and financial markets, private equity investors being one of the central issues. The U.S. adopted new rules on hedge funds and private equity in July 2010 as part of the Dodd-Frank Act, and in Europe the AIFM directive on regulation and supervision of managers of alternative investment funds was adopted in November 2010. These processes pose many questions concerning the role of private equity funds during the financial crisis, which may possibly be answered only after some time has passed. Our paper cannot ultimately answer the question of whether private equity investors are "visionaries" or "locusts". Nevertheless, it attempts to provide some insights into how private equity investors, who have become an influential and important part of European

economies in recent years, affect their portfolio companies, in particular in terms of distress and bankcruptcy risks.

In further research, we would like to take a closer look at the heterogeneity of investor types and their impact on performance, financial constraints and bankruptcy. In particular, we want to investigate the impact of investor type (independent private equity investor, bank-related private equity investor, etc.) since institutional diversity is very pronounced in Europe and since these investors' differing aims, know-how and governance structures may have important effects on the way how they select and create value in their companies.

Appendix

Variable description and sources

DEPENDENT VARIABLES	DESCRIPTION
ROA	Return on equity equals the ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) to total assets. Source: Amadeus
Leverage	Ratio of total debt to total assets. Source: Amadeus
O-score Z-score Zmijewski(ZM)-score	Measures of financial constraints. Source: Amadeus
Bankruptcy	Dummy variable with a value of one if the firm goes bankrupt within the time period 1997-2010 and zero otherwise. Source: Amadeus
INDEPENDENT VARIABLES	**DESCRIPTION**
BUYOUT	Dummy variable with a value of one for buyouts within the time period 2000-2008 and zero for control firms. Source: Zephyr
POST	Dummy variable with a value of one for buyouts in the years after a buyout transaction and zero for the years prior to the transaction and for control firms. Source: Zephyr
POST1 POST2 POST3	Dummy variables equal to one for buyouts in the years 1, 2 or 3 after the transaction, respectively, and zero for buyouts in the remaining years and for control firms. Source: Zephyr
SYND	Dummy variable equal to one for syndicated transactions and zero otherwise. A transaction is classified as syndicated if the number of private equity funds is disclosed and is larger than one. Source: Zephyr

EXPER	Dummy variable equal to one for experienced PEs and zero otherwise. A buyout is allocated to the subgroup of buyouts by experienced private equity funds if the average number of executed transactions of all acquirers involved in a particular transaction exceeds one. All transactions in which the names of investors are not disclosed are assigned to the subsample of non-experienced private equity funds' buyouts. Source: Zephyr
HHI	Herfindahl-Hirschman-Index measures the market concentration for industries aggregated to a two-digit NACE-Rev.2 industry code level. HHI is defined as the sum of the squares of market shares of each company in an industry, country, and year. Source: Amadeus
FIRM SIZE	Firm size is calculated as the natural logarithm of one plus the average total assets of the firm for the analyzed time period. Source: Amadeus
FIRM AGE	Firm age is calculated as the natural logarithm of one plus the age of the firm in 2010. Source: Amadeus
BUYOUTFAVORABLE	Dummy variable with a value of one for buyouts that take place within years with favorable debt market conditions and zero for (i) control firms and for (ii) buyouts that take place within years with unfavorable debt market conditions. Source: Datastream, Zephyr

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Table 1
Number of buyouts by year, country and industry

Year	Full sample	Syndicated transactions	Stand-alone transactions	Experienced PE funds	Inexperienced PE funds
2000	55	3	15	8	47
2001	79	2	10	4	75
2002	63	2	24	15	48
2003	92	10	57	43	49
2004	161	15	110	87	74
2005	288	39	178	153	135
2006	361	82	229	246	115
2007	452	72	316	277	175
2008	378	47	262	205	173
Total	**1929**	**272**	**1201**	**1038**	**891**
Country					
Austria	19	3	14	12	7
Belgium	85	11	49	42	43
Denmark	56	2	52	38	18
Finland	47	7	38	36	11
France	480	73	273	259	221
Germany	221	32	165	154	67
Greece	2	1	1	2	0
Ireland	7	0	5	2	5
Italy	132	26	80	85	47
Luxembourg	1	0	1	1	0
Netherlands	114	14	70	63	51
Portugal	24	3	16	13	11
Spain	171	40	94	100	71
Sweden	132	12	102	73	59
United Kingdom	438	48	241	158	280
Total	**1929**	**272**	**1201**	**1038**	**891**
Industry					
Manufacturing, mining and quarrying and other industry	639	90	400	373	266
Trade, transportation and storage, accommodation and food services	429	57	264	221	208
Administration and support services	342	49	212	178	164
Information and communication	157	26	104	83	74
Financial and insurance activities	153	14	105	78	75
Public administration, defense, education, health and social services	64	10	33	29	35
Construction	60	11	30	31	29
Other services	51	12	28	28	23
Real estate activities	31	3	23	15	16
Agriculture, forestry and fishing	3	0	2	2	1
Total	**1929**	**272**	**1201**	**1038**	**891**

Table 2
Summary statistics for buyouts, control firms and all non-buyouts

Panel A

	Total Assets (th. Euros)	Age (years)	ROA	Leverage	O-score	Z-score	ZM-score
(1) Buyouts (median)	19,802	14	5.72%	57.07%	0.5067	2.5053	-1.3812
(2) Control firms (median)	20,139	16	2.74%	57.58%	0.6446	2.1810	-1.1908
(3) Full sample non-buyouts (median)	297	9	2.10%	64.98%	0.9065	2.3874	-0.6326
Ranksum test (1) vs. (2)	0.6964	0.0018	0.0000	0.3170	0.0001	0.0000	0.0156
Ranksum test (1) vs. (3)	0.0000	0.0000	0.0000	0.0000	0.0000	0.1037	0.0000
No. observ. (1)	1,777	1,777	1,663	1,643	574	1,351	1,478
No. observ. (2)	5,048	5,048	4,922	4,929	1,709	3,642	4,223
No. observ. (3)	33,778,242	32,288,668	27,403,387	28,283,282	12,895,619	16,994,347	20,594,489

Panel B

Balancing property - pscores	median	mean
(1) Buyouts	0.0007	0.0033
(2) Control group	0.0007	0.0030
Test	0.9282	0.3844

Panel A of this table reports medians of the variables total assets, age, ROA, leverage, and the indices measuring financial constraints – O-score, Z-score, and the Zmijewski score – for the sample of firms that were involved in a buyout during 2000-2008 in the EU-15 (1) compared to the control group (2) and to the full sample of non-buyouts (3). The control group (2) comprises three matching firms for each buyout identified as described in Section 4. The full sample of non-buyouts includes all firms not involved in a buyout which operate in country-industry-years where at least one buyout was executed. The data for the firms involved in buyouts and control firms correspond to the year before the transaction. The data for the full sample of non-buyout firms correspond to the whole time period from 2000 to 2008. Panel B shows the propensity scores of the samples of buyouts and control firms as well as tests for the equality of means (t-test allowing for unequal variances) and the equality of distributions (Wilcoxon-Mann-Whitney ranksum test) between both groups. Variable definitions are provided in the Appendix. The number of observations varies across items due to data availability.

Table 3
Median values and median changes from the pre-transaction period to the post-transaction period for buyout and control firms

	Values						Changes		
	ROA								
Year (transaction year=0)	t=-3	t=-2	t=-1	t=1	t=2	t=3	-1/1	-1/2	-1/3
Buyouts (median)	4.21%	4.77%	5.72%	4.39%	4.66%	4.50%	-0.2944	-0.0469	-0.3161
Control firms (median)	2.73%	2.64%	2.74%	2.76%	3.00%	2.79%	0.0081	0.0142	-0.1094*
Ranksum test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.5404	0.8289	0.6427
No. observ. (buyouts)	1372	1544	1663	1055	742	504	1000	704	489
No. observ. (control firms)	3688	4287	4922	3330	2322	1576	2972	2279	1542
	Leverage								
Year (transaction year=0)	t=-3	t=-2	t=-1	t=1	t=2	t=3	-1/1	-1/2	-1/3
Buyouts (median)	58.58%	58.72%	57.07%	59.73%	59.14%	57.40%	1.8038***	2.7076***	3.3707***
Control firms (median)	56.75%	56.61%	57.58%	55.72%	55.44%	55.90%	-0.4848***	-0.7192***	-0.6629**
Ranksum test	0.0251	0.0022	0.3170	0.0001	0.0074	0.2773	0.0000	0.0000	0.0000
No. observ. (buyouts)	1332	1513	1643	1019	700	481	935	642	436
No. observ. (control firms)	3566	4274	4929	3285	2252	1492	3173	2151	1414
	O-score (higher values indicate larger constraints)								
Year (transaction year=0)	t=-3	t=-2	t=-1	t=1	t=2	t=3	-1/1	-1/2	-1/3
Buyouts (median)	0.5794	0.5270	0.5067	0.5586	0.5683	0.6407	3.4613***	1.70	8.3399***
Control firms (median)	0.6302	0.6189	0.6446	0.6067	0.5982	0.6440	-0.5514*	-1.0139***	-0.7783*
Ranksum test	0.0785	0.0117	0.0001	0.2511	0.6493	0.6752	0.0005	0.0182	0.0003
No. observ. (buyouts)	501	548	574	354	218	162	241	147	105
No. observ. (control firms)	1340	1482	1709	1244	835	555	920	584	373
	Z-score (higher values indicate smaller constraints)								
Year (transaction year=0)	t=-3	t=-2	t=-1	t=1	t=2	t=3	-1/1	-1/2	-1/3
Buyouts (median)	2.3463	2.4716	2.5053	2.3778	2.3644	2.4569	-6.4093***	-11.5199***	-9.7154***
Control firms (median)	2.2361	2.2469	2.1810	2.2633	2.3194	2.3672	5.8387***	5.5789***	9.8690***
Ranksum test	0.0160	0.0000	0.0000	0.0962	0.7609	0.0844	0.0000	0.0000	0.0006
No. observ. (buyouts)	1104	1256	1351	798	576	381	706	506	336
No. observ. (control firms)	2746	3184	3642	2328	1639	1085	2161	1513	982

	Values						Changes		
	ZM-score (higher values indicate larger constraints)								
Year (transaction year=0)	t=-3	t=-2	t=-1	t=1	t=2	t=3	-1/1	-1/2	-1/3
Buyouts (median)	-1.2012	-1.2503	-1.3812	-1.2063	-1.2352	-1.3601	13.2860***	13.6600***	21.2147***
Control firms (median)	-1.2156	-1.2238	-1.1908	-1.3313	-1.3316	-1.2602	-2.8469	-4.5046**	-5.8065*
Ranksum test	0.4053	0.7679	0.0156	0.1515	0.2748	0.9806	0.0000	0.0000	0.0000
No. observ. (buyouts)	1208	1364	1478	948	658	447	840	589	403
No. observ. (control firms)	3136	3671	4223	2861	2015	1355	2676	1870	1243

This table shows medians of ROA, leverage, and the indices measuring financial constraints – O-score, Z-score, and the Zmijewski-score – for the sample of firms involved in a buyout during 2000-2008 in the EU-15 and the control firms. The variables are presented for a time horizon of three years prior to the transaction to three years after the transaction. The changes (in percentage points) are measured from the year prior to the buyout through the third year following each buyout (year -1 to years 1, 2, and 3). We test for the equality of distributions (Wilcoxon-Mann-Whitney rank-sum test) between the two groups of firms. Moreover, we test whether the changes are significantly different from zero (denoted by asterisks) by using a Wilcoxon signed-ranks test for medians. Variable definitions are provided in the Appendix. The number of observations varies across items due to data availability. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Table 4
Difference in differences regressions for buyouts and control firms

Panel A: All Buyouts	ROA			Leverage		
	t=1	t=2	t=3	t=1	t=2	t=3
BUYOUT	-0.5808	0.0196	0.0281*	0.0217	-0.0130	-0.0298**
	(0.582)	(0.012)	(0.019)	(0.098)	(0.035)	(0.067)
POST	3.5630	-0.8997	-0.0027	0.1035	0.0362	0.1048*
	(3.457)	(0.924)	(0.0130)	(0.0670)	(0.0240)	(0.0460)
BUYOUTxPOST	-2.9482	0.8922	-0.0240	0.0125	0.0167	-0.0509
	(3.506)	(0.924)	(0.0270)	(0.1390)	(0.0500)	(0.0950)
constant	yes	yes	yes	yes	yes	yes
F-value	1.3360	1.2453	1.3662	1.7716	2.4377	3.5878
No. observ.	8536	5962	4056	8198	5582	3696

	O-score			Z-score			ZM-score		
	t=1	t=2	t=3	t=1	t=2	t=3	t=1	t=2	t=3
BUYOUT	-0.0683***	-0.0660**	-0.0454	0.2833***	0.2419***	0.3354***	-0.0908	-0.1183	-0.2844***
	(0.0220)	(0.0290)	(0.0340)	(0.0610)	(0.0710)	(0.0900)	(0.0710)	(0.0870)	(0.1030)
POST	-0.0121	-0.0306	-0.0177	0.0786	0.0918	0.1231	-0.0155	-0.0388	-0.0135
	(0.0140)	(0.0180)	(0.0230)	(0.0430)	(0.0500)	(0.0640)	(0.0490)	(0.0600)	(0.0720)
BUYOUTxPOST	0.0523*	0.0641	0.0954**	-0.2076**	-0.2559**	-0.2239*	0.1940*	0.2972**	0.2666**
	(0.0320)	(0.0410)	(0.0490)	(0.0870)	(0.1000)	(0.1270)	(0.1010)	(0.1230)	(0.1460)
constant	yes	yes	yes	yes	yes	yes	yes	yes	yes
F-value	3.0602	1.7431	1.7174	7.5933	4.0274	5.3108	1.2631	1.8235	3.4948
No. observ.	2320	1463	955	5732	4039	2636	7027	4914	3289

Panel B: Favorable debt market conditions	ROA			Leverage		
	t=1	t=2	t=3	t=1	t=2	t=3
BUYOUT	-0.9760	0.0397**	0.0478**	0.0363	-0.0141	-0.0269
	(1.011)	(0.019)	(0.022)	(0.031)	(0.019)	(0.016)
POST	5.9574	-1.7305	-0.0026	0.0070	0.0334	0.0271
	(5.985)	(1.780)	(0.018)	(0.017)	(0.036)	(0.034)
BUYOUTxPOST	-4.9336	1.7113	-0.0422	0.1867	0.0493	0.0334
	(6.068)	(1.780)	(0.035)	(0.188)	(0.051)	(0.038)
constant	yes	yes	yes	yes	yes	yes
F-value	1.0690	1.8369	2.6747	0.9560	1.9030	2.1150
No. observ.	4934	3102	2520	4648	2859	2255

	O-score			Z-score			ZM-score		
	t=1	t=2	t=3	t=1	t=2	t=3	t=1	t=2	t=3
BUYOUT	-0.0555**	-0.0211	0.0026	0.3299***	0.2560***	0.3469***	-0.1370	-0.1168	-0.2246**
	(0.028)	(0.036)	(0.044)	(0.074)	(0.076)	(0.093)	(0.096)	(0.121)	(0.108)
POST	-0.0001569	-0.0037016	0.0186071	0.0658907	0.058696	0.0891344	-0.0092	-0.0011	0.0921
	(0.023)	(0.037)	(0.036)	(0.079)	(0.116)	(0.121)	(0.088)	(0.135)	(0.132)
BUYOUTxPOST	0.0589*	0.0346	0.0665	-0.2156*	-0.2742**	-0.1906	0.2179*	0.2923*	0.2305
	(0.035)	(0.057)	(0.059)	(0.127)	(0.129)	(0.148)	(0.125)	(0.176)	(0.175)
constant	yes	yes	yes	yes	yes	yes	yes	yes	yes
F-value	1.5377	0.15115	1.3318	7.0371	3.8174	5.0270	1.1924	1.1551	1.9084
No. observ.	1296	694	529	3075	2159	1504	4012	2515	2022

Panel C: Unfavorable debt market conditions	ROA			Leverage		
	t=1	t=2	t=3	t=1	t=2	t=3
BUYOUT	-0.0415	-0.0024	-0.0031	0.0028	-0.0118	-0.0343
	(0.042)	(0.016)	(0.025)	(0.019)	(0.021)	(0.025)
POST	0.2789	-0.0035	-0.0028	0.2310	0.0392	0.2280*
	(0.290)	(0.019)	(0.012)	(0.148)	(0.045)	(0.131)
BUYOUTxPOST	-0.2221	0.0090	0.0050	-0.2133	-0.0170	-0.1838
	(0.293)	(0.026)	(0.036)	(0.150)	(0.050)	(0.137)
constant	yes	yes	yes	yes	yes	yes
F-value	1.4912	0.0526	0.0202	1.1888	0.5284	1.7599
No. observ.	3602	2860	1536	3550	2723	1441

	O-score			Z-score			ZM-score		
	t=1	t=2	t=3	t=1	t=2	t=3	t=1	t=2	t=3
BUYOUT	-0.0844**	-0.1078**	-0.1052**	0.2314**	0.2253*	0.3187*	-0.0331	-0.1184	-0.3802**
	(0.039)	(0.046)	(0.045)	(0.102)	(0.130)	(0.177)	(0.131)	(0.138)	(0.153)
POST	-0.0272	-0.0544*	-0.0628	0.0934	0.1294	0.1688	-0.0240	-0.0781	-0.1826
	(0.029)	(0.033)	(0.039)	(0.085)	(0.088)	(0.122)	(0.097)	(0.101)	(0.140)
BUYOUTxPOST	0.0432	0.0906	0.1316**	-0.1989	-0.2328	-0.2690	0.1635	0.3013	0.3253
	(0.052)	(0.061)	(0.061)	(0.138)	(0.175)	(0.226)	(0.186)	(0.217)	(0.231)
constant	yes	yes	yes	yes	yes	yes	yes	yes	yes
F-value	2.2152	2.2857	2.3074	1.9411	1.5771	1.8352	0.36679	0.6451	2.3349
No. observ.	1024	769	426	2657	1880	1132	3015	2399	1267

This table reports the coefficients (and standard errors in parentheses) from a difference in differences approach for ROA, leverage, and the indices measuring financial constraints – O-score, Z-score, and the Zmijewski-score – for the sample of firms involved in a buyout during 2000-2008 in the EU-15 and the sample of control firms. Panel A comprises all transaction years, Panel B includes only buyouts from the years with favorable debt market conditions (spread between the high-yield rate and the LIBOR is below the median value for the analyzed time period) and their control firms, and Panel C includes only buyouts (and their control firms) from years with unfavorable debt market conditions. We trim the dependent variables at the upper and lower 1 percentile. BUYOUT is a dummy variable equal to 1 for buyouts and 0 otherwise. POST is a dummy variable which takes a value of 1 in column t=1 for observations one year after the transaction; in column t=2 for observations two years after the transaction and in column t=3 for observations three years after the transaction. BUYOUTxPOST is an interaction term for buyouts 1, 2 or 3 years after the transaction. Dependent variables definitions are provided in the Appendix. Standard errors are clustered by country, industry and year. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Table 5
Panel regressions for buyouts and control firms

	ROA				Leverage			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
POST	-0.0212		-0.0153		0.1840***		0.0882***	
	(0.048)		(0.056)		(0.061)		(0.031)	
POST1		0.0962***		0.0988***		0.0046		0.0577***
		(0.033)		(0.036)		(0.041)		(0.02)
POST2		0.0324		0.0381		-0.0055		0.0266
		(0.039)		(0.043)		(0.049)		(0.023)
POST3		0.0050		0.0069		-0.0315		0.0328
		(0.047)		(0.051)		(0.059)		(0.028)
Y_t-1			-0.0265	-0.0283			0.3113***	0.3114***
			(0.039)	(0.039)			(0.003)	(0.003)
HHI	0.0204	0.0143	-0.0117	-0.0268	0.0187	0.0194	0.0930	0.0914
	(0.262)	(0.262)	(0.412)	(0.412)	(0.327)	(0.327)	(0.221)	(0.221)
Year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Firm fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Constant	yes	yes	yes	yes	yes	yes	yes	yes
F-value	8.8384	9.0376	6.3965	6.6056	0.9215	2.2198	7.5199	4.3929
No. observ.	47,194	47,194	39,822	39,822	44,354	44,354	36,991	36,991

	O-score				Z-score				ZM-score			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
POST	0.0538***		0.0568***		-0.1469***		-0.1019***		0.1950***		0.1297***	
	(0.008)		(0.009)		(0.025)		(0.024)		(0.031)		(0.03)	
POST1		0.0060		0.0030		-0.0049		-0.0119		0.0173		0.0211
		(0.005)		(0.005)		(0.017)		(0.015)		(0.021)		(0.019)
POST2		-0.0019		-0.0044		-0.0040		0.0281		.0430*		-0.0034
		(0.006)		(0.006)		(0.02)		(0.018)		(0.024)		(0.022)
POST3		0.0176**		0.0117		0.0205		0.0326		0.1009***		0.0814***
		(0.007)		(0.008)		(0.024)		(0.021)		(0.029)		(0.027)
Y_t-1			0.2159***	0.2177***			0.2847***	0.2855***			0.3945***	0.3950***
			(0.01)	(0.01)			(0.006)	(0.006)			(0.006)	(0.006)
HHI	0.0347	0.0388	0.1485*	0.1512*	-0.2616**	-0.2578*	-0.2663	-0.2710*	0.1827	0.1812	0.1107	0.1133
	(0.065)	(0.065)	(0.081)	(0.081)	(0.133)	(0.133)	(0.164)	(0.164)	(0.169)	(0.169)	(0.211)	(0.211)
Year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Firm fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Constant	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
F-value	19.0287	14.4036	31.5396	24.7533	5.5427	3.2564	28.4624	24.1787	6.9024	5.1098	88.9624	75.8028
No. observ.	16,532	16,532	12,050	12,050	37,649	37,649	30,519	30,519	41,831	41,831	34,311	34,311

This table reports the coefficients (and standard errors in parentheses) from panel regressions with the dependent variables ROA, leverage, and the indices measuring financial constraints – O-score, Z-score, and the Zmijewski-score. We trim the dependent variables at the upper and lower 1 percentile. POST is a dummy variable with a value of 1 for buyouts in the years after a buyout transaction. POST1, POST2 or POST3 equal one for buyouts in the years 1, 2 or 3 after the transaction, respectively, and 0 for buyouts in the remaining years or for control firms. Y_t-1 denotes a lagged dependent variable. HHI is the Herfindahl-Hirschman-Index measuring market concentration. All regressions include a constant, year and firm fixed effects. Dependent variables definitions are provided in the Appendix. Standard errors are clustered by company. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Table 6
Median values and median changes from the pre-transaction period to the post-transaction period for syndicated transactions and stand-alone transactions

	Values						Changes		
	ROA								
Year (transaction year=0)	t=-3	t=-2	t=-1	t=1	t=2	t=3	-1/1	-1/2	-1/3
Syndicated (median)	3.0292%	3.6606%	4.4783%	2.6275%	2.8470%	1.7902%	0.5752	0.8752	-0.0650
Stand-alone (median)	4.2174%	4.3284%	5.6623%	4.4940%	5.4259%	4.4971%	-0.3202	-0.0200	-0.1783
Ranksum test	0.1771	0.3610	0.2381	0.3715	0.0491	0.1116	0.2821	0.4038	0.7118
No. observ. (syndicated)	214	230	239	146	89	44	145	88	44
No. observ. (stand-alone)	883	968	1030	605	407	260	435	254	132
	Leverage								
Year (transaction year=0)	t=-3	t=-2	t=-1	t=1	t=2	t=3	-1/1	-1/2	-1/3
Syndicated (median)	62.57%	62.09%	60.21%	57.16%	56.12%	64.99%	1.4402*	4.5682**	11.2925***
Stand-alone (median)	57.27%	57.88%	56.24%	60.42%	59.62%	57.40%	2.7221***	3.5767***	5.1591***
Ranksum test	0.0316	0.2471	0.1242	0.8799	0.6821	0.0873	0.4180	0.9515	0.1492
No. observ. (syndicated)	208	231	250	146	91	44	144	90	42
No. observ. (stand-alone)	867	957	1024	585	382	253	551	362	241
	O-score (higher values indicate larger constraints)								
Year (transaction year=0)	t=-3	t=-2	t=-1	t=1	t=2	t=3	-1/1	-1/2	-1/3
Syndicated (median)	0.6974	0.5939	0.6050	0.5795	0.6981	0.8785	3.0326	-1.7237	17.3129***
Stand-alone (median)	0.5706	0.5277	0.4889	0.5668	0.5594	0.6782	5.4664***	5.9554**	10.6387***
Ranksum test	0.0366	0.3266	0.0608	0.7945	0.6579	0.0803	0.4689	0.3601	0.6470
No. observ. (syndicated)	86	90	92	54	28	18	44	23	13
No. observ. (stand-alone)	316	355	354	204	112	76	137	78	48
	Z-score (higher values indicate smaller constraints)								
Year (transaction year=0)	t=-3	t=-2	t=-1	t=1	t=2	t=3	-1/1	-1/2	-1/3
Syndicated (median)	2.2539	2.2437	2.2509	2.2243	1.8637	1.9406	-3.8821	-13.4870	-10.2701
Stand-alone (median)	2.3381	2.4940	2.5630	2.3604	2.4479	2.4900	-10.9069***	-22.2073***	-15.5323**
Ranksum test	0.4257	0.2664	0.0386	0.3700	0.0629	0.2752	0.2456	0.4071	0.6214
No. observ. (syndicated)	188	212	219	123	72	38	119	71	35
No. observ. (stand-alone)	705	784	835	438	300	191	402	277	182

	Values						Changes		
	ZM-score (higher values indicate larger constraints)								
Year (transaction year=0)	t=-3	t=-2	t=-1	t=1	t=2	t=3	-1/1	-1/2	-1/3
Syndicated (median)	-0.8194	-1.0236	-1.1787	-1.0941	-1.1005	-0.6354	9.9680	2.6428	79.9491*
Stand-alone (median)	-1.3339	-1.2822	-1.4474	-1.1887	-1.2641	-1.3167	18.2279***	19.4024***	34.5917***
Ranksum test	0.0168	0.1545	0.0295	0.6941	0.8616	0.0899	0.2624	0.4914	0.4897
No. observ. (syndicated)	190	215	226	136	88	44	128	84	41
No. observ. (stand-alone)	781	853	910	541	354	231	489	325	218

This table shows medians of ROA, leverage, and the indices measuring financial constraints – O-score, Z-score, and the Zmijewski-score – for the sample of syndicated transactions and the sample of stand-alone transactions. The variables are presented for a time horizon of three years prior to the transaction to three years after the transaction. The changes (in percentage points) are measured from the year prior to each buyout through the third year following each buyout (year -1 to years 1, 2, and 3). We test for the equality of distributions (Wilcoxon-Mann-Whitney rank-sum test) between the two groups of transactions. Moreover, we test whether the changes are significantly different from zero (denoted by asterisks) by using a Wilcoxon signed-ranks test for medians. Variable definitions are provided in the Appendix. The number of observations varies across items due to data availability. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Table 7
Difference in differences approach for syndicated transactions and stand-alone transactions

	ROA			Leverage		
	t=1	t=2	t=3	t=1	t=2	t=3
SYND	1.0496	-0.0213	-0.0137	-0.0163	-0.0167	0.0150
	(1.4380)	(0.0310)	(0.0480)	(0.2500)	(0.0550)	(0.0720)
POST	1.0771	-0.0165	-0.0415*	0.1986	0.0841**	0.0923**
	(0.9140)	(0.0190)	(0.0260)	(0.1630)	(0.0350)	(0.0400)
SYNDxPOST	-1.0813	0.0019	0.0009	-0.1916	-0.0370	0.0000
	(2.0330)	(0.0440)	(0.0680)	(0.3540)	(0.0780)	(0.1020)
constant	yes	yes	yes	yes	yes	yes
F	0.4451	0.8840	1.6889	0.5312	2.2948	2.8557
No. observ.	1424	940	596	1352	870	542

	O-score			Z-score			ZM-score		
	t=1	t=2	t=3	t=1	t=2	t=3	t=1	t=2	t=3
SYND	0.0826	0.1016	0.0679	-0.2688*	-0.4357**	-0.3813	0.2129	0.1257	0.3595
	(0.0540)	(0.0740)	(0.0940)	(0.1480)	(0.1840)	(0.2770)	(0.2000)	(0.2730)	(0.3380)
POST	0.0783**	0.0829*	0.1361**	-0.1856*	-0.2563**	-0.1596	0.2507*	0.3465*	0.3724*
	(0.0380)	(0.0500)	(0.0620)	(0.1020)	(0.1190)	(0.1610)	(0.1300)	(0.1770)	(0.1940)
SYNDxPOST	-0.0695	-0.0746	0.0039	0.1999	0.1261	0.1016	-0.1874	-0.1037	0.0918
	(0.0760)	(0.1040)	(0.1330)	(0.2090)	(0.2600)	(0.3920)	(0.2830)	(0.3870)	(0.4780)
constant	yes	yes	yes	yes	yes	yes	Yes	yes	yes
F-value	2.0497	1.6074	3.0000	1.7512	4.3025	1.2206	1.5191	1.6062	2.5422
No. observ.	356	197	121	1011	667	414	1203	791	499

This table reports the coefficients (and standard errors in parentheses) from a difference in differences approach for ROA, leverage, and the indices measuring financial constraints – O-score, Z-score, and the Zmijewski-score – for the samples of syndicated transactions and the sample of stand-alone transactions. We trim the dependent variables at the upper and lower 1 percentile. SYND is a dummy variable equal to 1 for syndicated transactions and 0 otherwise. POST is a dummy variable which takes a value of 1 in column t=1 for observations one year after the transaction; in column t=2 for observations two years after the transaction and in column t=3 for observations three years after the transaction. SYNDxPOST is an interaction term for syndicated transactions 1, 2 or 3 years after the transaction. Dependent variables definitions are provided in the Appendix. Standard errors are clustered by country, industry and year. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Table 8
Panel regressions for syndicated and stand-alone transactions

	ROA				Leverage			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
POST	-0.0406***		-0.04338***		0.2329**		0.1488*	
	(0.012)		(0.012)		(0.102)		(0.086)	
SYNDxPOST	-0.030		0.019		-0.285		-0.134	
	(0.021)		(0.021)		(0.177)		(0.148)	
POST1		-0.021		-0.02248*		0.2739**		0.2561***
		(0.013)		(0.013)		(0.111)		(0.091)
POST2		-0.018		-0.018		0.2806**		-0.031
		(0.016)		(0.016)		(0.137)		(0.111)
POST3		-0.03350*		-0.03516*		0.044		0.003
		(0.019)		(0.019)		(0.167)		(0.135)
SYNDxPOST1		0.003		0.027		-0.343		-0.281
		(0.027)		(0.027)		(0.233)		(0.190)
SYNDxPOST2		-0.048		-0.010		-0.339		0.014
		(0.034)		(0.034)		(0.291)		(0.234)
SYNDxPOST3		-0.066		-0.009		-0.109		-0.030
		(0.046)		(0.046)		(0.395)		(0.319)
Y_t-1			-0.004	-0.005			0.5357***	0.5366***
			(0.016)	(0.016)			(0.011)	(0.011)
HHI	-0.048	-0.050	-0.067	-0.070	0.339	0.331	0.137	0.139
	(0.070)	(0.070)	(0.083)	(0.083)	(0.609)	(0.609)	(0.582)	(0.582)
Year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Firm fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Constant	yes	yes	yes	yes	yes	yes	yes	yes
F-value	5.5699	4.3373	5.9472	4.3492	1.9375	1.4666	1588.481	1604.923
No. observ.	9426	9426	7858	7858	8991	8991	7385	7385

	O-score				Z-score				ZM-score			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
POST	0.0818***		0.0741***		-0.1979***		-0.1496***		0.2504***		0.2053***	
	(0.015)		(0.017)		(0.040)		(0.038)		(0.056)		(0.053)	
SYNDxPOST	-0.018		-0.037		0.1386**		0.1276**		-0.150		-0.1746*	
	(0.025)		(0.028)		(0.069)		(0.064)		(0.096)		(0.090)	
POST1		0.0337**		0.0502***		-0.0927**		-0.0915**		0.1361**		0.1576***
		(0.016)		(0.018)		(0.044)		(0.041)		(0.061)		(0.056)
POST2		0.0638***		0.0460**		-0.1147**		-0.069		0.2231***		0.1603**
		(0.021)		(0.023)		(0.054)		(0.049)		(0.074)		(0.068)
POST3		0.0848***		0.0759***		-0.049		-0.044		0.1957**		0.1803**
		(0.025)		(0.028)		(0.066)		(0.061)		(0.091)		(0.083)
SYNDxPOST1		-0.026		-0.040		0.1769**		0.1670**		-0.164		-0.1986*
		(0.032)		(0.033)		(0.089)		(0.081)		(0.126)		(0.116)
SYNDxPOST2		-0.021		-0.036		0.036		0.070		-0.112		-0.2535*
		(0.043)		(0.045)		(0.114)		(0.102)		(0.154)		(0.141)
SYNDxPOST3		0.041		-0.002		0.033		0.152		0.139		-0.025
		(0.053)		(0.056)		(0.151)		(0.138)		(0.211)		(0.190)
Y_t-1		0.2949***	0.2992***				0.3068***	0.3097***			0.4221***	0.4228***
		(0.0250)	(0.0250)				(0.0130)	(0.0130)			(0.0130)	(0.0130)
HHI	-0.0681	-0.0660	0.0645	0.0658	0.1468	0.1504	-0.1407	-0.1499	-0.2886	-0.2913	0.0090	0.0169
	(0.0950)	(0.0950)	(0.1050)	(0.1050)	(0.2280)	(0.2290)	(0.2450)	(0.2460)	(0.3250)	(0.3250)	(0.3480)	(0.3480)
Year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Firm fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Constant	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
F-value	5.4140	3.8799	10.8181	7.8063	2.1369	1.4166	11.9826	8.8245	3.4155	2.6288	20.9491	15.3003
No. observ.	3188	3188	2251	2251	7739	7739	6201	6201	8452	8452	6831	6831

This table reports the coefficients (and standard errors in parentheses) from panel regressions with the dependent variables ROA, leverage, and the indices measuring financial constraints – O-score, Z-score, and the Zmijewsk-score – for syndicated and stand-alone transactions. We trim the dependent variables at the upper and lower 1 percentile. POST is a dummy variable with a value of one in all years after the transaction. SYNDxPOST is an interaction term which equals one for syndicated transactions in all years after the respective transaction. POST1, POST2 or POST3 equal one only in the year 1, 2 or 3 after the transaction, respectively, and 0 in the remaining years. SYNDxPOST1/POST2/POST3 are interaction terms with a value of one for syndicated transactions in the respective year 1, 2 or 3 after the transaction. Y_t-1 denotes a lagged dependent variable. HHI is the Herfindahl-Hirschman-Index measuring market concentration. All regressions include a constant, year and firm fixed effects. Dependent variable definitions are provided in the Appendix. Standard errors are clustered by company. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Table 9
Median values and median changes from the pre-transaction period to the post-transaction period for experienced and inexperienced PE funds

	Values						Changes		
	ROA								
Year (transaction year=0)	t=-3	t=-2	t=-1	t=1	t=2	t=3	-1/1	-1/2	-1/3
Experienced PE funds (median)	3.82%	4.30%	5.76%	4.52%	5.48%	4.07%	0.0514	0.8435	-0.1615
Inexperienced PE funds (median)	4.46%	5.42%	5.62%	4.29%	4.13%	5.04%	-0.5635	-0.7997	-0.4794
Ranksum test	0.0390	0.0139	0.9963	0.4446	0.1694	0.1952	0.2175	0.0535	0.9886
No. observ. (experienced)	792	857	908	530	349	206	522	347	215
No. observ. (inexperienced)	580	687	756	525	393	298	496	372	286
	Leverage								
Year (transaction year=0)	t=-3	t=-2	t=-1	t=1	t=2	t=3	-1/1	-1/2	-1/3
Experienced PE funds (median)	58.55%	58.68%	57.41%	60.24%	58.95%	59.34%	2.5259***	3.8058***	7.0417***
Inexperienced PE funds (median)	58.82%	58.73%	56.77%	58.76%	59.47%	56.06%	0.6838**	1.2055*	1.3946
Ranksum test	0.9547	0.8677	0.5361	0.8123	0.8478	0.1328	0.2201	0.0873	0.0146
No. observ. (experienced)	765	843	911	523	338	207	507	334	203
No. observ. (inexperienced)	567	670	733	496	362	274	447	325	245
	O-score (higher values indicate larger constraints)								
Year (transaction year=0)	t=-3	t=-2	t=-1	t=1	t=2	t=3	-1/1	-1/2	-1/3
Experienced PE funds (median)	0.5620	0.5229	0.5180	0.5630	0.6378	0.7073	4.0032**	1.7000	11.1059***
Inexperienced PE funds (median)	0.6006	0.5362	0.4947	0.5462	0.5467	0.5685	2.9732	0.5146	0.5393
Ranksum test	0.9440	0.7391	0.4962	0.3925	0.8416	0.1399	0.3233	0.4189	0.0215
No. observ. (experienced)	288	327	319	190	106	72	140	77	47
No. observ. (inexperienced)	213	221	255	164	112	90	104	73	59
	Z-score (higher values indicate smaller constraints)								
Year (transaction year=0)	t=-3	t=-2	t=-1	t=1	t=2	t=3	-1/1	-1/2	-1/3
Experienced PE funds (median)	2.3794	2.5237	2.5279	2.3491	2.4015	2.4436	-10.1986**	-16.2143***	-15.0005**
Inexperienced PE funds (median)	2.3101	2.4216	2.4771	2.4058	2.3287	2.4585	-5.0551*	-7.7909*	-2.2134
Ranksum test	0.9387	0.4072	0.6977	0.5597	0.8388	0.2608	0.5975	0.3058	0.1417
No. observ. (experienced)	653	730	767	407	269	161	391	261	158
No. observ. (inexperienced)	451	526	585	391	307	220	331	261	189

	Values						Changes		
	ZM-score (higher values indicate larger constraints)								
Year (transaction year=0)	t=-3	t=-2	t=-1	t=1	t=2	t=3	-1/1	-1/2	-1/3
Experienced PE funds (median)	-1.2158	-1.2263	-1.3476	-1.2034	-1.2666	-1.1238	17.3216***	14.6057***	44.3548***
Inexperienced PE funds (median)	-1.1718	-1.2855	-1.4694	-1.2144	-1.2084	-1.4624	12.1407**	12.5998**	8.6477
Ranksum test	0.5924	0.4175	0.3936	0.7874	0.9382	0.0397	0.7623	0.5996	0.0181
No. observ. (experienced)	710	773	818	487	320	194	450	302	185
No. observ. (inexperienced)	498	591	661	461	338	253	406	301	228

This table shows medians of ROA, leverage, and the indices measuring financial constraints – O-score, Z-score, and the Zmijewski-score – for the sample of experienced PE funds and the sample of inexperienced PE funds. The variables are presented for a time horizon of three years prior to the transaction to three years after the transaction. The changes (in percentage points) are measured from the year prior to each buyout through the third year following each buyout (year -1 to years 1, 2, and 3). We test for the equality of distributions (Wilcoxon-Mann-Whitney rank-sum test) between the two groups of transactions. Moreover, we test whether the changes are significantly different from zero (denoted by asterisks) by using a Wilcoxon signed-ranks test for medians. Variable definitions are provided in the Appendix. The number of observations varies across items due to data availability. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Table 10
Difference in differences approach for experienced and inexperienced PE funds

	ROA			Leverage		
	t=1	t=2	t=3	t=1	t=2	t=3
EXPER	-1.150	0.018	0.028	0.009	-0.011	-0.010
	(0.822)	(0.019)	(0.031)	(0.148)	(0.032)	(0.036)
POST	-0.001	-0.005	-0.017	0.024	0.0587	0.051
	(0.827)	(0.019)	(0.028)	(0.152)	(0.032)	(0.034)
EXPERxPOST	1.216	-0.005	-0.023	0.176	-0.012	0.007
	(1.162)	(0.027)	(0.043)	(0.210)	(0.045)	(0.051)
constant	yes	yes	yes	yes	yes	yes
F-value	0.9623	0.5805	1.1520	0.6631	2.1102	2.0247
No. observ.	2000	1409	978	1870	1286	874

	O-score			Z-score			ZM-score		
	t=1	t=2	t=3	t=1	t=2	t=3	t=1	t=2	t=3
EXPER	-0.037	-0.026	-0.060	-0.113	-0.058	-0.037	0.023	0.006	0.056
	(0.040)	(0.050)	(0.057)	(0.106)	(0.124)	(0.157)	(0.131)	(0.166)	(0.181)
POST	0.019	0.015	0.029	-0.162	-0.118	-0.069	0.176	0.250	0.168
	(0.042)	(0.049)	(0.053)	(0.109)	(0.122)	(0.148)	(0.133)	(0.164)	(0.169)
EXPERxPOST	0.037	0.036	0.113	0.061	-0.095	-0.072	0.005	0.017	0.196
	(0.056)	(0.070)	(0.080)	(0.149)	(0.175)	(0.223)	(0.185)	(0.235)	(0.256)
constant	yes	yes	yes	yes	yes	yes	yes	yes	yes
F-value	1.1443	0.3998	2.2509	1.1685	1.5087	0.3371	1.2297	1.6497	2.0410
No. observ.	482	297	211	1413	1017	674	1681	1179	809

This table reports the coefficients (and standard errors in parentheses) from a difference in differences approach for ROA, leverage, and the indices measuring financial constraints – O-score, Z-score, and the Zmijewski-score – for the sample of experienced PE funds and the sample of inexperienced PE funds. We trim the dependent variables at the upper and lower 1 percentile. EXPER is a dummy variable equal to 1 for experienced PE funds and 0 otherwise. POST is a dummy variable which takes a value of 1 in column t=1 for observations one year after the transaction; in column t=2 for observations two years after the transaction and in column t=3 for observations three years after the transaction. EXPERxPOST is an interaction term for experienced PE funds 1, 2 or 3 years after the transaction. Dependent variables definitions are provided in the Appendix. Standard errors are clustered by country, industry and year. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Table 11
Panel regressions for experienced and inexperienced PE funds

	ROA				Leverage			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
POST	-0.0434***		-0.0386***		0.2505		0.1623**	
	(0.0100)		(0.0110)		(0.1680)		(0.0770)	
EXPERxPOST	0.0159		0.0135		-0.3995*		-0.1572*	
	(0.0120)		(0.0130)		(0.2050)		(0.0930)	
POST1		-0.0163		-0.0118		0.0760		0.2938***
		(0.0120)		(0.0120)		(0.1990)		(0.0860)
POST2		-0.0224*		-0.0157		-0.0068		0.1089
		(0.0140)		(0.0140)		(0.2320)		(0.0990)
POST3		-0.0235		-0.0188		-0.2939		0.0445
		(0.0150)		(0.0150)		(0.2650)		(0.1130)
EXPERxPOST1		0.0070		0.0045		-0.2393		-0.3146***
		(0.0170)		(0.0170)		(0.2770)		(0.1200)
EXPERxPOST2		0.0049		0.0049		-0.1820		-0.1266
		(0.0200)		(0.0200)		(0.3320)		(0.1430)
EXPERxPOST3		-0.0121		-0.0100		0.0783		-0.0594
		(0.0240)		(0.0240)		(0.4010)		(0.1720)
Y_t-1			0.0016	0.0011			0.2742***	0.2744***
			(0.0130)	(0.0130)			(0.0040)	(0.0040)
HHI	-0.0340	-0.0351	-0.0385	-0.0427	0.0646	0.0863	0.1564	0.1533
	(0.0540)	(0.0540)	(0.0680)	(0.0680)	(0.8970)	(0.8970)	(0.4840)	(0.4840)
Year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Firm fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Constant	yes	yes	yes	yes	yes	yes	yes	yes
F-value	5.6847	4.1534	5.6978	4.1241	1.0390	1.1762	9.0745	12.9235
No. observ.	12603	12603	10520	10520	11926	11926	9792	9792

	O-score				Z-score				ZM-score			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
POST	0.0633***		0.0544***		-0.1277***		-0.0896**		0.1418***		0.1092**	
	(0.0140)		(0.0160)		(0.0380)		(0.0380)		(0.0510)		(0.0500)	
EXPERxPOST	0.0131		0.0098		0.0010		0.0023		-0.0136		-0.0289	
	(0.0180)		(0.0200)		(0.0470)		(0.0460)		(0.0620)		(0.0600)	
POST1		0.0147		0.0160		-0.0372		-0.0320		0.0744		0.0908
		(0.0170)		(0.0180)		(0.0460)		(0.0430)		(0.0610)		(0.0560)
POST2		0.0327*		0.0321		-0.0249		-0.0005		0.1894***		0.1489**
		(0.0200)		(0.0210)		(0.0520)		(0.0470)		(0.0700)		(0.0630)
POST3		0.04207*		0.0284		0.0412		0.0159		0.0657		0.0352
		(0.0220)		(0.0230)		(0.0610)		(0.0550)		(0.0800)		(0.0720)
EXPERxPOST1		0.0090		0.0151		0.0055		-0.0055		-0.0318		-0.0558
		(0.0230)		(0.0240)		(0.0640)		(0.0600)		(0.0840)		(0.0780)
EXPERxPOST2		0.0153		-0.0112		-0.0649		-0.0330		-0.0886		-0.1346
		(0.0280)		(0.0300)		(0.0750)		(0.0690)		(0.1000)		(0.0910)
EXPERxPOST3		0.0464		0.0418		-0.0872		-0.0283		0.1326		0.1432
		(0.0330)		(0.0350)		(0.0920)		(0.0850)		(0.1210)		(0.1090)
Y_t-1			0.2877***	0.2935***			0.2793***	0.2810***			0.4231***	0.4233***
			(0.0210)	(0.0210)			(0.0120)	(0.0120)			(0.0110)	(0.0110)
HHI	-0.0296	-0.0254	0.1160	0.1201	-0.1537	-0.1562	-0.1428	-0.1576	0.0508	0.0561	-0.1393	-0.1287
	(0.0870)	(0.0870)	(0.0940)	(0.0940)	(0.1980)	(0.1980)	(0.2330)	(0.2330)	(0.2670)	(0.2670)	(0.3020)	(0.3020)
Year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Firm fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Constant	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
F-value	6.2696	3.9056	12.6182	8.5533	2.4212	1.5476	9.6471	7.6422	3.5765	3.2360	29.0177	23.0730
No. observ.	4212	4212	2959	2959	10260	10260	8216	8216	11243	11243	9083	9083

This table reports the coefficients (and standard errors in parentheses) from panel regressions with the dependent variables ROA, leverage, and the indices measuring financial constraints – O-score, Z-score, and the Zmijewsk-score – for experienced and inexperienced PE funds. We trim the dependent variables at the upper and lower 1 percentile. POST is a dummy variable with a value of one in all years after the transaction. EXPERxPOST is an interaction term which equals one for transactions with experienced PE funds in all years after the respective transaction. POST1, POST2 or POST3 equal one only in the year 1, 2 or 3 after the transaction, respectively, and zero in the remaining years. EXPERxPOST1/POST2/POST3 are interaction terms with a value of one for transactions with experienced PE funds in the respective year 1, 2 or 3 after the transaction. Y_t-1 denotes a lagged dependent variable. HHI is the Herfindahl-Hirschman-Index measuring market concentration. All regressions include a constant, year and firm fixed effects. Dependent variable definitions are provided in the Appendix. Standard errors are clustered by company. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Table 12
Probability of bankruptcy for buyouts and control firms, syndicated and stand-alone transactions, experienced and inexperienced PE funds

	All buyouts and control firms		Syndicated transactions and control firms	Stand-alone transactions and control firms	Experienced PE funds and control firms	Inexperienced PE funds and control firms	All buyouts and all non-buyout firms
	Bankruptcy						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	logit	logit	logit	logit	logit	logit	IV
BUYOUT	0.0911		-0.4995	0.1722	-0.2462	0.6002**	0.2172
	(0.1680)		(0.4760)	(0.2140)	(0.2750)	(0.2830)	(0.1896)
BUYOUT_FAVORABLE		-0.0512					
		(0.2026)					
FIRM AGE	-0.1079	-0.0941	-0.1585	-0.0209	-0.0032	-0.1395	0.0060***
	(0.0920)	(0.0914)	(0.3200)	(0.1170)	(0.124)	(0.1760)	(0.0001)
FIRM SIZE	-0.1567***	-0.1427***	-0.2763**	-0.1479***	-0.2231***	-0.1203*	-0.1225***
	(0.0490)	(0.0495)	(0.1370)	(0.0550)	(0.0560)	(0.0760)	(0.0105)
Country dummies	yes	Yes	yes	yes	yes	yes	yes
Industry dummies	yes	yes	yes	yes	yes	yes	yes
Constant	yes	yes	yes	yes	yes	yes	yes
Chi^2 / (F-value)	234.5529	279.1841	52.6477	132.5374	122.8790	125.8810	(17584.16)
No. observ.	6,972	6,960	432	3,537	2,825	1,235	7,449,062

This table presents the coefficients (and standard errors in parentheses) from cross-sectional logit estimations in Models (1) to (6) and from IV regressions in Model (7) with the dependent variable BANKRUPTCY, which takes a value of one if the firm goes bankrupt in the time period of 1997-2010 and a value of zero otherwise for (1)/(2) all buyout and control firms, (3) syndicated transactions and control firms, (4) stand-alone transactions and control firms (5) transactions of experienced PE funds and control firms, (6) transactions of inexperienced PE funds and control firms; (7) all buyouts and all non-buyout firms. BUYOUT is a dummy variable equal to one for buyouts and zero otherwise. BUYOUT_FAVORABLE is a dummy variable equal to one for buyouts in favorable debt market conditions (below median spread years) and zero otherwise. AGE is the natural log of one plus the age of the firm in 2010. FIRM SIZE is the natural log of one plus the average total assets of the firm for the analyzed time period. All regressions include a constant, country and industry fixed effects. The standard errors are clustered by country and industry. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.