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# Private Equity and the Resolution of Financial Distress

Finance Working Paper N° 331/2012
Revised July 2021

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# Abstract

We examine the role of private equity (PE) sponsors in the resolution of financial distress of portfolio companies. PE-backed firms have higher leverage and default at higher rates than other companies borrowing in leverage loan markets. However, conditional on contemporaneous leverage, default rates are not significantly higher. Among leveraged borrowers that experience a default, we find that PE-backed firms restructure more quickly and more often out of court, and are less likely to be liquidated. PE owners are more likely to retain control post-restructuring than other pre-default owners, often by infusing capital as firms approach distress. Our results suggest that while PE investors contribute to more defaults due to the high leverage they put on companies, this cost is reduced by the ability of PE investors to manage financial distress compared to other owners.



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# Private Equity and the Resolution of Financial Distress*

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**Abstract**

We examine the role of private equity (PE) sponsors in the resolution of financial distress of portfolio companies. PE-backed firms have higher leverage and default at higher rates than other companies borrowing in leverage loan markets. However, conditional on contemporaneous leverage, default rates are not significantly higher. Among leveraged borrowers that experience a default, we find that PE-backed firms restructure more quickly and more often out of court, and are less likely to be liquidated. PE owners are more likely to retain control post-restructuring than other pre-default owners, often by infusing capital as firms approach distress. Our results suggest that while PE investors contribute to more defaults due to the high leverage they put on companies, this cost is reduced by the ability of PE investors to manage financial distress compared to other owners.

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## I. Introduction

Leveraged buyouts (LBOs) by private equity (PE) funds have played an important role in corporate finance for over three decades. Dating back to Jensen (1989), proponents have identified the benefits of LBOs to include the discipline of high leverage, concentrated ownership, and monitoring by PE investors. Subsequent empirical studies have examined the effects of PE ownership on firm operating and financial performance.[1]

An important but unanswered question is whether the high leverage used in PE buyout transactions contributes to disproportionately high default rates and deadweight financial distress costs among buyout targets. Kaplan and Stein (1993) argue that excessive amounts of leverage during the "hot" LBO market of the late 1980s led to many defaults. Axelson et al. (2013) show that PE deal leverage increases in times of easy credit, and that higher leverage correlates with higher transaction prices and lower fund returns. However, whether the high leverage used in PE buyouts leads to excessive defaults and losses related to the costs of financial distress will depend, at least in part, on how PE sponsors manage the restructuring of distressed portfolio companies.

The main goal of our paper is to investigate the connections between private equity ownership and both the probability of default and resolution of financial distress. The relation between PE ownership and the risk and severity of distress is unclear. On the one hand, actions that boost the short-term returns to PE owners, such as increasing leverage to pay large dividends or pursue acquisition programs, could drain liquidity, putting PE-owned firms at higher risk of default. On the other hand, PE sponsors could help avoid defaults or resolve financial distress in a manner that better preserves firm value when defaults do occur. PE funds often have reserves that can be used to recapitalize a distressed portfolio company to restore its solvency. Further, reputational concerns with lenders and other stakeholders might provide incentives for PE sponsors to ensure that distress is resolved in a way that results in lower losses to these stakeholders.

[1] See, e.g., Guo, Hotchkiss and Song (2012), Cohen, Mills and Towery (2014), Cohen, Hotchkiss, and Towery (2020), Boucly et al. (2011), Davis, et al. (2014), Eaton et al (2020), Harris, et al. (2014), and Bernstein et al. (2016). Cumming et al (2007) and Kaplan and Strömberg (2009) provide thorough reviews of a large body of earlier PE research. See also Section II.C. below.



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To conduct our analysis, we follow a set of 2,151 firms that borrow in the leveraged loan market between 1997 through 2010, tracking when PE funds enter and exit as owners of these firms. Borrowers in this market are highly leveraged, below-investment-grade credit firms that pay relatively high spreads on their loans. While their debt consists mostly of bank loans and other private credit, leveraged loan borrowers frequently have ratings on their loans from Moody's or S&P, enabling us to observe when and if these firms default. During our sample period, the leveraged loan market was the predominant source of credit for PE transactions, and about half our sample consists of companies that are "PE-backed"; that is, acquired by a PE fund through an LBO at some point during our sample period. The remaining borrowers in the leveraged loan market are similar to the PE-backed firms in that they deliberately choose to take on relatively large debt loads, providing a control group to compare how PE ownership differentially impacts firm behavior at high levels of debt.

The first part of our analysis studies the frequency with which PE-backed firms become financially distressed, using a Cox proportional hazard model with time-varying explanatory covariates to predict defaults.[2] We find that PE-backed firms default more frequently than non PE-backed firms, but PE-backed firms also carry more debt than non PE-backed firms. Once we control for indebtedness as of the date of the last leveraged loan financing, differences in default probabilities between the two groups disappear.[3] This results in a glass "half full / half empty" interpretation of the relationship between PE ownership and default rates: on the one hand it is high leverage, rather than PE-backing per se, that increases the risk of default; on the other hand, PE-backed firms have higher leverage than other borrowers, thus exposing their portfolio companies to more default risk. The extent to which higher default rates translate to value destruction will depend on the expected financial distress costs of the PE-backed companies that default, and on the expertise that PE firms have in resolving financial distress in a manner that minimizes deadweight costs.

[2] Our methodology follows that of Shumway (2001), Bharath and Shumway (2008), and related default prediction literature summarized in Altman, Hotchkiss, and Wang (2019), but adds a co-variate for PE-ownership instead of or in addition to leverage. We measure time-varying leverage as of the most recent leveraged loan deal preceding the year of potential default.

[3] Consistent with this finding, estimating our model using only observations for PE-backed firms, leverage at the time of the most recent financing remains related to the observed likelihood of default.



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The second part of our paper focuses on defaulting firms and assesses how these firms resolve their financial distress following the default. We show that PE-backed firms in distress restructure more often through consensual agreements accomplished outside of bankruptcy court, or through pre-packaged bankruptcy agreements ("pre-packs") that are negotiated prior to filing. The differences between PE-backed and non PE-backed firms are economically meaningful; over half (52%) of all PE-backed restructurings are accomplished entirely out of court or through a pre-pack, whereas most (64%) non PE-backed firms restructure via a traditional "free-fall" Chapter 11 bankruptcy filing.

PE-backed firms in default also resolve financial distress more quickly. The median PE-backed firm completes its restructuring 4.2 months (35%) faster than the median non PE-backed firm. This finding derives partly from the fact that PE-backed firms restructure more frequently out-of-court and through pre-packs. But PE-backed firms also move through free-fall Chapter 11 filings roughly three months (25%) faster than non PE-backed firms. Because both direct and indirect costs increase with time spent in distress, particularly in bankruptcy court, these findings suggest that the costs of resolving financial distress are lower for PE-backed firms than similar non PE-backed firms.

The outcome of distress resolution is also quite different for PE-backed firms compared with firms that are not owned by a PE sponsor prior to default. PE-backed firms are more likely to exit their restructuring as a viable independent entity and less likely to liquidate than non PE-backed firms. Meanwhile, PE owners retain a controlling ownership stake in the distressed company in a substantial proportion (28%) of restructurings, compared to equity owners of non PE-backed firms, who are almost always wiped out in a restructuring (retaining control in only 4% of cases).

One explanation for the difference in these characteristics of restructurings is that PE owners facilitate a quick turnaround by deploying fresh capital into a distressed firm. We study the propensity for pre-default equity owners -- both PE and non PE -- to invest capital into their companies when they are distressed. 29% of PE-backed firms receive some form of capital injection in the period leading to or at the time of default, compared with only 18% of firms without a PE owner. Controlling for the presence of a PE owner, firms that receive fresh capital from their owners within two years prior to default are more likely to resolve their distress out of court (or through a pre-pack), restructure more quickly, and retain



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ownership in the distressed company. These findings suggest that the ability of PE-backed firms to move efficiently through a restructuring derives, in part, from the willingness of PE owners to step in and provide liquidity to a struggling firm.

A caveat to our findings for differences in restructuring characteristics is that PE funds choose to acquire firms with lower expected costs of financial distress; that is, the behavior we observe is endogenous to the types of firms acquired by PE owners. While we cannot empirically rule out selection effects, we provide additional evidence that is more suggestive of a causal impact of PE ownership on restructuring outcomes. First, we repeat our analysis of restructuring outcomes on a restricted sample constructed with propensity score matching methods and obtain virtually identical results for each of our tests for differences in restructuring outcomes. Second, we re-estimate the restructuring regressions with an additional indicator variable for whether a firm was ever owned by a PE investor, including firms that are PE-backed at the time of default as well as firms that were previously PE-owned, but where the PE owner exited a year or more before default. To the extent that our results are driven by PE sponsors selecting buyout targets with low ex ante distress costs, there should be no effect of a PE owner being present at default once this additional control variable is included. But we find that the PE-dummy is still statistically and economically significant for most of the default outcomes we consider, while the control is mostly insignificant, suggesting that the effect is driven by the presence of a PE owner at default rather than the selection of the company by a PE owner in the first place. Lastly, our cross-sectional findings that outcomes are related to PE fund characteristics, and our observation that specific actions by PEs -- infusions of capital -- are related to more efficient outcomes, are difficult to explain by pure selection.

One interpretation of our findings is that optimal leverage is higher for PE-backed firms because they can restructure, conditional on default, at lower cost. A contrasting explanation is that the higher leverage common to LBOs increases the frequency of costly defaults by PE-acquired firms, but PE sponsors are successful at quickly implementing restructurings through which they avoid liquidation and also retain control. Our finding that PE firms often infuse equity into their distressed companies, and that companies receiving capital injections appear to resolve financial distress more quickly, suggests a positive role for PE firms in restructuring portfolio companies. Nevertheless, we cannot exclude entirely



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the possibility that PE sponsors are simply good at selecting companies with lower ex ante financial distress costs and then direct funding when those companies default to the subset with that are the easiest – and least costly – to restructure.

While our sample periods ends in 2010, high corporate leverage, as well as PE ownership, have continued to play a large -- if not accelerated – role in the economy (Altman, 2020). As a result, PE presence remains pervasive in distressed restructurings. For instance, following the onset of the Covid crisis, PE-backed companies comprised one-half of all leveraged loan defaults during the second quarter of 2020 (Idzelis, 2020). Consistent with our findings, defaulting PE-backed companies were more likely to restructure out of court, with their owners keeping control, compared to their non PE-backed counterparts.[4]

The rest of the paper is organized as follows. Section II reviews the extant literature discussing the costs and benefits of deploying high leverage in PE-backed companies, and how high leverage combined with PE ownership might relate to incentives of the PE equity owners when portfolio companies are distressed. Section III provides an overview of our data and sample construction. Sections IV through VII present our results. Section VIII discusses robustness and interpretation issues. Section IX summarizes the findings and implications of our paper.

## II. Related Literature and Hypotheses

### *A. Private Equity and Financial Distress: Potential Costs of Excessive Leverage*

Previous research has suggested that PE sponsors tend to use "excessive" leverage in their transactions, that is, more leverage than would be optimal for maximizing firm value (and returns to PE investors), particularly during times when credit markets are booming and PE transaction volumes are high. Kaplan and Stein (1993) argue that excessive leverage led to a high incidence of financial distress among PE transactions undertaken in the LBO boom of the late 1980s. More recently, Axelson, et al. (2013) show that leverage levels in PE transactions are largely unrelated to firm and industry

[4] See Izdelis (2020): "[Moody's analyst] said that private equity firms, being skillful financial engineers, will try to avoid bankruptcy through distressed debt exchanges. While still constituting a default, debt swaps can help buyout firms salvage their equity stakes as the company's lenders take a haircut. We expect in the current downturn that if the company is owned by a private equity sponsor, they will opt for an out-of-court debt restructuring."



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characteristics, and are driven instead by economy-wide credit conditions. Moreover, PE deal leverage is associated with higher transaction prices and lower buyout fund returns, suggesting that PE funds overpay when access to credit is relatively easy.[5]

One reason why PE fund managers may be compelled to employ excessive leverage has to do with the structure of their compensation contracts. In particular, the call option-like payoff of the profit share to the "general partner" provides the PE fund manager with the extra incentive to invest in more risky investments because the manager's "carried interest" increases with large stock price increases, but has limited downside risk.[6] "Limited partner" investors in the fund bear most of the downside risk.[7] By using deploying more leverage in acquisitions, the PE fund manager increases the expected profits and volatility of the fund, leading to a higher value of carried interest.

The incentive for PE fund managers to lever up their investments raises the concern that PE investors put too much debt on the firms they acquire, beyond what would be optimal for maximizing firm value (given a trade-off between tax and incentive benefits of debt against the costs of financial distress). This, in turn, potentially leads to excessive defaults and high financial distress costs among the PE fund's portfolio companies, compared to other firms.

A second argument for why PE transactions may be associated with excessive leverage and high costs of financial distress relates to the presumed short-termism of PE fund managers.[8] PE funds have a limited life, usually 10-12 years, during which the fund needs to make investments, exit the investments,

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[5] Additionally, Ljungqvist et al (2007) find that buyout funds accelerate their investment flows when credit market conditions loosen, and Gorbenko and Malenko (forthcoming) present evidence that financial buyers bid more aggressively in auctions for firms when credit conditions are stronger.

[6] These incentives are compounded by management fees earned by general partners that are not passed on to limited partners. See, e.g,. Phalippou, et al. (2018).

[7] See Robinson and Sensoy (2013) for the structure of PE fund compensation. Axelson et al (2009) provide a formal model of the PE fund and compensation structure, as well as the use of leverage, as an optimal contracting solution to the agency problem between PE funds and their investors. Although the discipline of debt mitigates overinvestment in some states of the world in their model, PE funds will still tend to overinvest during periods when access to debt is more favorable.

[8] Empirical evidence examining whether PE behavior exhibits short-termism is mixed. On the one side, Lerner et al (2011) find evidence that PE-owned funds make more efficient long-term investments in innovation. Similarly, Cao and Lerner (2009) find that PE-backed IPOs outperform other IPOs, inconsistent with short-termism. On the other side, Eaton, et al. (2020) show that PE investments in higher education institutions leads to higher government-subsidy capture and worse student outcomes, consistent with short-termism. Similarly, the evidence in Gupta et al (2021) imply that the cost efficiencies realized by PE investors in nursing homes come at the expense of quality of care.



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and pay proceeds back to their investors. The limited investment horizon raises the concern that the PE sponsors may emphasize short-term profits at the expense of long-run value.

PE critics often cite "dividend recapitalizations," in which the proceeds of additional debt raised by the portfolio company are used to pay out a dividend to PE owners, as an example of such short-termism. In the extreme case, dividend recapitalizations can provide a high enough short-term investment return to the PE fund that the fund loses incentive to expend effort to support the portfolio company in the longer run. Similarly, PE sponsors could reap short-term profits in other ways, such as selling off assets or neglecting long-term investments. Critics argue that this type of behavior leads to costly defaults, as PE portfolio companies struggle under their high debt loads without support from their PE owners, who have already recovered their investment.

The extent to which incentives for PE funds to use excessive leverage impacts corporate performance is an empirical question. For instance, if PE-backed firms use suboptimally high levels of debt, then PE-backed firms should default more often than other leveraged borrowers. However, it is also important to consider, conditional on default, the role of PEs in resolving distress for portfolio firms. The arguments for the use of excessive leverage may also predict that PE sponsors have less incentive to support a distressed portfolio company compared to other owners, for example in providing additional liquidity through a capital infusion or working to negotiate with creditors. These arguments suggest that PE-backed firms will experience higher costs of financial distress than other firms.

*B. Private Equity and Financial Distress: Potential Benefits of PE Ownership*

While incentives may exist for PE sponsors to use leverage in excess of an optimal amount, there are also reasons to believe PE owners employ high levels of leverage because they are better at managing financial distress. Jensen (1989) argues that the PE ownership model – with concentrated ownership, strong incentives to managers and employees, and high leverage – is a superior form of corporate governance. High leverage, and the threat of financial distress, forces management to deal with operational problems earlier and more forcefully than they would in the absence of debt repayment obligations. Thus, PE backed firms should be better able to avoid default, and/or resolve financial distress at lower cost when they do default.



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Additional factors could lower both the likelihood and cost of financial distress for PE-backed firms. First, to the extent that a PE owner has undrawn commitments ("dry-powder") left in the fund when a portfolio company becomes distressed, this locked-in capital can be used to support the distressed firm by infusing new money and making it easier to strike a deal with creditors. A non PE-backed firm in a similar situation would potentially need to raise external capital from less informed, arms-length investors who would face greater adverse selection frictions (Myers and Majluf, 1984). Moreover, a PE fund can provide the "insurance" of locked-in capital to many portfolio companies with a relatively small amount of capital left, as long as default risk is not too correlated across their investments. Hence, fund capital reserves enable the PE sponsor to increase the debt capacity of its portfolio companies, similar to the borrowing advantage of a diversified conglomerate (see e.g. Lewellen, 1971).[9]

Second, because PE sponsors are repeat players in the buyout market, recurrent episodes of costly financial distress could harm reputations with lenders and other stakeholders (e.g. fund investors and management teams).[10] If a bank or other lender experiences large losses in connection with a PE-backed firm's default, these lenders may not lend on favorable terms for future buyouts.[11] Everything else equal, this gives the PE sponsor a stronger incentive to avoid defaults, and to reduce the costs to lenders and stakeholders when a default does occur. For example, a PE fund may have a greater incentive to provide more capital to a distressed company even if most of the value of such an equity infusion would benefit creditors more than shareholders (i.e. Myers, 1977).

Third, PE sponsors may develop specific skills in managing firms in financial distress. Established PE investors are likely to have had some experience in managing the distress and restructuring process due to previous portfolio companies defaults. In addition, many PE sponsors also

[9] Consistent with this argument, Bernstein, et al. (2017) show that the performance and financing of PE-backed firms were less sensitive to the downturn associated with the 2008 financial crisis. The authors find that PE-backed firms had greater access to both debt and equity financing (at a lower cost) during the financial crisis, compared to non PE-backed firms.

[10] We define the "PE sponsor" as the fund manager, which manages the particular PE fund. A given PE sponsor can raise several buyout funds over time, where each fund has a 10-year life and its own committed capital.

[11] Demiroglu and James (2010) show that more reputable PE sponsors pay lower loan rates and are able to obtain higher leverage in their buyout deals. Ivashina and Kovner (2011) show that PE sponsors with long-term relationships with banks obtain loans with lower interest rates and more favorable covenants in their deals. Huang, et. al. (2016) show that bond offerings by PE-backed companies following an IPO have lower yields that similar non PE-backed companies, consistent with reputation dominating PE incentives. See Malenko and Malenko (2014) for further discussion on PE reputation with lenders.



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manage investment funds that specialize in distressed investing, whose expertise could help them restructure distressed portfolio companies in their buyout fund.[12]

To the extent that PE owners have particular skills in dealing with high levels of leverage and financial distress in their portfolio companies, the effect of PE-backing on the costs of default is somewhat ambiguous. On the one hand, the ability of PE funds to manage high debt levels should decrease the likelihood of default. On the other hand, the lower likelihood of financial distress or lower expected distress costs could enable PE sponsors to take on additional leverage in their portfolio companies that increases the probability of default. Conditional on default, PE-backed firms should experience lower costs of financial distress if PEs more efficiently manage the resolution of distress. In any case, the potential benefits of PE-backing on the likelihood and cost of financial distress should be stronger for PE funds with more capital left to support the distressed company, more reputable PE sponsors, and for PE sponsors with experience in resolving distressed situations.

*C. Related Empirical Evidence*

Our evidence relates to a number of papers investigating financial distress following highly-leveraged transactions. Kaplan (1994) shows that Federated Department Store, which went bankrupt following a 1988 leveraged buyout, had a higher value post-bankruptcy than pre-buyout. Asquith, Gertner, and Scharfstein (1994) examine a sample of junk bond issuers (including many LBOs) from the 1970's and 1980's and document the ways in which financially distressed firms avoid bankruptcy. Andrade and Kaplan (1998) show that value gains outweighed subsequent costs of financial distress for a sample of 31 highly-levered transactions in the 1980's. Apart from having a large sample which is more representative of modern PE transactions, our sample construction permits us to compare highly leveraged borrowers which are PE vs. non PE-backed, to focus on how the presence of PE investors impacts the risk and resolution of financial distress.[13]

[12] In a survey conducted by Ernst & Young following the onset of the Covid-crisis, 93% of PE respondents reported that they were better prepared from their experience managing portfolio companies during the great financial crisis in 2008-2009 (EY, 2020). See also Gompers et al (2012) for anecdotal evidence of a buyout sponsor drawing on the expertise of its distressed debt arm to help restructure a distressed portfolio company.

[13] Tykvova and Borell (2012) compare accounting measures of performance and bankruptcy rates for PE-backed and non PE-backed firms in Europe. They find PE-backed bankruptcy rates are similar to the bankruptcy rates for non PE-backed firms. The authors restrict their analysis to predicting bankruptcy but not other distressed restructurings,



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Our paper is also connected to papers that extend our understanding of the impact of private equity investors on firm performance. Papers in this literature include Guo, et al (2009), Cohn, et al (2014) and Cohn, et al (2021), who examine the operating performance of PE-backed firms during the late 1990s and early 2000s; Harford and Kolasinski (2014), who study wealth creation by PE-backed firms following the exit of the PE owner; Lerner, et al (2011), who investigate the relation between PE ownership and innovation; Acharya, et al. (2013) who relate PE fund returns to value-creation activities; Davis, et al. (2011 and 2019), who study the impact of private equity investment on employment and productivity; and Eaton, et al. (2020) who examine PE investments in for-profit education. Relating to financial distress more specifically, Harford and Kolasinski (2014) find that a PE sponsor's reliance on dividend recapitalizations has no impact on the default probability of a PE-backed firm, while Bernstein et al (2018) find that PE-backed companies in the U.K. decreased investments less and had higher growth than their peers during the great financial crisis. Overall, our paper contributes to this literature by focusing in detail on how PE-backing affects the resolution of financial distress.

## III. Data

### *III.a. Full Sample of Leveraged Loan Borrowers*

Our sample is constructed to meet two objectives: (1) Collect information on a comprehensive sample of PE-backed firms whose financial health can be observed through time, and (2) include a set of control firms that are not owned by a PE fund but share characteristics similar to PE-backed firms. PE-backed firms are, by definition, held primarily as private companies and therefore lack consistent public information on their existence, much less their financial health. To overcome this challenge, we draw on a number of datasets to build an extensive panel of PE-backed and control firms.

We start with listings of all firms borrowing in the leveraged loan market, as tracked by Reuters LPC Dealscan and Dealogic between January 1997 and April 2010. Borrowers in this market are financed through private credit agreements using significant amounts of debt. The definition of a leveraged loan

and do not consider how financial distress and bankruptcy is eventually resolved, which is a major focus of our analysis.



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varies across sources but applies generally to loans with spreads higher than 200 to 250 basis points above LIBOR (see Yago and McCarthy (2004)). A major benefit of starting from a set of leveraged loan borrowers is that both the PE and control samples consist of firms that voluntarily take on significant leverage ex-ante. This mitigates the potential selection bias that PE-funds choose firms based on their ability to take on leverage; our non-PE firms also choose to lever up significantly.

We also restrict our sample to firms that are rated below investment grade (Ba1 or below) by Moody's at some point during the sample period. Therefore, our sample period begins in 1997 when Moody's began to rate loans (Sufi (2007)). Linking the leveraged loan data to Moody's ratings produces a sample of 2,151 firms, which we refer to hereafter as our "full sample". Firms enter our full sample panel when they first borrow in the leveraged loan market. Firms exit the panel when they default, are acquired, or when their credit rating rises above investment-grade.[14] The average firm is in our sample for seven years, yielding an unbalanced panel of 12,737 firm-year observations from 1997 to April 2010.

We restrict our analysis to Moody's rated issuers for two reasons. First, Moody's provides firm-level information for rated borrowers, including both private and public companies. Notably, many of these leveraged loan borrowers neither have public debt nor publicly traded equity outstanding. Second, Moody's tracks these firms over time and produces a consistent measure of what constitutes an event of default. A default occurs when Moody's observes: (a) a missed interest or principal payment on a debt obligation, (b) a filing of a court-led bankruptcy, or (c) the execution of an out-of-court "distressed exchange."[15] Moody's continues to follow firms after a default, producing information about the restructuring and estimates of creditor recovery rates. We also search other sources including The Deal, and the private debt intelligence service, Debtwire, and find only seven additional defaults (for a total of 552 defaulting firms) not already flagged by Moody's, indicating that Moody's has identified virtually all defaults within our sample of leveraged loan borrowers.

[14] Our results are robust to keeping firms that migrate to investment grade in the sample. Only 33 of 2,151 firms migrate from non-investment grade to investment grade during our sample period.

[15] A distressed exchange involves exchanging debt for another security of lower priority (such as equity), open market purchases of debt by the borrower at a substantial discount to the face value of the debt, or any other exchange that appears to allow the borrower to avoid default. See Moody's Corporate Default Risk Service (2007).



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It is possible that our methodology overlooks firms that become financially distressed but do not default. For instance, PE investors might successfully employ fund resources to inject capital into the company, thereby avoiding a default. Based on our examination of three additional sources, we do not appear to under-observe cases of financial distress. We search Moody's DRS database for evidence of ratings downgrades to CCC or below followed by an upgrade or recovery without default, The Deal's "Distressed Warnings" archive, which provides "warnings" for firms at high risk of default, and Debtwire's monthly published listings of leveraged loan borrowers classified as "Pre-Restructuring". We find that virtually all firms classified as distressed (or pre-distressed) appear in our sample of defaulting firms, suggesting that when performance declines significantly highly leveraged firms are unlikely to avoid a default. Therefore, our analysis of default probabilities may be more broadly interpreted as predicting the likelihood of significant financial distress.

*III.b. Identifying PE-backed Firms*

For our panel of leveraged loan borrowers, we identify dates that firms are under PE ownership. We define a firm to be "*PE-backed*" when it is acquired through a leveraged or secondary buyout and held in a managed PE fund for purposes of active control. For the purposes of our paper, a PE fund is a limited liability partnership managed by a general partner that raises outside funding from a set of limited partners. We label leveraged borrowers in our sample that do not fit the above criteria as *non PE-backed*. Non PE-backed firms include public corporations with no controlling shareholder, as well as public and private companies that may be controlled by non PE investors, including investment management companies, financial institutions, and other corporations. Controlling interests held by individuals and families are also considered non PE-backed when they do not hold their ownership stake within a private equity fund structure.

We consider a firm to be PE-backed from the time the PE fund acquires the firm through the time the fund exits by: (a) the firm going public, (b) selling the company to a strategic or non-PE financial buyer, or (c) relinquishing ownership following a bankruptcy or other restructuring.[16] We identify the

[16] PE funds still typically retain some portion of their equity after they have taken a company public. The exact timing of when the PE funds sell their remaining shares is not observable. We follow prior research in using the IPO date as the date of PE exit.



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time series of ownership information using a variety of sources, including Capital IQ, Dealogic, The Deal Pipeline, SEC filings, and the websites of the PE funds and their portfolio companies. We record the dates at which a PE sponsor enters as a controlling owner of a sample firm, the exit date, type of exit, and other information about actions taken by a PE fund during the period in which they own the firm. Thus, we construct a unique panel dataset that allows us to observe individual firms over time as they potentially enter and exit PE ownership.

We collect data on all loan financings, including the date, amount, and loan purpose, as well as firm size (total sales) at the time of the financing from Dealscan and Dealogic. Additional financial characteristics, including measures of asset size, leverage, and profitability are obtained from Capital IQ, Compustat or Moody's Financial Metrics database. For SEC-registered firms that are not on Compustat, we also hand collect financial data from 10-Ks. We collect information on firm-level capital infusions using Moody's reports and Capital IQ. Finally, because some firms have no reported financial information while private, some specifications of our regression models use industry medians sales growth and profitability calculated from Compustat, using Fama-French industry classifications. It is important to note that once a firm defaults, a significant amount of financial information and details of the restructuring become publicly available from news sources and bankruptcy court documents, even for firms that were previously private.

*III.c. Full Sample Summary Statistics*

Table 1 provides summary statistics for our full sample. Panel A shows that 965 of the firms, or 44.9% of the 2,151 firms in sample, are PE-backed at some point during the sample period. A total of 552 firms (25.7% of the sample) experience a default at some point between 1997 and 2010; 241 of these are PE-backed at the time of default or within the five-year period prior to default. From these summary statistics, PE-backed firms do not appear have a higher default frequency relative to the full sample of firms that borrow in the leveraged loan market.

Panel B of Table 1 provides a comparison of PE-backed and firms with no PE owner across a variety of firm, industry, and market characteristics. For our default probability analysis, we divide non PE-backed firms into those where the PE sponsor has exited within the last five years (*PE-exited*) and



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those with no recent history of PE ownership (*Non PE-backed*). Firms sold from one PE owner to another through a secondary buyout remain classified as PE-backed.

All variables reported in Table 1 are defined in Appendix Table A1. In the analysis to follow, we use these variables as controls in our regressions, along with industry and time fixed effects.

Although all of our sample firms are, by definition, highly leveraged borrowers, Panel B shows that PE-backed firms and companies with no recent PE ownership history (non PE-backed) differ on a number of dimensions. The median PE-backed firm carries a slightly lower credit rating (B2 compared to B1) and more debt (*total debt/assets* of 66.4% compared to 41.3%) and is smaller (*total assets* of $598 million in assets compared to $1,349 million) than the median non PE-backed firm. We use the dummy variable, *On Compustat*, to indicate firms with dispersed equity ownership.[17] Only 36.9% of PE-backed firms have information on Compustat, compared to 75.6% of non PE-backed firms (financial information as available from 10-Ks is filled in for non-Compustat firms from the sources noted above).

PE-exited firms fall in between PE-backed and other non PE-backed companies based on their credit rating (median Moody's rating = B2), leverage (median *total debt/assets* = 51.1% of assets), and size (median *total assets* = $748 million). PE-exited firms appear to have higher profit margins (median *EBITDA/sales* = 14.6%) than the other firms, suggesting that PE funds typically do not leave firms in weak financial condition when they exit. A large proportion of firm-years that remain in our panel after a PE exit are those where the PE has exited their portfolio company through an IPO; thus, these are likely among the best performing buyouts in our sample. This interpretation is consistent with their higher profitability but lower leverage relative to firms still under PE ownership (PE-backed), and further shows the importance of separately identifying the PE-exited firm-year observations.

Panel B also shows that PE-backed firms and PE-exited firms differ substantially from non PE-backed firms in their financing behavior. PE-backed firms are far more likely than non PE-backed firms to have engaged in leverage-increasing recapitalizations within the last five years (*recap* 16.8% vs. 7.8%), including recaps used primarily to pay large dividends to shareholders (*dividend recap* 8.5% vs. 0.6%),

[17] Using an indicator variable for firms which have a stock price available from Compustat as an alternative proxy for dispersed equity ownership produces identical results throughout our analyses.



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and debt financings that fund acquisitions (*acquisition financing* 48.1% vs. 41.2%). PE-exited firms are more active in the recapitalization market than currently PE-backed firms, engaging in some form of recap in 23% of the cases and debt-financed acquisitions in 55.7% of the cases. The relative frequency of recapitalizations is consistent with the finding of Cohn et al (2014) that PE owners maintain high leverage for portfolio companies following an LBO. Our analysis below addresses whether this behavior is related to default rates and the resolution of financial distress.

The last panel in Table 1 (Panel C) reports characteristics of the PE investors that own firms in our sample. We use these characteristics to study whether PE investors with deeper capital resources, stronger reputations, and skills specific to financially distressed companies are associated with lower default probabilities or more efficient restructurings. Because we do not observe the amount of undrawn capital available in the PE fund at a given point in time, we use *months since PE entry* as a proxy, since levels of undrawn capital decline with the age of the fund. From Panel C, the median PE-backed firm has been owned by its sponsor for three years (36 months). We consider several measures of the PE fund's reputational capital. *Last fund raised < 5 yrs ago* proxies for PE reputation based on the idea that PE investors that have successfully raised a recent fund are likely to have a more reputable track record. Among our PE-backed sample, 85% of the firms are owned by funds investors that have raised a new fund within the last five years.[18] We also consider *PE sponsor age* (median = 13 years) and a dummy variable, *PE sponsor older than 10 yrs*, equal to one when the sponsor, rather than the fund itself, is older than 10 years (57.1% of the PE-backed firms), as additional measures of PE reputation. Finally, the indicator variable *PE sponsor is top distressed investor* (11.6% of PE-backed firms) equals one when a sponsor is listed as a top investor in distressed companies, "turnarounds", or "special situations" by Preqin or in the appendix of Jiang et al (2012).

[18] *Last fund raised < 5 yrs* ago could also be correlated with *months since PE entry* to the extent the last fund raised is the fund owning the PE-backed firm. Still, there is substantial independent variation across these variables. Also, standard covenants in PE fund agreements prohibit a PE fund from using capital from a new fund to invest in a firm still owned by a previous fund.



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## IV. Likelihood of Financial Distress

The previous section shows that leveraged loan borrower defaults are common. In this section, we examine the impact of PE ownership on default probabilities using a hazard model that controls for firm, industry, owner, and market characteristics.

*IV.a. Defaults of PE- and non PE-backed firms through time.*

Table 2 provides an overview of annual default frequencies for our sample firms over the period 1998 to 2010. The table shows that PE-backed firms default at a rate of 4.9% per year on average during the sample period, compared to a rate of 3.6% for non PE-backed firms. Counter to the argument that PE owners with short-term motives leave a company in weak financial shape upon exit, PE-exited firms have the lowest default frequency; the 3% overall default frequency of firms where PEs have recently exited is 39% lower than that of PE-backed firms and 17% lower than that of other non PE-backed firms. We further observe a time clustering of defaults in 2001 and 2009, each following the onset of an economic downturn (Das et al, 2007).[19] Interestingly, default rates of PE-backed firms are substantially lower during the financial crisis in 2009 (14.5%) compared to other leveraged borrowers (17.4%).

*IV.b. Default Probability Models*

To control for observable differences that might explain variation in default rates across the full sample, we employ a default prediction framework following the models of Shumway (2001), Chava and Jarrow (2004), Campbell, Hilscher, and Szilagyi (2008), Bharath and Shumway (2008), and other models for the likelihood of default as summarized by Altman et al (2019). Specifically, we estimate a Cox proportional hazard model that describes the conditional likelihood of default as a function of a set of time-varying explanatory covariates.

Table 3 reports our model estimates. Because proportional hazard models assume that that the logarithm of the hazard rate (in our model, the conditional likelihood of default) is linear in the control variables, coefficients in each of the columns of Table 3 describe the log-linear relation between the

[19] This is also the case for defaults following the Covid outbreak in 2020 (https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/leveraged-loan-default-rate-tumbles-to-1-73-lowest-level-since-december-2019-64793803).



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control variables and the conditional likelihood of default.[20] Panel A reports seven specifications that differ by the set of variables included as controls. The first two variables in all seven columns are the indicator variables that identify PE-backed and PE-exited firms; the excluded category is the group of firms with no recent history of PE ownership (*non PE-backed firms*). All variables other than leverage are measured at the year prior to the observation of default. Columns (1) and (2) report specifications that exclude firm-level characteristics and include industry controls, which allows us to include the private firms in our sample that do not report firm-level financial data. Column (1) also excludes industry and year fixed effects, while Column (2) includes these effects. Columns (3) through (5) include firm financial characteristics (which reduces the number of firms in the sample), without and with industry and year fixed effects respectively. The control variables enter the regressions with signs and significance that are consistent with the existing literature. The likelihood of default is lower when industry profitability (*industry change in EBITDA/sales*) and growth potential (*industry market-to-book ratio*) are higher, although the market-to-book effect is not significant once we include industry fixed effects. For specifications without year fixed effects, we also include the annual *S&P 500 return*, which indicates that default probabilities are counter-cyclical to market performance, as would be expected.

Our first takeaway from Panel A of Table 3 is that PE-backed firms have a higher estimated probability of default (specifications (1) and (2)). However, when we either substitute leverage for PE-backed, or include both leverage and PE-backed in the same model, only leverage is significantly related to defaults.[21] We interpret these results as PE-backed firms appear more likely to default than non PE-backed firms due to their higher leverage, but that for similar leverage levels PE-backing does not in itself affect the likelihood of default. Our regressions use two different measures of leverage, measured at the date of the last financing: *total debt/assets*, and *rating* (with a higher number representing a lower credit

[20] The Cox model is a semi-parametric hazard model that leaves the "baseline hazard function" unspecified, allowing for a fairly flexible relation between the likelihood of default and the time that a firm has gone without defaulting. For more details on these models, see Ongena and Smith (2001) and Bharath and Shumway (2008).
[21] For brevity, we report the specification including both variables in Table 3 because the coefficients for remaining variables are nearly identical when we remove PE-backed and include only leverage. Leverage is measured as of the time the last financing preceding the year in which we observe default (or non-default), while PE ownership is measured at the year prior. Still, leverage itself can be considered an outcome of PE ownership. Thus, leverage could be considered a "bad control" as described by Angrist and Pischke (2009) and Imbens and Rubin (2015). Excluding the PE-backed variable entirely, however, does not address the question of whether, conditional on leverage, PE-backed firms are more likely to default, which is the focus of our study.



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rating). The credit rating variable is available for a wider set of sample firms than *total debt/assets* and likely includes information on credit risk that is not impounded in accounting measures of leverage. A drawback with using *rating*, however, is that PE-backing might affect the rating directly above and beyond leverage.

To better understand how PE ownership and leverage factor into default probabilities, column (5) interacts the PE-backed indicator with *total debt/assets*. The interaction term is negative and statistically significant, and both *PE-backed* and *total debt/assets* enter with positive and significant coefficients. Jointly, these estimates imply that there is a level of *total debt/assets*, 64.2%, below which increasing amounts of debt imply that PE-backed firms are more likely to default than non PE-backed firms, and above which PE-backed firms become *less* likely to default for further increases in leverage.[22] For instance, the estimates imply that for a firm with debt that is 70% of assets, PE-backed firms are 0.8 percentage points less likely to default than their non PE-backed peers; for leverage of 75%, PE-backed firms have a default probability that is 1.7 percentage points lower than non PE-backed firms (assuming a baseline hazard rate equal to the unconditional average default rate of 3.9% across the full sample, from the last column of Table 2). Column (7) performs a similar exercise using *rating* as the measure of leverage. In this case, only the ratings variable itself is significant. This result would be expected if the credit rating already incorporates information about the interaction between PE ownership and leverage, thereby absorbing information on the interaction. Regardless, the regression results overall are consistent with our interpretation that leverage is the primary determinant of defaults, regardless of PE ownership.

The second takeaway from these models is that PE-exited firms are significantly less likely to default than non PE-backed firms with no recent history of PE ownership. The coefficients for *PE-exited* are tightly estimated across all specifications in the range of -0.51 to -0.64, implying that PE-exited firms

[22] The level 64.2% is the *total debt/assets* that solves the equation (where $\hat{\beta}s$ represent estimates from column 5) :

$$\hat{\beta}_{PE-badked} * 1 + \hat{\beta}_{Totaldebt/assets} * Totaldebt/assets + \hat{\beta}_{PE-backed*Totaldebt/assets} * 1 * Totaldebt/assets$$
$$= \hat{\beta}_{PE-badked} * 0 + \hat{\beta}_{Totaldebt/assets} * Totaldebt/assets + \hat{\beta}_{PE-backed*Totaldebt/assets} * 0 * Totaldebt/assets$$



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are 50-60% *less* likely to default than other non PE-backed firms, holding other variables constant. This result weighs strongly against the idea that PE sponsors leave behind financially weak firms upon exit.

The third takeaway from the Table 3 regressions is that leverage-increasing recaps, which includes dividend recaps, and acquisition-related debt financings have no impact on the likelihood of default. Indeed, specifications (3)-(5), which incorporate firm-level measures of performance, suggest that firms that engage in leverage increasing recapitalizations are about 30% *less* likely to default, holding other control variables constant.[23] This suggest that when PE sponsors re-lever their portfolio companies, they tend to choose the ones that perform particularly well.

We also provide estimates from our Cox proportional hazard model using only the subsample of PE-backed firms, enabling us to understand the impact of leverage within the subsample of buyouts. These regressions further enable us to examine whether characteristics of the PE fund and sponsor affect the likelihood of default. We include four variables from Panel C of Table 1 that proxy for PE reputation, capital resources, and skill. Although not significant across all specifications, the estimates reported in Panel B of Table 3 suggest that the conditional likelihood of a default is increasing in the length of time a PE sponsor has owned a firm (our proxy for less remaining fund capital) and is lower when the PE owner has raised a new fund within the last five years (our proxy for PE reputation). This suggest that firms owned by PE funds that have uncommitted capital and that are managed by more successful sponsors tend to default less frequently. Moreover, the strong positive effect of leverage on default probability continues to hold within the subsample of PE-backed firms.

To summarize, PE-backed firms default at a rate that is 1.3 percentage points (36%) more frequent than non PE-backed firms. However, defaults appear largely driven by leverage, measured at the time of the last financing prior to the year of default. PE behavior that further increases leverage beyond the initial LBO, such as dividend recaps, is not associated with a higher probability of default, and in some specifications is associated with lower default probabilities. Additionally firms backed by more successful PE sponsors and more well-capitalized PE funds appear to default less frequently. Overall, if

[23] The finding that firms that borrow to finance acquisition have lower default probabilities should not be interpreted as a causal statement. The documented association may relate to the operating performance of the firm pursuing an acquisition program. For a fixed level of leverage, firms with stronger operating performance should be less likely to default and may have stronger incentives to engage in wealth-increasing acquisitions.



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leverage is the key to understanding defaults, PEs arguably put portfolio companies at higher risk by taking on large debt burdens. If PE sponsors are able to resolve distress at lower cost than other owners, however, it is less clear that firm value is destroyed from the higher leverage in PE-backed firms.

## V. Resolving Financial Distress

From an economic efficiency stand-point, being in a state of financial distress only matters to the extent that the state: (a) creates deadweight costs that reduce the ex post value of a firm, and (b) influences ex ante incentives in a manner that raises the cost of financing (see, e.g., Smith and Strömberg, 2005). On the one hand, PE-backed firms might have a comparative advantage in resolving financial distress, leading to lower ex post costs of financial distress. Indeed, moving through a restructuring following a default could, for some firms, be the most efficient way to turn around a firm with operational problems. On the other hand, a PE-owner might have little incentive to support portfolio companies in financial distress, especially if they have already been able to extract enough value from the firm, e.g. through a dividend recapitalization. In this case, we might expect the defaulted PE-backed firm to have a more difficult time resolving financial distress, due to the lack of support from their owners, leading to higher ex post costs.

Because there is no single unambiguous measure of financial distress costs, we investigate several indicators suggested by previous literature. First, resolving financial distress outside of court is typically less costly than restructuring in a formal bankruptcy proceeding (Gilson et al, 1990; Asquith et al, 1994). Therefore, we look at the frequency of out-of-court restructurings and pre-packaged bankruptcies relative to regular Chapter 11 filings among our defaulted firms. Second, both the direct and indirect costs of distress should be related to the time the firm spends in resolving distress (Bris, et al, 2006; Denis and Rodgers, 2007). We therefore also examine the time spent from the default date until the completion of a restructuring. Third, a number of papers suggest that deadweight costs of financial distress are high when a firm assets are sold through fire-sale liquidations (see e.g. Gertner and Scharfstein, 1990; Pulvino, 1999;



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and Strömberg, 2000; Bernstein et al, 2019).[24] Hence, we also measure the extent to which firms survive a restructuring as an independent going concern. Fourth, since higher costs of financial distress reduce the value left for creditors (see e.g. Bris et al, 2006; and Bharat et al, 2010), we examine creditor recovery rates.

*V.a. Data on Restructuring Following Default*

To conduct the analysis in this section, we collect detailed information related to 621 default events for the 552 defaulting firms in our sample using information from Moody's Default and Recovery database, Deal Pipeline, Chapter 11 bankruptcy court documents including disclosure statements, SEC filings, Capital IQ, and web-based news searches.

For each defaulted firm, we code the *type* of restructuring as an (1) out-of-court "distressed exchange" of debt for equity, (2) a non-exchange out of court restructuring, (3) a pre-packaged Chapter 11 filing, or (4) a traditional ("free-fall") Chapter 11 filing. A pre-packaged bankruptcy ("pre-pack") filing occurs when a company negotiates its bankruptcy plan of reorganization and receives support from enough creditors outside of court, and then uses the court approval process to complete the restructuring. In this sense, a pre-pack is a hybrid of an out-of-court and traditional bankruptcy filing (see Tashjian et al, 1996).

We classify restructuring *outcomes* as follows. A firm is either: (1) reorganized as an independent company, (2) sold as a going concern to a financial buyer, (3) sold as a going concern to a strategic buyer, or (4) liquidated piecemeal.[25] We consider outcomes (1) and (2) as cases in which the *company survives*, and also record the identity of the post-restructuring controlling owners of the company. We consider outcomes (3) and (4) as cases in which the company ceases to exist as an independent concern.

*V.b. Restructuring Types and Outcomes: Summary Statistics*

[24] Alternatively, an overly lenient bankruptcy regime could allow economically nonviable firms to be continued. While there is some evidence of inefficient continuation in Chapter 11, particularly in the 1980's (Hotchkiss, 1995; Weiss and Wruck, 1998), Ayotte and Morrison (2009) argue that increased creditor control in bankruptcy has eliminated this continuation bias and has led to excessive sales and liquidations in more recent bankruptcies. Accordingly, we believe that the excess liquidation problem is more plausible during the time period we study. Moreover, the critics of PE have focused on excess liquidation (and its related costs such as job losses) rather than excess continuation of unprofitable businesses.

[25] In this section, we group *PE-exited* firms as part of *non PE-backed*. Our sample includes only 15 defaults of formerly PE-backed companies, which exit between 63 and 8 months before the default (only two exit within a year of the default). We utilize the formerly PE-backed companies in our robustness tests in Section VIII.



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Table 4 summarizes the restructuring data for PE and non PE-backed firms. Panel A shows that PE-backed firms restructure more frequently out of court or through a pre-packaged Ch. 11 filing, while non PE-backed firms file more often for a traditional Chapter 11. Specifically, 52% of PE-backed firms restructure out of court or through a pre-pack (28% out of court, 24% prepacks), compared to only 36% of non PE-backed firms (20% out of court, 16% prepacks).

Panel B shows that PE-backed firms restructure roughly 40% faster than do non PE-backed firms. The panel reports the mean and median number of months that a firm takes to complete its restructuring, which measures the time from default to the completion of an out of court restructuring or exit from Chapter 11. On average, PE-backed firms restructure in 10.1 months (median 7.7 months), compared with 16.2 months (median 11.9 months) for firms that are not backed by a PE sponsor. This relationship holds across various time periods, including during the 2007-09 financial crisis. Given that PE-backed firms restructure more frequently out of court or through prepacks, it is not necessarily surprising that PE-backed restructurings are resolved more quickly. However, as we show below, PE-backed firms also move more quickly through free-fall Chapter 11 filings compared to non PE-backed firms.

Panel C of Table 4 reports that PE-backed firms survive more often as an independent entity – either by reorganizing the firm directly, or through a sale to a financial buyer – in 80% of the cases, compared with 71% of the cases for non PE-backed firms. The most notable difference between the groups is the relative frequency of reorganizations versus liquidations. PE-backed firms reorganize at a higher rate (74% vs. 66%) and liquidate piecemeal at a lower rate (9% vs. 15%) than non PE-backed firms. This result is inconsistent with the argument that PE owners leave their defaulted firms in worse condition than other owners.

Panel D of Table 4 examines the identities of the controlling equity owners for the restructured firms that survive Chapter 11 as an independent entity. New owners obtain control of a Chapter 11 firm through an outright acquisition of the company via "Section 363" of the Bankruptcy Code, by converting debt claims that they hold into equity of the reorganized firm, or by providing new equity capital to the firm. Debt claims converted to controlling equity stakes are typically the "fulcrum" claims, often acquired as a control play by sophisticated investors via secondary markets for distressed debt (Hotchkiss and



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Mooradian (1997); Ivashina et al (2016); Feldhütter et al (2014)). So while control often passes to new owners in distressed restructurings, the original PE equity owners can retain control, even when they are "out of the money" at the time of default.

Panel D shows that the original PE investors retain a controlling equity stake in 18% of the PE-backed firms that file for Chapter 11. By comparison, only 4% of non PE-backed owners retain control of their firms in bankruptcy.[26] This result shows that PE owners often have a long-term interest in managing the firm. Below, we explore one mechanism by which PE owners retain control, namely through capital infusions into the troubled companies.

Also noteworthy from Panel D of Table 4 is the broader role that PE investors, in general, play in the restructuring of distressed firms. New PE investors – i.e. PE sponsors that were not already owners of the distressed firm – enter and take control of 19% of all defaulted firms in our sample, including a roughly equal proportion of firms that were not previously PE-backed. Because restructurings often involve transfers of control to new owners, they are a ripe source of portfolio companies for new PE investors, particularly those that specialize in turning around distressed companies.

Finally, Panel E of Table 4 reports discounted creditor recovery rates, as provided by Moody's. These firm-wide recovery rates estimate the market value of the restructured company as a percentage of the face value of liabilities of the defaulted firm. Overall recovery rates are slightly lower in PE-backed defaults, with the greatest differences appearing in firms acquired by a financial buyer (median recovery 19% for PE-backed versus 34% for non PE-backed). However, we show below that these differences disappear once we control for other characteristics at the time of default.

In sum, Table 4 suggests that PE-backed firms move through a distressed restructuring more quickly and more often out of court than non PE-backed firms and are more likely to emerge from a restructuring as a going concern, often with the original PE owners remaining in control. At the same time, creditor recoveries are lower for PE-backed firms. In the next section, we examine the persistence of these patterns in multivariate regressions that control for firm, industry, market and PE characteristics.

[26] Similarly, equity holders of large companies filing for Chapter 11 retain control in only 7% of the cases studied by Ivashina et al (2016).



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## VI. Multivariate Analysis of Distress Resolution

We now examine the relation between PE ownership and the resolution of financial distress in a regression setting, following the same sequence as the univariate comparisons in Table 4. The control variables are similar to the default probability models in Table 3, measured at the time of default or the last financial disclosure prior to default.[27]

We also include additional control variables particularly relevant to the resolution of default. Following Acharya, et al. (2007), we calculate an indicator for firms in a *distressed industry*, industry-level *specific assets*, and an interaction term (*distressed industry*specific assets*), which captures potential fire-sale costs as described by Shleifer and Vishny (1992) and Strömberg (2000). As a measure capital structure complexity, we include an indicator variable for whether a company has *public debt outstanding*, since creditor coordination problems could be higher when dispersed public bondholders are part of restructuring negotiations (see e.g. Gilson et al, 1990). To control for the overall macro environment, we include the contemporaneous average default rate on all Moody's-rated firms and return on the S&P 500 index. Finally, some specifications include indicator variables for whether a firm filed for bankruptcy protection in Delaware or the Southern District of New York (SDNY), which are the predominant venues for large debtor bankruptcy filings. Delaware in particular has been recognized for its ability to process prepackaged bankruptcies (Ayotte and Skeel, 2004), while the SDNY has been recognized as "management friendly" (Hotchkiss, 1995).

In Table 5, we report additional summary statistics for selected characteristics of the default events used in the regressions discussed below. The leverage *(total debt/assets)* of defaulting PE-backed firms is high; the median leverage of defaulting PE-backed firms is 86.2%, compared to 64.8% for non PE-backed firms. This finding reinforces the idea in Table 3 that PE-backed firms are less likely than their non PE-backed peers to default at higher levels of leverage. Table 5 shows that defaulting PE-backed firms are also more profitable at default (median *EBITDA/sales* = 8.2%) than non PE-backed firms

[27] Financial ratios are winsorized to reduce the effect of outliers. Since the problem with outliers differs across different financial ratios, the winsorizing threshold varies between 1% and 5% for different variables. The results are robust, however, to using a common winsorizing threshold across all variables.



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(median *EBITDA/sales* = 5.6%), suggesting that PE-backed firms are less economically distressed as they enter a restructuring. Table 5 also reports that 55.3% of all defaulting PE-backed companies file for Chapter 11 in Delaware, compared with only 38.1% of non PE-backed firms.

Table 6 reports logit regressions in which the dependent variable equals one when a firm files for Chapter 11 (either through a pre-pack or free-fall) and zero when a firm restructures out of court. The table shows marginal effects and t-statistics calculated using standard errors clustered at the default year level. We incorporate firm-level data, which are not available for every observation, without excluding observations with missing data by including an indicator variable that flags the firms for which financial information is missing.[28] Regression (3) includes additional PE sponsor and fund characteristics.

The PE-backed variable is negative and statistically across all three specifications, indicating that PE-backed firms are less likely to file for Ch. 11 bankruptcy and more likely to restructure out of court than their non PE-backed peers. The estimates in regressions (1) and (2) imply that PE-backed firms are between 5.5 and 7.3 percentage points more likely to restructure out of court, holding other characteristics constant. Column (3) shows that PE-backed firms are less likely to restructure out of court the longer the time since the buyout occurred (our variable used to indicate the PE fund is less likely to have unused capital at the time of default). This is consistent with the ability of PE-funds to infuse capital to help distressed firms avoid bankruptcy, a point to which return in section VII. Column (3) also shows that PE sponsors that specialize in distressed investments are more apt to restructure out of court than other PEs. Firms with prior dividend recaps are also more likely to restructure out of court. Most control variables are insignificant in regressions (1) through (3), except that larger firms and firms in industries with lower market-to-book ratios are more likely to file for bankruptcy than to restructure out of court.

Regressions (4) and (5) in Table 6 exclude out-of-court restructurings and focus on the decision to file a pre-pack versus a traditional bankruptcy filing. Holding other characteristics constant, PE-backed firms are 7.8 to 8.6 percentage points more likely to file a pre-pack than non PE-backed firms, conditional

[28] Typically, these are firms that provide no disclosures to the SEC. Results are largely unchanged if we instead restrict the sample to the firms with financial information, although we prefer this approach in order not to lose potentially informative data points.



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on not restructuring out of court. More profitable firms (*EBITDA/sales*) are more likely to file a pre-pack, which typically involve less operational restructuring than a free fall bankruptcy.

Table 7 reports regressions for the time spent in restructuring. Regressions (1) through (3) include both out-of-court and bankruptcy restructurings. For several out-of-court restructurings, the recorded default and emergence date are the same (that is, time in default equals zero); because the dependent variable is left censored at zero, we use Tobit regressions for these specifications. Regressions (4) through (6) include only bankruptcy restructurings, and thus use OLS.

Consistent with the univariate results, *PE-backed* is negative and statistically significant in all specifications. Measured across all restructurings, regressions (1) and (2) show that PE-backed firms resolve their financial distress 3.5 to 4.2 months faster than non PE-backed firms. The faster speed with which PE-backed firms complete their restructurings is consistent with PE-backed firms relying more on out-of-court and pre-pack restructurings, which move much faster than free-fall Chapter 11 cases. But regression (6) shows that PE-backed firms also move nearly three months faster through a free-fall Chapter 11 than non PE-backed companies, indicating that PE-backed firms resolve distress more swiftly even in traditional bankruptcy settings. From Regression (3), firms backed by PE sponsors with experience as distressed-debt investors move through restructurings more quickly than other PE-backed firms. The control variables indicate that larger firms (*log sales*) take longer to resolve financial distress, while more leveraged firms (*total debt/assets*) restructure more quickly.

Table 8 uses logit regressions to study the association between PE ownership and the likelihood the firm survives the restructuring as an independent entity. As described above, we define *company survives* as cases in which the firm emerges from a reorganization or is sold to a financial buyer. A firm is deemed not to survive when it is liquidated or acquired by (and thus becoming a part of) another non-financial firm. Columns (1), (2), and (4) of Table 8 show that, holding other characteristics constant, PE-backed firms are roughly nine percentage points more likely to survive a restructuring than non PE-backed firms, and conditional on bankruptcy, 12 percentage points more likely to exit Chapter 11 as a surviving entity. Column (3) suggests that much of the effect documented in the other specifications arises among firms that are backed by a PE sponsor that has recently raised a new fund, implying that



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more successful PE sponsors are associated with a higher likelihood of survival. In contrast with the results on out-of-court restructurings and time in default, neither the time since the PE transaction was undertaken (our proxy for the level of uncommitted capital) nor PE experience as a distressed investor significantly affect the likelihood of survival. The results also show that more profitable firms (*EBITDA/sales*) and firms in industries with higher current valuations (*industry market-to-book ratio*, controlling for industry fixed effects) are more likely to survive, consistent with a positive screening role of default and bankruptcy.

Table 8 also examines regressions in which the dependent variable equals one when the pre-default shareholders retain control following the restructuring. Columns (5) and (6) show that the original PE owners are more likely to retain control following a restructuring than non PE owners, consistent with the univariate results.

Finally, we consider the relation between PE ownership and recovery rates in Table 9. Controlling for firm characteristics, creditor recovery rates from PE-backed and non PE-backed firms are statistically indistinguishable. The regressions include leverage (*total debt/assets*) at the last financial statement before filing as a control, which enters with a negative and significant coefficient. Since total debt is closely related to the denominator – total liabilities at filing -- of the recovery rate ratios, higher leverage implies lower recovery rates. Similar to Acharya et al (2007) we find that that recovery rates are lower for firms in distressed industries with more specific assets (*industry distress*specific assets*), consistent with the fire-sale hypothesis of Shleifer and Vishny (1992).

Overall, our multivariate analyses demonstrate that, holding relevant firm, industry, and market characteristics constant, defaulted PE-backed firms are more likely to restructure through cost-effective out-of-court restructurings than non PE-backed firms, and resolve their financial distress more quickly – both in court and out of court – compared to firms that are not PE-owned. At the same time, PE backed-firms are less likely to be liquidated and more likely to survive as a going-concern, often with the original PE owners still in place. With the exception of recovery rates, where we find no difference, this suggests that PE-backed firms experience lower costs of financial distress compared to other distressed firms.



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## VII. Capital Infusions and Resolving Financial Distress

In this section, we explore whether capital infusions are a mechanism behind the observed differences in PE-backed and non PE-backed restructurings. Capital infusions can provide the liquidity required by a distressed firm to fund operations during a restructuring. Injections of financing also signal a willingness by owners to have "skin in the game" during restructuring negotiations, which in turn may induce other parties to commit to a successful and quick resolution of distress.[29]

Our analysis proceeds by first examining the frequency with which owners in distressed firms commit new capital to their firms– via debt, equity, or a hybrid of both – prior to default. Specifically, we search Capital IQ securities and capital issuance reports, Capital IQ statements of cash flow, and Moody's reports to identify cases where a defaulted sample firm receives new capital in the two years prior to default. We then study the association between injections of capital and restructuring outcomes following default. Tables 10 through 12 report these results.

Panel A of Table 10 shows that PE sponsors are more likely to commit new capital than other owners across all forms of infusions, injecting capital in 29.4% of their firms prior to default, compared to 17.7% among non PE-backed firms. PE-backed firms are also more likely to receive non-equity capital; 33.8% of the injections by PE owners come in the form of debt, a debt-equity mix, or some form other than equity, whereas non-PE owners provide non-equity in only 16.9% of their capital injections.

Panel B of Table 10 shows that firms receiving capital injections resolve their distress more quickly than firms than others (median 8.6 months vs. 11 months), are less likely to file for bankruptcy (65.5% vs. 80.1%), and are more likely to have their owners retain control following the restructuring (16.7% vs. 6.6%). In short, firms receiving capital injections appear to have less costly restructurings and result in more beneficial outcomes to their original shareholders.

[29] Another possibility is that pre-distress owners are more likely to support firms that they know to be in better economic condition. Thus, a positive relation between default outcomes and capital injections could be due to reverse causality. To mitigate this concern, we control for firm performance in the regressions. Also, we relate the likelihood of a capital injection to whether the company is backed by a PE-fund which is more likely to have undrawn capital, which should be largely independent of the financial prospects of the firm.



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Table 11 models the propensity to inject capital into a distressed firm as a function of PE-ownership and the control variables utilized earlier. Several interesting patterns emerge. First, PE-backed firms are 14.6 percentage points more likely to receive a capital injection prior to default than non PE-backed firms, supporting the univariate pattern observed in Panel A of Table 10. Second, PE-backed firms in which the original buyout happened longer ago are less likely to receive capital injections than other PE-backed firms, supporting our earlier interpretation of this variable as a proxy for uncommitted capital. The probability of receiving a capital injection declines by 3.6 percentage points per year since the time the firm was acquired in an LBO. Third, and somewhat surprisingly, PE-backed firms in funds that have successfully raised a new fund within the last 5 years are 11.4 percentage points *less* likely to receive a capital injection (equation (4) of Table 11).

The latter counterintuitive result suggests that sponsors that have recently been more successful in raising new funds – presumably because they have better recent performance – are less likely to invest new money in portfolio firms that are distressed. Indeed, our findings in Tables 6 through 9 provide little indication that more successful PE sponsors – as proxied by whether they have raised a new fund in the last five years–improve the efficiency of the restructuring process. Still, Table 3 provides some evidence that firms owned by more successful sponsors are less likely to default in the first place.

Lastly, Table 12 examines the association between capital infusions, private equity ownership, and default outcomes. The table suggests that capital infusions are related to quicker restructurings, independently of whether the owner of a firm is a PE investor. Holding PE ownership constant, the estimates indicate that a capital infusion is associated with a 13.8 percentage higher likelihood of an out-of-court restructuring, 10.5 percentage point increase in the likelihood of a pre-pack among bankruptcy filers, and a restructuring that is over three months shorter than for firms that do not receive a capital injection.

The coefficient estimates in Table 12 also help us to understand whether variation in the outcome variables is explained by capital infusions versus the presence of a PE owner. For instance, the estimates in specification (1) suggest that capital infusions are more important for explaining out-of-court restructurings, not necessarily whether the firm is PE-backed. This may simply reflect that out-of-



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restructurings are more feasible when the owner contributes capital before or in connection to the restructuring. On the other hand, specification (3) indicates that PE-backing itself is related to the length of a restructuring, beyond an effect related to capital infusions; PE-backed firms that receive a capital injection resolve distress more than six months faster than non PE-backed firms that receive no capital injection. Based on the estimates in specification (3), about half of the increase in speed is explained by the pre-default injection and another half by the fact that the firm is PE-backed.

Together, the findings in Tables 10 through 12 provide support for the idea that the observed speed and efficiency of restructurings among PE-backed firms is related, in part, to the propensity for PE owners to provide fresh capital to distressed firms.

## VIII. Robustness and Selection Issues

One caveat that arises when interpreting these results is that PE-backed and non PE-backed firms may be systematically different. Although we have controlled for observable firm characteristics throughout our multivariate analysis, there may still be a concern if there is limited overlap in these characteristics across the PE-backed and non PE-backed subsamples. For example, if PE-backed leveraged borrowers are only small firms below a certain size threshold, while non PE-borrowers are larger firms above a certain size threshold, our PE indicator may pick up differences in size rather than the effect of PE-backing, even when size is explicitly included as a control variable.

To address this concern, we follow a procedure similar Crump et al. (2009), and first run a prediction model of the determinants of PE backing; we then repeat our analysis excluding observations that either have a too large or too small probability of being PE-backed. The results are presented in Appendix Table A3. The first-stage logit model (1) indicates that PE-backed companies are significantly less likely to be on Compustat, have lower revenue growth, and higher leverage prior to default. We then exclude all observations with a predicted likelihood of being PE-backed lower than 10% and higher than 90% and repeat the analyses of Tables 6-9 and 11. The results in regressions (2) through (10) are virtually identical to those shown earlier, with PE-backing being significantly related to all default outcomes except recovery rates and with similar magnitudes.



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Another concern is that PE funds choose acquisition targets based on unobservable characteristics, such that PE-backed and non PE-backed firms have a systematically different likelihood and/or cost of financial distress, even conditional on observable characteristics. Ex-ante, this could lead to a higher debt capacity for PE-backed firms, and PE-backed firms should optimally choose to take on higher debt levels. Our result that PE-backed firms have higher leverage but that there is no difference in default probabilities versus firms with similar leverage is consistent with this interpretation.

Since there is no plausibly exogenous instrument that can predict PE-backing status, we cannot directly address selection effects in our default probability regressions. However, our cross sectional findings suggest that certain PE fund characteristics are related to less costly restructurings. Further, the observation of direct actions taken by PEs, such as their infusions of capital, make our results more difficult to explain as due entirely to selection.

For our analysis of outcomes conditional on default outcome, examining firms where the PE has exited prior to default is also informative. If PE fund selection of companies is driven by an unobserved factor that is related to ex ante costs of financial distress, and if this unobserved factor is constant over time, then default outcomes should be similar for firms that are formerly PE-back as we find for firms currently PE-backed at the time of default. In our default sample, 37 are firms formerly controlled by a PE fund that exited one year or more before default, and 257 are firms still PE-backed at the time of default. We include firms with PE exits less than a year before default as still PE-backed, since these funds may still have a significant ownership stake at the time of restructuring.

We rerun our main analyses replacing the *PE-backed* variable with two dummy variables: *Ever PE-backed*, which takes a value of one if the firm was ever controlled by a PE fund, and *PE-backed at default*, which indicates that the firm is currently PE-backed based on the definitions above. *Ever PE-backed* should capture the effect of PE investors selecting firms with certain characteristics, at least assuming that these unobserved characteristics do not materially change over time. The coefficient on *PE-backed at default*, while controlling for *Ever PE-backed*, should capture the effect of PE ownership over and above these unobserved characteristics. An insignificant coefficient of *PE-backed at default* and significant coefficient for *Ever PE-backed* would therefore indicate that our previous results are more



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driven by ex-ante selection. Appendix Table A4 shows that tor the most part – the likelihood of an out-of-court restructuring, firm survival, equity control, and capital infusions – *Ever PE-backed* is insignificant, while *PE-backed* is still statistically and economically significant. The exception is the speed of distress resolution, where *Ever PE-backed* is statistically significant and accounts for the majority of the effect, while *PE-backed* is statistically insignificant. Hence, it may be the case that PE funds choose firms with characteristics that make them faster to restructure, while the continued presence of the PE fund is less important for the speed of restructuring.

Finally, regardless of whether some findings may be driven by ex-ante selection, we believe our results have implications for the role of PE investors in the economy. Even if PE funds ex-ante choose firms with lower probability and costs of financial distress (which in itself may be a skill), our results still suggest that the high leverage in PE transactions does not lead to excessive costs of financial distress. Hence, while PE funds may have incentives to use higher leverage in their transactions, we do not find evidence that this behavior leads to excessive deadweight costs compared to the leverage choices of other firms.

## IX. Conclusions

We empirically examine the behavior of PE-backed firms, including the frequency with which they default and, conditional on default, how PE-backed firms resolve financial distress. As a benchmark, we compare PE-backed firms to a sample of highly levered firms that similarly borrow in the leveraged loan market but lack a PE owner. We find that leverage, rather than PE-backing specifically, is the key driver of default probabilities. At the same time, because PE sponsors typically use relatively higher leverage for portfolio firms, these firms have a greater risk of default.

We further find that when PE-backed firms do become financially distressed, they are more likely to restructure out of court, take less time to complete a restructuring, and are more likely to survive as an independent going concern, compared to financially distressed peers not backed by a PE investor. Thus, PE sponsors may be skilled at investing in firms with lower expected costs of distress, or may directly influence restructurings in a manner leading to more efficient restructurings. Our evidence that more



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favorable default outcomes are related to the infusion of capital by PE owners into distressed portfolio companies suggests that selection effects do not entirely explain the observed impact of PE investing.



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## Table 1: Descriptive statistics for full sample

Descriptive statistics for the full sample of 2,151 firms that raised leveraged loan financing during the period January 1997 to April 2010. A firm enters the sample when it is identified as a leveraged loan borrower by Dealscan or Dealogic and is identified as rated below investment grade by Moody's. Firms exit the sample upon a default, merger, or upgrade to investment grade. We define a firm as *PE-backed* when it is acquired through a leveraged or secondary buyout and held in a managed private equity fund for purposes of active control. We obtain ownership and financial information from Moody's, Capital IQ, Dealscan, Dealogic, Deal Pipeline, SEC filings, and other news sources. Variable definitions are provided in Appendix Table A1.

**A: Full sample of leveraged loan borrowers (N=2,151)**

| | Number of firms | % of full sample |
|---|---|---|
| PE-backed firm | 965 | 44.9% |
| Firm defaults | 552 | 25.7% |
| PE-backed firm defaults | 241 | 11.2% |

**B: Firm, market, and industry statistics (by firm-year)**

| | PE-backed | | | Non PE-backed | | | PE-exited | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | Mean | Median | N | Mean | Median | N | Mean | Median | N | Mean | Median |
| *Financial characteristics* | | | | | | | | | | | | |
| Rating | 2,337 | B3 | B2 | 5,839 | B1 | B1 | 1,090 | B2 | B2 | 9,266 | B2 | B2 |
| On Compustat | 4,098 | 0.369 | 0.000 | 8,196 | 0.756 | 1.000 | 1,677 | 0.423 | 0.000 | 13,971 | 0.603 | 1.000 |
| Total assets ($ million) | 1,358 | 4,957 | 598 | 4,961 | 4,737 | 1,349 | 668 | 2,005 | 748 | 6,987 | 4,519 | 1,042 |
| Revenues ($ million) | 1,409 | 1,678 | 545 | 4,980 | 3,468 | 1,108 | 676 | 1,356 | 633 | 7,065 | 2,909 | 903 |
| EBITDA/sales | 1,405 | 0.150 | 0.130 | 4,883 | -0.112 | 0.124 | 676 | 0.175 | 0.146 | 6,964 | -0.031 | 0.129 |
| Total debt/assets | 1,358 | 0.727 | 0.664 | 4,957 | 0.457 | 0.413 | 666 | 0.534 | 0.511 | 6,981 | 0.517 | 0.465 |
| *Loan financing activity in last 5 yrs* | | | | | | | | | | | | |
| Acquisition financing | 4,098 | 0.485 | | 8,196 | 0.412 | | 1,677 | 0.557 | | 13,971 | 0.451 | |
| Recap | 4,098 | 0.168 | | 8,196 | 0.078 | | 1,677 | 0.230 | | 13,971 | 0.123 | |
| Dividend recap | 4,098 | 0.085 | | 8,196 | 0.006 | | 1,677 | 0.148 | | 13,971 | 0.046 | |
| *Market and industry conditions* | | | | | | | | | | | | |
| S&P 500 return | 4,098 | 5.819 | 10.880 | 8,196 | 8.588 | 10.880 | 1,677 | 4.920 | 5.490 | 13,971 | 7.336 | 10.880 |
| Industry change in sales | 4,098 | 0.077 | 0.080 | 8,196 | 0.087 | 0.087 | 1,677 | 0.070 | 0.077 | 13,971 | 0.082 | 0.084 |
| Industry change in EBITDA/sales | 4,098 | 0.000 | 0.001 | 8,196 | 0.000 | 0.001 | 1,677 | -0.001 | 0.000 | 13,971 | 0.000 | 0.001 |
| Industry market-to-book ratio | 4,098 | 1.899 | 1.522 | 8,196 | 1.809 | 1.392 | 1,677 | 1.898 | 1.586 | 13,971 | 1.849 | 1.461 |

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## Table 1 (continued)

**C: PE sponsor characteristics**

| | N | Mean | Median |
|---|---|---|---|
| Months since PE entry | 4,330 | 43 | 36 |
| Last fund raised < 5 yrs ago | 4,337 | 0.85 | 1 |
| PE sponsor age (years) | 4,113 | 13.5 | 13 |
| PE sponsor older than 10 yrs | 4,337 | 0.571 | 1 |
| PE sponsor is top distressed investor | 4,337 | 0.116 | 0 |

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## Table 2: Default frequencies

Default frequencies for the full sample of 2,151 leveraged loan borrowers. A firm enters the sample when it is identified as a leveraged loan borrower by Dealscan or Dealogic, and is rated below investment grade by Moody's. Firms exit the sample upon a default, merger, or upgrade to investment grade. We define a firm to be *PE-backed* when it is acquired through a leveraged or secondary buyout and held in a managed private equity fund for purposes of active control. *PE-exited* firms are formerly PE-backed, where the PE sponsor exited within the prior five years. Defaults include payment defaults on interest or principal, distressed debt exchanges, other out-of-court restructurings, and bankruptcy filings identified by Moody's or reported in other news sources. N is the number of firm-year observations. Detailed variable definitions are provided in Appendix Table A1.

| | PE-backed | | | Non PE-backed | | | PE-exited | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Panel Year | N | # of defaults | % defaulting | N | # of defaults | % defaulting | N | # of defaults | % defaulting | N | # of defaults | % defaulting |
| 1998 | 173 | 2 | 1.2% | 771 | 10 | 1.3% | 56 | 1 | 1.8% | 1,000 | 13 | 1.3% |
| 1999 | 245 | 13 | 5.3% | 901 | 26 | 2.9% | 67 | 4 | 6.0% | 1,213 | 43 | 3.5% |
| 2000 | 306 | 19 | 6.2% | 868 | 39 | 4.5% | 74 | 1 | 1.4% | 1,248 | 59 | 4.7% |
| 2001 | 330 | 30 | 9.1% | 828 | 41 | 5.0% | 77 | 5 | 6.5% | 1,235 | 76 | 6.2% |
| 2002 | 321 | 19 | 5.9% | 789 | 36 | 4.6% | 80 | 2 | 2.5% | 1,190 | 57 | 4.8% |
| 2003 | 332 | 13 | 3.9% | 748 | 20 | 2.7% | 77 | 4 | 5.2% | 1,157 | 37 | 3.2% |
| 2004 | 359 | 11 | 3.1% | 679 | 16 | 2.4% | 88 | 0 | 0.0% | 1,126 | 27 | 2.4% |
| 2005 | 369 | 6 | 1.6% | 621 | 11 | 1.8% | 132 | 1 | 0.8% | 1,122 | 18 | 1.6% |
| 2006 | 368 | 9 | 2.4% | 569 | 10 | 1.8% | 173 | 0 | 0.0% | 1,110 | 19 | 1.7% |
| 2007 | 354 | 4 | 1.1% | 492 | 4 | 0.8% | 219 | 0 | 0.0% | 1,065 | 8 | 0.8% |
| 2008 | 343 | 22 | 6.4% | 397 | 26 | 6.5% | 254 | 9 | 3.5% | 994 | 57 | 5.7% |
| 2009 | 325 | 47 | 14.5% | 299 | 52 | 17.4% | 212 | 19 | 9.0% | 836 | 118 | 14.1% |
| 2010 | 273 | 6 | 2.2% | 235 | 2 | 0.9% | 168 | 4 | 2.4% | 676 | 12 | 1.8% |
| All years | 4,098 | 201 | 4.9% | 8,197 | 293 | 3.6% | 1,677 | 50 | 3.0% | 13,972 | 544 | 3.9% |

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**Table 3: Default probability models**

This table shows the results from a Cox proportional hazards model with time-varying covariates. Panel A reports regressions for the sample of 2,151 firms that were borrowers in the leveraged loan market during the period 1997 through 2010. Panel B reports regressions for the subsample of those firms which are PE backed at some time during the sample period. *PE-backed* is an indicator variable that takes a value of one when a firm is owned by a private equity fund. *PE-exited* equals one when a firm is no longer owned by a private equity firm but had a private equity owner within the last five years. Total debt/assets and rating are measured as of the date of the last financing. Variables are as defined in Appendix Table A1. Standard errors are reported in parentheses. Coefficients are statistically significant at the 1% (***), 5% (**), and 10% (*) levels, respectively.

**A: Full sample**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| PE-backed | 0.162* | 0.217** | -0.099 | -0.035 | 0.717*** | 0.016 | 0.229 |
| | (0.097) | (0.100) | (0.128) | (0.134) | (0.267) | (0.104) | (0.939) |
| PE-exited | -0.505*** | -0.602*** | -0.525** | -0.617*** | -0.642*** | -0.578*** | -0.576*** |
| | (0.154) | (0.156) | (0.217) | (0.225) | (0.225) | (0.162) | (0.162) |
| Total debt/assets | | | 1.728*** | 1.663*** | 2.144*** | | |
| | | | (0.168) | (0.181) | (0.230) | | |
| PE-backed*Total debt/assets | | | | | -1.016*** | | |
| | | | | | (0.323) | | |
| Rating | | | | | | 0.329*** | 0.332*** |
| | | | | | | (0.021) | (0.025) |
| PE-backed*rating | | | | | | | -0.010 |
| | | | | | | | (0.044) |
| On Compustat | -0.025 | -0.007 | -0.989*** | -0.959*** | -0.884*** | -0.060 | -0.060 |
| | (0.096) | (0.098) | (0.134) | (0.144) | (0.146) | (0.104) | (0.104) |
| Industry change in sales | -0.660 | -1.144 | -0.603 | -1.434 | -1.562 | -0.392 | -0.392 |
| | (0.667) | (1.033) | (0.843) | (1.255) | (1.262) | (1.062) | (1.062) |
| Industry change in EBITDA/sales | -15.477*** | -14.791*** | -15.447*** | -11.177* | -11.101* | -15.374*** | -15.371*** |
| | (3.169) | (4.734) | (4.403) | (5.924) | (5.935) | (5.022) | (5.023) |
| Industry market-to-book ratio | -0.107*** | -0.042 | -0.138*** | -0.015 | -0.011 | -0.031 | -0.031 |
| | (0.040) | (0.066) | (0.051) | (0.075) | (0.074) | (0.066) | (0.066) |
| Log sales | | | 0.013 | 0.016 | 0.030 | | |
| | | | (0.044) | (0.050) | (0.051) | | |
| EBITDA/sales | | | 0.001 | 0.001 | 0.001 | | |
| | | | (0.006) | (0.005) | (0.005) | | |
| S&P 500 return | -0.017*** | | -0.019*** | | | | |
| | (0.002) | | (0.003) | | | | |
| Recap | 0.004 | -0.067 | -0.283* | -0.323* | -0.337* | 0.000 | -0.003 |
| | (0.130) | (0.133) | (0.172) | (0.177) | (0.177) | (0.138) | (0.138) |
| Acquisition financing | -0.007 | -0.041 | -0.107 | -0.156 | -0.137 | -0.001 | -0.001 |
| | (0.088) | (0.090) | (0.111) | (0.114) | (0.115) | (0.097) | (0.097) |
| Year & industry fixed effects | No | Yes | No | Yes | Yes | Yes | Yes |
| Likelihood Ratio | 140.3 | 314.9 | 248.3 | 356.5 | 367.5 | 539.8 | 539.9 |
| Number of firms | 1,890 | 1,890 | 1,699 | 1,699 | 1,699 | 1,836 | 1,836 |
| Number of defaults | 538 | 538 | 347 | 347 | 347 | 484 | 484 |

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## Table 3 (continued)

**B: PE-backed firms only**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Months since PE entry | 0.007** | 0.005 | 0.008 *** | 0.008 *** |
| | (0.003) | (0.004) | (0.003) | (0.003) |
| Last fund raised < 5 yrs | -0.467** | -0.496* | -0.215 | -0.122 |
| | (0.238) | (0.277) | (0.186) | (0.173) |
| PE sponsor older than 10 yrs | -0.284 | -0.143 | -0.057 | -0.146 |
| | (0.206) | (0.231) | (0.156) | (0.143) |
| PE sponsor is top distressed investor | 0.154 | 0.307 | 0.317 | 0.187 |
| | (0.281) | (0.319) | (0.195) | (0.184) |
| Total debt/assets | 1.360*** | 1.014 *** | | |
| | (0.283) | (0.337) | | |
| Rating | | | 0.302 *** | 0.277 *** |
| | | | (0.039) | (0.036) |
| On Compustat | -1.069*** | -1.032 *** | -0.196 | -0.044 |
| | (0.206) | (0.241) | (0.171) | (0.150) |
| Industry change in sales | 0.740 | -0.774 | 0.571 | 0.566 |
| | (1.616) | (2.603) | (1.817) | (1.196) |
| Industry change in EBITDA/sales | -22.146*** | -18.776 | -21.950 ** | -21.986 *** |
| | (8.160) | (13.050) | (9.120) | (5.874) |
| Industry market-to-book ratio | -0.092 | -0.130 | -0.052 | -0.071 |
| | (0.084) | (0.165) | (0.115) | (0.067) |
| Log revenues | 0.091 | 0.148 | | |
| | (0.088) | (0.112) | | |
| EBITDA/sales | -0.861*** | -0.872 ** | | |
| | (0.247) | (0.385) | | |
| S&P 500 return | -0.018*** | | | -0.018 *** |
| | (0.005) | | | (0.003) |
| Recap | -0.670** | -0.537 * | -0.246 | -0.209 |
| | (0.276) | (0.296) | (0.203) | (0.191) |
| Acquisition financing | -0.296 | -0.431 * | -0.002 | -0.058 |
| | (0.211) | (0.233) | (0.157) | (0.147) |
| Year & industry fixed effects | No | Yes | Yes | No |
| Likelihood Ratio | 93 | 160 | 237 | 141 |
| Number of firms | 804 | 804 | 907 | 907 |
| Number of defaults | 115 | 115 | 208 | 208 |

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## Table 4: Restructuring types, outcomes, and recovery rates

Default types and outcomes for of 621 default events of 552 U.S. companies between 1997 and 2011. The sample includes 253 events where the company is controlled by a private equity fund at the time of default (*PE-backed*) and 368 companies that are not (*non-PE-backed*). Restructuring outcomes that are "ongoing" in Panel C are unresolved as of July 2012. Panel E provides recovery rate statistics for the subsample of 267 defaults with data available from Moody's Ultimate Recovery database. Differences between PE- and non PE-backed subsamples are statistically significant using a rank-sum test at the 10% (*), 5% (**), and 1% (***) levels.

**A: Restructuring type**

| | | Chapter 11 (excluding pre-packed) | Pre-packaged bankruptcy | Distressed exchange | Other out-of-court | Total |
|---|---|---|---|---|---|---|
| Full sample of defaults | N | 358 | 119 | 94 | 50 | 621 |
| | % of defaults | 58% | 19% | 15% | 8% | |
| PE-backed | N | 122 | 61 | 45 | 25 | 253 |
| | % of defaults | 48% | 24% | 18% | 10% | |
| Non PE-backed | N | 236 | 58 | 49 | 25 | 368 |
| | % of defaults | 64% | 16% | 13% | 7% | |

**B. Number of months in default**

| All defaults | Time period | Mean | Median | | N |
|---|---|---|---|---|---|
| Whole sample | 1998-2006 | 16.6 | 12.8 | | 372 |
| | 2007-2009 | 8.9 | 7.8 | | 193 |
| | 2010-2011 | 3.7 | 3.3 | | 15 |
| | 1998-2011 | 13.7 | 10.3 | | 580 |
| PE-backed | 1998-2006 | 12.0 | 9.6 | *** | 136 |
| | 2007-2009 | 8.0 | 6.4 | * | 96 |
| | 2010-2011 | 2.7 | 1.9 | | 9 |
| | 1998-2010 | 10.1 | 7.7 | *** | 241 |
| Non PE-backed | 1998-2006 | 19.2 | 14.0 | *** | 236 |
| | 2007-2009 | 9.8 | 9.0 | * | 97 |
| | 2009-2010 | 5.3 | 4.1 | | 6 |
| | 1998-2010 | 16.2 | 11.9 | *** | 339 |
| Chapter 11 only | | | | | |
| Whole sample | 1998-2006 | 19.1 | 14.5 | | 310 |
| | 2007-2009 | 10.8 | 9.8 | | 149 |
| | 2010-2011 | 5.1 | 4.5 | | 11 |
| | 1998-2011 | 16.1 | 12.2 | | 470 |
| PE-backed | 1998-2006 | 14.4 | 12.4 | *** | 106 |
| | 2007-2009 | 9.6 | 8.2 | ** | 71 |
| | 2010-2011 | 4.0 | 3.9 | | 6 |
| | 1998-2010 | 12.2 | 9.8 | *** | 183 |
| Non PE-backed | 1998-2006 | 21.5 | 16.2 | *** | 204 |
| | 2007-2009 | 11.8 | 11.0 | ** | 78 |
| | 2009-2010 | 6.3 | 4.7 | | 5 |
| | 1998-2010 | 18.6 | 13.9 | *** | 339 |

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## Table 4 (continued)

**C: Restructuring outcome**

| | | Reorganized | Acquired by financial buyer | Acquired by strategic buyer | Liquidated | Ongoing |
|---|---|---|---|---|---|---|
| Whole sample | N | 428 | 36 | 76 | 79 | 2 |
| | % of defaults | 69% | 6% | 12% | 13% | 0% |
| PE-backed | N | 188 | 14 | 29 | 22 | 0 |
| | % of defaults | 74% | 6% | 11% | 9% | 0% |
| Non-PE-backed | N | 240 | 22 | 47 | 57 | 2 |
| | % of defaults | 65% | 6% | 13% | 15% | 1% |

**D: Controlling equity owners at exit from Chapter 11**

| | | Creditors of unknown identity | Bank lenders | Hedge fund | Original PE investor | Original non-PE share-holders | New PE investor | Manage-ment |
|---|---|---|---|---|---|---|---|---|
| Whole sample | N | 100 | 53 | 32 | 23 | 6 | 49 | 1 |
| | % of bankruptcies | 38% | 20% | 12% | 9% | 2% | 19% | 0% |
| PE-backed | N | 43 | 29 | 13 | 23 | 0 | 21 | 0 |
| | % of bankruptcies | 33% | 22% | 10% | 18% | 0% | 16% | 0% |
| Non-PE-backed | N | 57 | 24 | 19 | 0 | 6 | 28 | 1 |
| | % of bankruptcies | 42% | 18% | 14% | 0% | 4% | 21% | 1% |

**E: Creditor recovery rates by restructuring outcome**

| | N | Mean | Median |
|---|---|---|---|
| All defaults | | | |
| Reorganized | 267 | 0.58 | 0.59 |
| Acquired by financial buyer | 16 | 0.38 | 0.29 |
| Acquired by strategic buyer | 43 | 0.50 | 0.54 |
| Liquidated | 28 | 0.37 | 0.31 |
| Total | 354 | 0.54 | 0.54 |
| PE-backed | | | |
| Reorganized | 117 | 0.56 | 0.54 |
| Acquired by financial buyer | 6 | 0.32 | 0.19 |
| Acquired by strategic buyer | 16 | 0.51 | 0.55 |
| Liquidated | 10 | 0.37 | 0.29 |
| Total | 149 | 0.53 | 0.52 |
| Non PE-backed | | | |
| Reorganized | 150 | 0.60 | 0.60 |
| Acquired by financial buyer | 10 | 0.41 | 0.34 |
| Acquired by strategic buyer | 27 | 0.50 | 0.52 |
| Liquidated | 18 | 0.37 | 0.33 |
| Total | 205 | 0.55 | 0.56 |

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## Table 5: Defaulted firms, selected characteristics

Descriptive statistics for the sample of 621 default events of 552 U.S. companies that defaulted on their debt between 1997 and 2011. The sample includes 253 PE-backed defaults and 368 non PE-backed defaults. Variable definitions are provided in Appendix Table A1. Differences between the PE- and non-PE subsamples are statistically significant using a rank-sum test at the 10% (*), 5% (**), and 1% (***) levels.

**A: Firm characteristics (financials measured at FYE prior to default or year prior, as available)**

| | | Non PE-backed at default | PE-backed at default | | Total |
|---|---|---|---|---|---|
| Public debt outstanding (dummy) | *N* | 368 | 253 | | 621 |
| | *Mean* | 0.829 | 0.735 | *** | 0.791 |
| EBITDA/sales (winsorized) | *N* | 328 | 204 | | 532 |
| | *Mean* | 0.060 | 0.090 | *** | 0.072 |
| | *Median* | 0.056 | 0.082 | | 0.067 |
| Total debt/assets (winsorized) | *N* | 322 | 192 | | 514 |
| | *Mean* | 0.725 | 0.951 | *** | 0.810 |
| | *Median* | 0.648 | 0.862 | | 0.743 |

**B: Industry and macro variables**

| | | Non PE-backed at default | PE-backed at default | | Total |
|---|---|---|---|---|---|
| Distressed industry (dummy) | *N* | 365 | 252 | | 617 |
| | *Mean* | 0.205 | 0.254 | | 0.225 |
| Industry median specific assets | *N* | 368 | 253 | | 621 |
| | *Mean* | 0.303 | 0.278 | * | 0.293 |
| | *Median* | 0.270 | 0.254 | | 0.254 |

**C: Bankruptcy subsample characteristics**

| | | Non PE-backed at default | PE-backed at default | | Total |
|---|---|---|---|---|---|
| Southern District of NY filing (dummy) | *N* | 260 | 179 | | 439 |
| | *Mean* | 0.146 | 0.117 | | 0.134 |
| Delaware filing (dummy) | *N* | 260 | 179 | | 439 |
| | *Mean* | 0.381 | 0.553 | *** | 0.451 |

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## Table 6: Determinants of company filing for bankruptcy after default

The first three columns present logit regressions of the likelihood of the firm entering bankruptcy versus restructuring out of court for the sample of 621 defaults between 1997 and 2011. The last two columns present logit regressions of the likelihood of the firm filing a pre-packaged bankruptcy for the subsample of Chapter 11 filings. Variable definitions are provided in Appendix Table A1. Financial variables are measured at the fiscal year end prior to default (or year prior if not available). Industry fixed effects are at the Fama-French 49 industry level. "Dummies for missing firm financials" indicates specifications where firm financials are coded as zero when missing, and corresponding dummies are included for missing firm financials. Table shows marginal effects (above) and t-statistics (below), which are statistically significant at the 10% (*), 5% (**), and 1% (***) levels using standard errors clustered by default year.

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| VARIABLES | Default results in bankruptcy | Default results in bankruptcy | Default results in bankruptcy | Bankruptcy is a pre-pack (Ch.11 only) | Bankruptcy is a pre-pack (Ch.11 only) |
| PE-backed | -0.073** | -0.055** | -0.133** | 0.086** | 0.078* |
| | (-2.160) | (-2.564) | (-1.972) | (2.527) | (1.898) |
| Months since PE entry | | | 0.002*** | | |
| | | | (4.334) | | |
| Last fund raised < 5 yrs | | | -0.029 | | |
| | | | (-0.562) | | |
| PE sponsor older than 10 years | | | -0.008 | | |
| | | | (-0.118) | | |
| PE is top distressed investor | | | -0.249** | | |
| | | | (-2.061) | | |
| On Compustat | 0.039 | 0.019 | -0.002 | 0.028 | 0.041 |
| | (0.827) | (0.472) | (-0.062) | (0.508) | (0.633) |
| Public debt outstanding | -0.054 | -0.026 | -0.036 | -0.004 | -0.004 |
| | (-1.099) | (-0.606) | (-0.848) | (-0.061) | (-0.100) |
| Distressed industry | -0.126 | -0.083 | -0.096 | -0.094 | -0.193*** |
| | (-0.769) | (-0.796) | (-0.862) | (-0.955) | (-2.941) |
| Industry median specific assets | -0.048 | | | -0.091 | |
| | (-0.284) | | | (-0.717) | |
| Distressed industry*specific assets | 0.204 | 0.177 | 0.184 | 0.213 | 0.669** |
| | (0.687) | (0.609) | (0.630) | (0.572) | (2.426) |
| Industry market-to-book ratio | -0.228*** | -0.220*** | -0.221*** | 0.102 | 0.068 |
| | (-3.195) | (-3.071) | (-2.903) | (0.953) | (0.371) |
| Log sales | 0.028** | 0.029** | 0.041*** | -0.012 | -0.025 |
| | (1.986) | (2.092) | (3.340) | (-0.622) | (-1.177) |
| EBITDA/Sales | 0.013 | 0.033 | 0.030 | 0.528*** | 0.411** |
| | (0.101) | (0.313) | (0.291) | (3.421) | (2.085) |
| Revenue growth | 0.120 | 0.063 | 0.064 | -0.176** | -0.178 |
| | (1.218) | (0.814) | (0.803) | (-2.174) | (-1.559) |
| Total Debt/Assets | 0.042 | 0.044 | 0.013 | 0.189** | 0.158 |
| | (0.932) | (0.779) | (0.234) | (2.438) | (1.506) |
| Moody's default rate, year of default | -2.798*** | | | | |
| | (-3.322) | | | | |
| S&P 500 return, year of default | -0.001 | | | | |
| | (-1.383) | | | | |
| Dividend recap | | | -0.064* | | |
| | | | (-1.928) | | |
| Year fixed effects | No | Yes | Yes | Yes | Yes |
| Industry fixed effects | No | Yes | Yes | No | Yes |
| Dummies for missing firm financials | No | Yes | Yes | No | Yes |
| Pseudo-R2 | 0.08 | 0.15 | 0.18 | 0.15 | 0.20 |
| Observations | 500 | 611 | 609 | 377 | 457 |

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## Table 7: Determinants of the time spent in restructuring

Regressions for the number of months in default on *PE-backed* and other control variables for a sample of 621 defaults between 1997 and 2011. Specifications (1) through (3) are Tobit regressions, left censored at zero, while Specifications (4) through (6) are OLS regressions. Variable definitions are provided in Appendix Table A1. Coefficients (with t-statistics below, calculated using standard errors clustered by default year) are statistically significant at the 10% (*), 5% (**), and 1% (***) levels.

| VARIABLES | (1) Months in default (Tobit) | (2) Months in default (Tobit) | (3) Months in default (Tobit) | (4) Months in Ch.11 (OLS) | (5) Months in Ch.11 (OLS) | (6) Months in Ch.11, no prepacks (OLS) |
|---|---|---|---|---|---|---|
| PE-backed | -4.148*** | -3.534*** | -5.051** | -3.689** | -2.718* | -2.975* |
| | (-3.093) | (-3.432) | (-2.136) | (-2.656) | (-2.076) | (-2.005) |
| Months since PE entry | | | 0.027 | | | |
| | | | (1.128) | | | |
| Last fund raised < 5 yrs | | | 1.040 | | | |
| | | | (0.466) | | | |
| PE sponsor older than 10 years | | | 0.102 | | | |
| | | | (0.084) | | | |
| PE is top distressed investor | | | -4.548* | | | |
| | | | (-1.771) | | | |
| On Compustat | -0.071 | 0.935 | 0.730 | -0.838 | 1.308 | 2.104 |
| | (-0.030) | (0.475) | (0.369) | (-0.378) | (0.639) | (0.717) |
| Public debt outstanding | 0.368 | -0.603 | -0.494 | 1.711 | 0.049 | 0.875 |
| | (0.174) | (-0.349) | (-0.2710 | (0.649) | (0.022) | (0.271) |
| Distressed industry | -4.664 | -1.969 | -2.002 | -4.831* | -1.043 | -9.411 |
| | (-1.111) | (-0.664) | (-0.670) | (-1.891) | (-0.217) | (-1.170) |
| Industry specific assets | 1.896 | | | 2.881 | | |
| | (0.312) | | | (0.563) | | |
| Distressed Ind *specific assets | 10.065 | 5.541 | 5.777 | 11.005 | 4.549 | 25.516 |
| | (0.769) | (0.490) | (0.530) | (1.068) | (0.281) | (1.057) |
| Industry market-to-book ratio | -5.732 | -8.281** | -7.972** | -2.966 | -3.660 | -6.561 |
| | (-1.600) | (-2.244) | (-2.192) | (-0.854) | (-0.855) | (-1.207) |
| Moody's default rate | -48.811 | | | -23.620 | | |
| | (-1.148) | | | (-0.579) | | |
| S&P 500 return | -0.046 | | | -0.032 | | |
| | (-0.652) | | | (-0.441) | | |
| Log sales | 1.160* | 1.580*** | 1.691*** | 1.033 | 1.310** | 1.369* |
| | (1.666) | (3.605) | (4.184) | (1.638) | (2.600) | (1.892) |
| EBITDA/sales | 2.330 | 4.869 | 4.951 | 1.789 | 5.500 | 10.936 |
| | (0.470) | (1.155) | (1.213) | (0.309) | (0.853) | (1.269) |
| Revenue growth | 1.904 | -1.471 | -1.789 | -0.332 | -3.699* | -5.973*** |
| | (1.050) | (-0.929) | (-1.208) | (-0.242) | (-2.122) | (-3.156) |
| Total debt/assets | -4.869** | -2.932 | -3.430* | -6.260*** | -5.210** | -6.142** |
| | (-2.435) | (-1.354) | (-1.895) | (-3.819) | (-2.558) | (-2.511) |
| Delaware filing | | | | | -2.298 | -0.981 |
| | | | | | (-1.588) | (-0.728) |
| S. District of NY filing | | | | | 3.923 | 6.588** |
| | | | | | (1.776) | (2.204) |
| Dividend recap | | | 3.459 | | | |
| | | | (1.408) | | | |
| Constant | 21.395** | 6.641 | 4.622 | 20.471** | 18.952* | 23.755* |
| | (2.263) | (0.787) | (0.526) | (2.251) | (1.877) | (1.929) |
| Sigma | 14.954*** | 13.277*** | 13.253*** | | | |
| | (11.609) | (10.315) | (10.146) | | | |
| Year fixed effects | No | Yes | Yes | No | Yes | Yes |
| Industry fixed effects | No | Yes | Yes | No | Yes | Yes |
| Dummies for missing finan. | No | Yes | Yes | No | Yes | Yes |
| Observations | 465 | 570 | 568 | 371 | 427 | 316 |

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**Table 8: Determinants of defaulted firm surviving as an independent company**

*Company survives* is defined as firms that are reorganized as independent companies or are acquired by a financial buyer. The first three columns show results from logit regressions for the full sample of 621 default events, while the fourth column shows results for the subsample of Chapter 11 bankruptcies. Columns (5) and (6) show results from logit regressions for the likelihood that pre-default equity holders stay in control for the subsample of firms that successfully emerge from Chapter 11. Variable definitions are provided in Appendix Table A1. The table shows marginal effects and t-statistics, which are statistically significant at the 10% (*), 5% (**), and 1% (***) levels using standard errors clustered by default year.

| VARIABLES | (1)<br>Company survives (all defaults) | (2)<br>Company survives (all defaults) | (3)<br>Company survives (all defaults) | (4)<br>Company survives (Ch.11) | (5)<br>Equity retains control (Ch.11) | (6)<br>Equity retains control (Ch.11) |
|---|---|---|---|---|---|---|
| PE-backed | 0.094*** | 0.089*** | -0.017 | 0.120*** | 0.066*** | 0.169* |
| | (4.154) | (4.088) | (-0.219) | (2.749) | (2.623) | (1.678) |
| Months since PE entry | | | 0.001 | | | -0.001 |
| | | | (1.186) | | | (-1.465) |
| Last fund raised < 5 yrs | | | 0.078** | | | -0.010 |
| | | | (1.981) | | | (-0.750) |
| PE sponsor older than 10 years | | | 0.031 | | | -0.019 |
| | | | (0.470) | | | (-1.178) |
| PE is top distressed investor | | | 0.003 | | | -0.018 |
| | | | (0.037) | | | (-0.843) |
| On Compustat | 0.007 | -0.027 | -0.032 | 0.031 | 0.011 | 0.015 |
| | (0.235) | (-0.592) | (-0.719) | (0.508) | (0.646) | (1.035) |
| Public debt outstanding | 0.028 | 0.080*** | 0.085*** | 0.069 | -0.018 | -0.010 |
| | (0.700) | (2.751 | (2.753) | (1.268) | (-0.728) | (-0.488) |
| Distressed industry | 0.069 | -0.020 | -0.010 | -0.138 | -0.006 | -0.002 |
| | (0.784) | (-0.352) | (-0.177) | (-1.507) | (-0.361) | (-0.118) |
| Industry specific assets | 0.363*** | | | | -0.040 | -0.027 |
| | (2.675) | | | | (-0.958) | (-0.766) |
| Distressed Ind*spec assets | -0.426** | -0.284 | -0.304 | -0.342 | 0.001 | -0.007 |
| | (-2.170) | (-1.360) | (-1.440) | (-1.369) | (0.024) | (-0.232) |
| Industry market-to-book ratio | 0.235 | 0.282** | 0.273** | 0.224 | -0.012 | -0.019 |
| | (1.618) | (2.303) | (2.294) | (1.079) | (-0.230) | (-0.335) |
| Moody's default rate | 2.222** | | | | 0.482* | 0.454 |
| | (2.303) | | | | (1.667) | (1.607) |
| S&P 500 return | 0.001 | | | | 0.000 | 0.000 |
| | (0.606) | | | | (0.271) | (0.132) |
| Log sales | | -0.012 | -0.013 | -0.008 | -0.003 | -0.001 |
| | | (-0.785) | (-0.813) | (-0.262) | (-0.802) | (-0.356) |
| EBITDA/sales | | 0.485*** | 0.484*** | 1.059*** | -0.101 | -0.098** |
| | | (3.085) | (2.983) | (3.550) | (-1.525) | (-2.044) |
| Revenue growth | | -0.078 | -0.079 | -0.162 | 0.027 | 0.015 |
| | | (-1.134) | (-1.138) | (-1.473) | (1.361) | (0.705) |
| Total debt/assets | | -0.055 | -0.063 | -0.098 | 0.020 | 0.023 |
| | | (-1.227) | (-1.431) | (-1.591) | (0.533) | (0.663) |
| Delaware filing | | | | 0.080 | -0.017* | -0.017** |
| | | | | (1.425) | (-1.748) | (-2.089) |
| S. District of NY filing | | | | 0.114 | -0.036*** | -0.031** |
| | | | | (1.137) | (-2.874) | (-2.459) |
| Dividend recap | | | 0.077 | | | 0.027 |
| | | | (0.872) | | | (0.568) |
| Year fixed effects | No | Yes | Yes | Yes | No | No |
| Industry fixed effects | No | Yes | Yes | Yes | No | No |
| Dummies for missing firm financials | No | Yes | Yes | Yes | Yes | Yes |
| Pseudo-R2 | 0.067 | 0.191 | 0.194 | 0.213 | 0.197 | 0.233 |
| Observations | 611 | 611 | 609 | 432 | 325 | 323 |

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## Table 9: Determinants of creditor recovery rates in default

OLS regressions of creditor recovery rates on *PE-backed* and other control variables for a sample of 347 defaults between 1997 and 2011 with recovery rate data from Moody's. Recovery rates are discounted recovery rates at the time of default as defined by Moody's. Coefficients (standard errors clustered by default year) are statistically significant at the 10% (*), 5% (**), and 1% (***) levels.

| VARIABLES | (1)<br>Recovery rate | (2)<br>Recovery rate | (3)<br>Recovery rate |
|---|---|---|---|
| PE-backed | 0.008 | -0.008 | -0.067 |
| | (0.333) | (-0.389) | (-1.121) |
| Months since PE entry | | | 0.001* |
| | | | (1.714) |
| Last fund raised < 5 yrs | | | 0.060 |
| | | | (1.456) |
| PE sponsor older than 10 years | | | -0.047 |
| | | | (-1.234) |
| PE is top distressed investor | | | 0.042 |
| | | | (0.612) |
| On Compustat | 0.012 | 0.005 | 0.000 |
| | (0.354) | (0.175) | (0.003) |
| Public debt outstanding | -0.010 | 0.048 | 0.047 |
| | (-0.234) | (1.052) | (1.057) |
| Distressed industry | 0.089 | 0.036 | 0.043 |
| | (1.577) | (0.550) | (0.701) |
| Industry median specific assets | 0.302*** | | |
| | (4.849) | | |
| Distressed ind*specific assets | -0.390** | -0.277* | -0.292* |
| | (-2.661) | (-1.809) | (-1.918) |
| Industry market-to-book | 0.193** | 0.049 | 0.035 |
| | (2.394) | (0.300) | (0.239) |
| Moody's default rate | -0.094 | | |
| | (-0.188) | | |
| S&P 500 return | 0.002** | | |
| | (3.037) | | |
| Log sales | 0.021 | 0.014 | 0.014 |
| | (1.369) | (0.725) | (0.740) |
| EBITDA/Sales | 0.122 | 0.112 | 0.110 |
| | (0.965) | (0.859) | (0.898) |
| Revenue growth | -0.134* | -0.099 | -0.102* |
| | (-2.080) | (-1.754) | (-1.775) |
| Total Debt/Assets | -0.070* | -0.070** | -0.081*** |
| | (-1.845) | (-2.429) | (-3.235) |
| Dividend recap <5yrs | | | 0.058*** |
| | | | (2.861) |
| Constant | 0.123 | 0.718*** | 0.754*** |
| | (0.809) | (3.369) | (3.711) |
| Year fixed effects | No | Yes | Yes |
| Industry fixed effects | No | Yes | Yes |
| Dummies for missing firm financials | No | Yes | Yes |
| Observations | 311 | 347 | 346 |
| Adj. R-squared | 0.114 | 0.117 | 0.115 |

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## Table 10: Capital infusions

Panel A shows the frequency of capital infusions of different types in the two-year period before default for a sample of 621 defaults between 1997 and 2011. Panel B shows restructuring outcomes by whether or not the default was preceded by a capital infusion. Variable definitions are provided in Appendix Table A1. Differences between the infusion versus no infusion subsamples in Panel B are statistically significant using a rank-sum test at the 10% (*), 5% (**), and 1% (***) levels.

**A: Capital infusion frequency and type**

| | | Debt | Debt and equity or hybrid | Equity | Other / unknown type | Total |
|---|---|---|---|---|---|---|
| Whole sample | No. of infusions | 15 | 12 | 103 | 9 | 139 |
| | % of all defaults | 2.4% | 1.9% | 16.6% | 1.5% | 18.1% |
| | % of infusions | 10.8% | 8.6% | 74.1% | 6.5% | 100% |
| PE-backed | No. of infusions | 11 | 6 | 49 | 8 | 74 |
| | % of all defaults | 4.4% | 2.4% | 19.4% | 3.2% | 29.4% |
| | % of infusions | 14.9% | 8.1% | 66.2% | 10.8% | 100% |
| Non-PE-backed | No. of infusions | 4 | 6 | 54 | 1 | 65 |
| | % of all defaults | 1.1% | 1.6% | 14.7% | 0.3% | 17.7% |
| | % of infusions | 6.1% | 9.2% | 83.1% | 1.5% | 100% |

**B: Capital infusions and default outcome**

| Capital infusion before default? | | No | Yes | |
|---|---|---|---|---|
| Number of defaults | | 482 | 139 | |
| Months in default | Mean | 14.4 | 11.2 | ** |
| | Median | 11.0 | 8.6 | |
| Ch. 11 filing | % of defaults | 80.1% | 65.5% | *** |
| Remains independent | % of defaults | 74.1% | 77.0% | |
| Equity keeps control | % of Ch.11 | 6.6% | 16.7% | *** |
| Recovery rate, % | Mean | 54.0% | 56.3% | |
| | Median | 53.3% | 58.0% | |

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**Table 11: Determinants of capital infusions before default**

Logit regressions for the likelihood of receiving an infusion of capital in the two years before default. Coefficients are marginal effects. Standard errors clustered by default year and coefficients are statistically significant at the 10% (*), 5% (**), and 1% (***) levels.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| VARIABLES | Capital infusion bef. default | Capital infusion bef. default | Capital infusion bef. default | Capital infusion bef. default |
| PE-backed at default | 0.146*** | 0.332*** | 0.339*** | 0.513*** |
| | (3.079) | (4.722) | (5.569) | (12.013) |
| Months since PE entry | | -0.003** | -0.003*** | -0.004*** |
| | | (-2.507) | (-3.233) | (-5.915) |
| Last fund raised < 5 yrs | | | | -0.114*** |
| | | | | (-6.309) |
| PE sponsor older than 10 years | | | | -0.033 |
| | | | | (-0.916) |
| PE fund is top distressed investor | | | | 0.018 |
| | | | | (0.203) |
| On Compustat | -0.010 | -0.005 | 0.014 | 0.010 |
| | (-0.238) | (-0.109) | (0.420) | 0.294) |
| Public debt outstanding | -0.134*** | -0.136*** | -0.076** | -0.077** |
| | (-3.133) | (-3.510) | (-2.545) | (-2.455) |
| Distressed industry | 0.142 | 0.120 | 0.039 | 0.034 |
| | (1.502) | (1.207) | (0.590) | 0.519) |
| Industry median specific assets | -0.140 | -0.146 | | |
| | (-0.962) | (-1.029) | | |
| Distressed ind*specific assets | -0.087 | -0.014 | 0.006 | 0.036 |
| | (-0.428) | (-0.076) | (0.040) | (0.252) |
| Industry market-to-book ratio | 0.356*** | 0.331*** | 0.192* | 0.213* |
| | (3.128) | (3.067) | (1.669) | (1.886) |
| Log sales | 0.028*** | 0.026** | 0.027** | 0.027*** |
| | (2.617) | (2.467) | (2.452) | (3.006) |
| EBITDA/Sales | -0.122 | -0.159 | -0.079 | -0.077 |
| | (-0.654) | (-0.903) | (-0.690) | (-0.670) |
| Revenue growth | 0.106** | 0.087* | 0.069** | 0.066* |
| | (2.264) | (1.920) | (2.066) | (1.871) |
| Total Debt/Assets | -0.021 | 0.017 | -0.013 | -0.016 |
| | (-0.377) | (0.298) | (-0.242) | (-0.287) |
| S&P 500 return | -0.002*** | -0.002** | | |
| | (-2.779) | (-2.345) | | |
| Moody's default rates | 0.311 | -0.005 | | |
| | (0.550) | (-0.008) | | |
| Dividend recap <5years of default | | | | 0.152*** |
| | | | | (3.282) |
| Year fixed effects | No | No | Yes | Yes |
| FF49 industry fixed effects | No | No | Yes | Yes |
| Dummies for missing firm financials | No | No | Yes | Yes |
| Observations | 500 | 499 | 600 | 600 |
| Pseudo R-squared | 0.075 | 0.097 | 0.191 | 0.206 |
| Adjusted R-squared | | | | |

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## Table 12: Capital infusions and default outcomes

Regressions for restructuring outcomes as a function of receiving an infusion of capital within two years of default and other control variables. Specifications (1) through (4), and (5) through (10) are logit regressions, where marginal effects are reported. Specifications (5) and (6) are left-censored tobit regressions, and specifications (11) and (12) are OLS regressions. Standard errors clustered by default year and coefficients are statistically significant at the 10% (*), 5% (**), and 1% (***) levels.

| VARIABLES | Bankruptcy filing | Pre-pack (Ch. 11 only) | Months in default (Tobit) | Survives as independent | Equity in control (Ch.11 only) | Recovery rate |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| PE-backed at default | -0.034 | 0.067* | -3.059*** | 0.090*** | 0.062** | -0.013 |
| | (0-1.593) | (1.657) | (-3.409) | (4.089) | (2.470) | (-0.588) |
| Capital infusion | -0.138*** | 0.105** | -3.166** | -0.007 | 0.053 | 0.036 |
| | (-2.867) | (2.347) | (-2.201) | (-0.288) | (1.451) | (0.868) |
| On Compustat | 0.019 | 0.043 | 0.861 | -0.027 | 0.010 | 0.004 |
| | (0.497) | (0.719) | (0.441) | (-0.596) | (0.651) | (0.163) |
| Public debt | -0.037 | 0.002 | -0.844 | 0.080*** | -0.012 | 0.051 |
| | (-0.865) | (0.056) | (-0.487) | (2.775) | (-0.571) | (1.082) |
| Distressed industry | -0.080 | -0.192*** | -1.950 | -0.019 | -0.004 | 0.037 |
| | (-0.792) | (-2.956) | (-0.697) | (-0.333) | (-0.198) | (0.575) |
| Distressed ind*specific assets | 0.172 | 0.665** | 5.732 | -0.285 | -0.014 | -0.279* |
| | (0.618) | (2.530) | (0.525) | (-1.349) | (-0.324) | (-1.903) |
| Industry market-to-book ratio | -0.200*** | 0.053 | -7.638** | 0.283** | -0.034 | 0.039 |
| | (-2.620) | (0.282) | (-2.169) | (2.264) | (-0.913) | (0.242) |
| Log sales | 0.033** | -0.029 | 1.670*** | -0.012 | -0.000 | 0.013 |
| | (2.562) | (-1.311) | (3.774) | (-0.771) | (-0.102) | (0.722) |
| EBITDA/Sales | 0.012 | 0.408** | 4.936 | 0.484*** | -0.095 | 0.124 |
| | (0.127) | (2.075) | (1.183) | (3.094) | (-1.456) | (1.064) |
| Revenue growth | 0.073 | -0.182 | -1.210 | -0.077 | 0.024 | -0.102* |
| | (0.989) | (-1.602) | (-0.824) | (-1.119) | (1.425) | (-1.817) |
| Total Debt/Assets | 0.035 | 0.167 | -3.109 | -0.056 | 0.026 | -0.069** |
| | (0.596) | (1.603) | (-1.378) | (-1.230) | (0.741) | (-2.361) |
| Sigma | | | 13.227*** | | | |
| | | | (1.269) | | | |
| Year fixed effects | Yes | Yes | Yes | Yes | No | Yes |
| FF49 industry fixed effects | Yes | Yes | Yes | Yes | No | Yes |
| Dummies for missing firm financials | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 611 | 457 | 570 | 611 | 325 | 347 |
| Pseudo (Adjusted) R-squared | 0.166 | 0.202 | 0.032 | 0.191 | 0.228 | 0.117 |

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## Appendix Table A1: Variable definitions

| Variable | Description | Primary Source(s) |
|---|---|---|
| Bankruptcy is a pre-pack (Chapter 11 only) | Indicator variable that equals one when a firm files a Chapter 11 bankruptcy as a "pre-packaged" or "pre-arranged" deal. | The Deal Pipeline, Dealogic |
| Capital infusion | Indicator variable set equal to one when a defaulted firm receives an infusion of new capital in the two year period leading to default. | Capital IQ, Moody's |
| Company survives | Indicator variable that equals one if a company (i) remains a going concern (i.e., does not liquidate) following a reorganization, or (ii) is sold as a going concern to a financial buyer. | The Deal Pipeline, Moody's, various news sources |
| Default results in bankruptcy | Indicator variable that equals one when a defaulted firm files for Chapter 11 or Chapter 7 bankruptcy protection. | Moody's |
| Distressed industry | Indicator variable that equals one if firm is in an industry in which the median COMPUSTAT firm has a negative EBITDA-to-Sales margin. | COMPUSTAT |
| Dividend recap | Indicator variable that equals one if a firm borrowed in prior five years, where proceeds were used primarily to fund a dividend. | Reuters LPC Dealscan |
| EBITDA/sales | Ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) to firm sales. | COMPUSTAT, Capital IQ, Moody's, 10Ks |
| Industry market-to-book ratio | Median ratio for COMPUSTAT firms of the market value of assets (book value of assets – book value of common equity + market value of common equity) to book value of assets. | COMPUSTAT |
| Industry median specific assets | Median ratio for COMPUSTAT firms of the book value of machinery and equipment to the book value of total assets. | COMPUSTAT |
| Last PE fund raised < 5 yrs | Indicator variable that equals one when a PE sponsor raised its last LBO fund within the past five years. | Preqin |
| Log sales | Natural logarithm of sales | COMPUSTAT, Capital IQ, Moody's, 10Ks |
| Months in default (months in Chapter 11) | Number of months from default date to date of completion of an out of court restructuring or exchange or confirmation of a bankruptcy plan. | Moody's, The Deal Pipeline |
| Months since PE entry | Months since the PE-backed company was acquired by the PE sponsor. | Capital IQ, Dealogic, The Deal Pipeline, SEC filings, websites of PE funds and portfolio firms |
| Moody's default rate | Annual default rate of corporate borrowers tracked by Moody's Investor Service. | Moody's |

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| | | |
|---|---|---|
| On Compustat | Indicator variable that equals one if financial data is available Compustat in a given year. | COMPUSTAT |

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| | | |
|---|---|---|
| PE-backed | Indicator variable set equal to one in a year when a firm is owned by a managed private equity fund. | Capital IQ, Dealogic, The Deal Pipeline, SEC filings, websites of PE funds and portfolio firms |
| PE-exited | Formerly *PE-backed* firm, where PE has exited the investment within the prior 5 years | |
| Non PE-backed | Indicator if *PE-backed* = 0; for default subsample tests (Sections V through VII), *PE-exited* is also included in *non PE-backed*. | |
| Ever PE-backed | *PE-backed* or *PE-exited* firm | |
| PE is top distressed investor | Indicator variable that equals one when a PE sponsor is listed as either: (1) A Preqin all-time top-10 "Distressed Private Equity Firm" or a sponsor raising a top-5 largest "Special Situations" or "Turnaround" fund between 2004-2011, or (2) listed in the appendix of Jiang, Li, and Wiang (2011) as a one of the "Top Hedge Fund Players in Chapter 11." | Preqin Special Report: Distressed Private Equity (October 2011) and Jiang, Li, and Wiang (2011) |
| PE sponsor older than 10 years | Indicator variable that equals one when a PE sponsor raised its first fund more than 10 years prior. | Preqin |
| Public debt outstanding | Indicator variable that equals one if firm had public debt outstanding. | Moody's |
| Rating | Moody's credit rating, coded as a numerical variable where Aaa=1, Aa=2, Aa1=3, Aa2=4, Aa3=5, A=6, A1=7, A2=8, A3=9, Baa=10, Baa1=11, Baa2=12, Baa3=13, Ba=14, Ba1=15, Ba2=16, Ba3=17, B=18, B1=19, B2=20, B3=21, Caa=22, Caa1=23, Caa2=24, Caa3=25, Ca=26, and C=27. | Moody's |
| Recovery rate | Moody's "family" recovery rate, calculated as the total dollar proceeds paid when a defaulted firm is sold or liquidated, or estimated enterprise market value when a firm is reorganized, divided by total liabilities outstanding at default. Recoveries are discounted back to the date of default resolution. | Moody's Ultimate Recovery Database |
| Revenue growth | Percentage increase in annual sales. | COMPUSTAT, Capital IQ, Moody's, 10Ks |
| Total debt/assets | Ratio of firm total debt to assets. Total debt is the sum of long-term debt, currently maturing long-term debt, and short-term debt, including short term notes. | COMPUSTAT, Capital IQ, Moody's, 10Ks |
| S&P 500 return | Annual return on S&P 500 index. | Moody's Investor Service |

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## Appendix Table A2: Sample industry distribution

| Fama-French industry group | | N, (% of total subsample) | | | | |
|---|---|---|---|---|---|---|
| | | Full sample | Ever PE-backed | Non PE-backed | Defaults | No default |
| 1 | Agriculture | 12 (0.6%) | 8 (0.8%) | 4 (0.3%) | 6 (1.1%) | 6 (0.4%) |
| 2 | Food Products | 39 (1.8%) | 16 (1.7%) | 23 (1.9%) | 9 (1.6%) | 30 (1.9%) |
| 3 | Candy & Soda | 13 (0.6%) | 7 (0.7%) | 6 (0.5%) | 4 (0.7%) | 9 (0.6%) |
| 4 | Beer & Liquor | 4 (0.2%) | 0 (0.0%) | 4 (0.3%) | 0 (0.0%) | 4 (0.3%) |
| 5 | Tobacco Products | 1 (0.0%) | 1 (0.1%) | 0 (0.0%) | 0 (0.0%) | 1 (0.1%) |
| 6 | Recreation | 15 (0.7%) | 10 (1.0%) | 5 (0.4%) | 7 (1.3%) | 8 (0.5%) |
| 7 | Entertainment | 53 (2.5%) | 21 (2.2%) | 32 (2.7%) | 15 (2.7%) | 38 (2.4%) |
| 8 | Printing and Publishing | 44 (2.0%) | 29 (3.0%) | 15 (1.3%) | 17 (3.1%) | 27 (1.7%) |
| 9 | Consumer Goods | 55 (2.6%) | 36 (3.7%) | 19 (1.6%) | 16 (2.9%) | 39 (2.4%) |
| 10 | Apparel | 23 (1.1%) | 10 (1.0%) | 13 (1.1%) | 10 (1.8%) | 13 (0.8%) |
| 11 | Healthcare | 78 (3.6%) | 49 (5.1%) | 29 (2.4%) | 15 (2.7%) | 63 (3.9%) |
| 12 | Medical Equipment | 24 (1.1%) | 11 (1.1%) | 13 (1.1%) | 3 (0.5%) | 21 (1.3%) |
| 13 | Pharmaceutical Products | 18 (0.8%) | 8 (0.8%) | 10 (0.8%) | 3 (0.5%) | 15 (0.9%) |
| 14 | Chemicals | 57 (2.6%) | 31 (3.2%) | 26 (2.2%) | 17 (3.1%) | 40 (2.5%) |
| 15 | Rubber and Plastic Products | 45 (2.1%) | 26 (2.7%) | 19 (1.6%) | 20 (3.6%) | 25 (1.6%) |
| 16 | Textiles | 33 (1.5%) | 10 (1.0%) | 23 (1.9%) | 16 (2.9%) | 17 (1.1%) |
| 17 | Construction Materials | 38 (1.8%) | 23 (2.4%) | 15 (1.3%) | 12 (2.2%) | 26 (1.6%) |
| 18 | Construction | 41 (1.9%) | 11 (1.1%) | 30 (2.5%) | 14 (2.5%) | 27 (1.7%) |
| 19 | Steel Works Etc | 47 (2.2%) | 10 (1.0%) | 37 (3.1%) | 20 (3.6%) | 27 (1.7%) |
| 20 | Fabricated Products | 16 (0.7%) | 12 (1.2%) | 4 (0.3%) | 8 (1.4%) | 8 (0.5%) |
| 21 | Machinery | 71 (3.3%) | 33 (3.4%) | 38 (3.2%) | 16 (2.9%) | 55 (3.4%) |
| 22 | Electrical Equipment | 22 (1.0%) | 13 (1.3%) | 9 (0.8%) | 6 (1.1%) | 16 (1.0%) |
| 23 | Automobiles and Trucks | 36 (1.7%) | 15 (1.6%) | 21 (1.8%) | 16 (2.9%) | 20 (1.3%) |
| 24 | Aircraft | 14 (0.7%) | 6 (0.6%) | 8 (0.7%) | 1 (0.2%) | 13 (0.8%) |
| 25 | Shipbuilding, Railroad Equipment | 8 (0.4%) | 5 (0.5%) | 3 (0.3%) | 1 (0.2%) | 7 (0.4%) |
| 26 | Defense | 5 (0.2%) | 3 (0.3%) | 2 (0.2%) | 0 (0.0%) | 5 (0.3%) |
| 27 | Precious Metals | 2 (0.1%) | 0 (0.0%) | 2 (0.2%) | 0 (0.0%) | 2 (0.1%) |
| 28 | Non-Metallic and Industrial Metal | 11 (0.5%) | 4 (0.4%) | 7 (0.6%) | 4 (0.7%) | 7 (0.4%) |
| 29 | Coal | 15 (0.7%) | 5 (0.5%) | 10 (0.8%) | 2 (0.4%) | 13 (0.8%) |
| 30 | Petroleum and Natural Gas | 110 (5.1%) | 25 (2.6%) | 85 (7.2%) | 14 (2.5%) | 96 (6.0%) |
| 31 | Utilities | 70 (3.3%) | 14 (1.5%) | 56 (4.7%) | 6 (1.1%) | 64 (4.0%) |
| 32 | Communication | 122 (5.7%) | 56 (5.8%) | 66 (5.6%) | 39 (7.1%) | 83 (5.2%) |
| 33 | Personal Services | 39 (1.8%) | 24 (2.5%) | 15 (1.3%) | 6 (1.1%) | 33 (2.1%) |
| 34 | Business Services | 166 (7.7%) | 87 (9.0%) | 79 (6.7%) | 40 (7.2%) | 126 (7.9%) |
| 35 | Computers | 19 (0.9%) | 9 (0.9%) | 10 (0.8%) | 3 (0.5%) | 16 (1.0%) |
| 36 | Electronic Equipment | 52 (2.4%) | 32 (3.3%) | 20 (1.7%) | 3 (0.5%) | 49 (3.1%) |
| 37 | Measuring and Control Equipment | 56 (2.6%) | 25 (2.6%) | 31 (2.6%) | 11 (2.0%) | 45 (2.8%) |
| 38 | Business Supplies | 14 (0.7%) | 7 (0.7%) | 7 (0.6%) | 1 (0.2%) | 13 (0.8%) |
| 39 | Shipping Containers | 44 (2.0%) | 23 (2.4%) | 21 (1.8%) | 15 (2.7%) | 29 (1.8%) |
| 40 | Transportation | 17 (0.8%) | 10 (1.0%) | 7 (0.6%) | 2 (0.4%) | 15 (0.9%) |
| 41 | Wholesale | 64 (3.0%) | 31 (3.2%) | 33 (2.8%) | 20 (3.6%) | 44 (2.8%) |
| 42 | Retail | 113 (5.3%) | 57 (5.9%) | 56 (4.7%) | 29 (5.3%) | 84 (5.3%) |
| 43 | Restaraunts, Hotels, Motels | 145 (6.7%) | 70 (7.3%) | 75 (6.3%) | 49 (8.9%) | 96 (6.0%) |
| 44 | Banking | 98 (4.6%) | 37 (3.8%) | 61 (5.1%) | 24 (4.3%) | 74 (4.6%) |
| 45 | Insurance | 27 (1.3%) | 7 (0.7%) | 20 (1.7%) | 4 (0.7%) | 23 (1.4%) |
| 46 | Real Estate | 34 (1.6%) | 11 (1.1%) | 23 (1.9%) | 5 (0.9%) | 29 (1.8%) |
| 47 | Trading | 35 (1.6%) | 3 (0.3%) | 32 (2.7%) | 5 (0.9%) | 30 (1.9%) |
| 48 | Almost Nothing | 86 (4.0%) | 24 (2.5%) | 62 (5.2%) | 18 (3.3%) | 68 (4.3%) |
| Total | | 2,151 | 965 | 1,186 | 552 | 1,599 |

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## Appendix Table A3: Robustness – PE vs. non-PE overlapping sample

Specification (2) - (10) shows regressions of default outcomes on *PE-backed* and other variables, where all observations with Pr(PE-backed) less than 0.1 or larger than 0.9 have been excluded from the sample. Pr(PE-backed) are fitted values from specification (1). Coefficients (with t-statistics below, calculated using standard errors clustered by default year) are statistically significant at the 10% (*), 5% (**), and 1% (***) levels.

| VARIABLES | (1) PE control (logit) | (2) Bankruptcy filing (logit) | (3) Pre-pack in Ch.11 (logit) | (4) Months in def. (Tobit) | (5) Months in Ch.11 (OLS) | (6) Survives as indep. (logit) | (7) Survives in Ch.11 (logit) | (8) Eq. stays in Ch.11 (logit) | (9) Recovery rate (OLS) | (10) Cap.infusion (logit) |
|---|---|---|---|---|---|---|---|---|---|---|
| PE-backed | | -0.071*** | 0.080* | -3.572*** | -3.264** | 0.081*** | 0.105** | 0.075*** | -0.003 | 0.159*** |
| | | (-2.934) | (1.850) | (-3.604) | (-2.515) | (3.329) | (2.477) | (2.830) | (-0.140) | (3.675) |
| On Compustat | -0.264*** | 0.032 | 0.081 | 0.587 | 0.236 | -0.015 | 0.031 | 0.017 | 0.006 | -0.004 |
| | (-2.873) | (0.759) | (1.279) | (0.287) | (0.104) | (-0.338) | (0.464) | (0.848) | (0.166) | (-0.097) |
| Public debt outstanding | -0.062 | -0.026 | 0.000 | -0.805 | 0.526 | 0.065** | 0.075 | -0.025 | 0.080** | -0.099*** |
| | (-1.134) | (-0.567) | (0.010) | (-0.451) | (0.203) | (2.057) | (1.507) | (-0.778) | (2.199) | (-3.243) |
| Distressed industry | 0.013 | -0.090 | -0.201*** | -2.718 | -2.490 | -0.017 | -0.009 | -0.025 | 0.047 | 0.044 |
| | (0.135) | (-0.723) | (-3.445) | (-0.851) | (-0.632) | (-0.245) | (-0.083) | (-1.262) | (0.798) | (0.587) |
| Industry median specific assets | | | | | | | | -0.052 | | |
| | | | | | | | | (-1.045) | | |
| Distressed ind*specific assets | -0.071 | 0.164 | 0.751*** | 6.116 | 8.206 | -0.292 | -0.597* | 0.059 | -0.267** | -0.046 |
| | (-0.361) | (0.463) | (2.787) | (0.537) | (0.589) | (-1.542) | (-1.646) | (0.843) | (-2.559) | (-0.284) |
| Industry market-to-book | -0.228 | -0.214*** | 0.017 | -7.995** | -4.468 | 0.320*** | 0.251 | -0.014 | 0.060 | 0.246* |
| | (-1.011) | (-2.829) | (0.093) | (-2.011) | (-0.993) | (2.716) | (1.264) | (-0.247) | (0.350) | (1.869) |
| Log sales | -0.020 | 0.036** | -0.030 | 1.666*** | 1.521*** | -0.012 | -0.001 | -0.003 | 0.013 | 0.034*** |
| | (-0.945) | (2.433) | (-1.306) | (3.338) | (3.131) | (-0.847) | (-0.036) | (-0.747) | (0.677) | (2.746) |
| EBITDA/Sales | 0.188 | -0.108 | 0.391* | 3.421 | 4.801 | 0.591** | 0.769* | -0.118 | 0.289 | 0.047 |
| | (1.594) | (-1.078) | (1.813) | (0.877) | (0.932) | (2.137) | (1.821) | (-1.468) | (1.666) | (0.441) |
| Revenue growth | -0.250*** | 0.113* | -0.177 | -2.829 | -4.695* | -0.122** | -0.192** | 0.040 | -0.114 | 0.068* |
| | (-3.826) | (1.884) | (-1.562) | (-1.245) | (-1.858) | (-2.044) | (-2.132) | (1.335) | (-1.351) | (1.901) |
| Total Debt/Assets | 0.372*** | 0.017 | 0.111 | -3.675 | -4.881** | -0.060 | -0.088 | 0.015 | -0.067 | -0.063 |
| | (3.777) | (0.272) | (1.100) | (-1.619) | (-2.479) | (-1.606) | (-1.577) | (0.326) | (-1.630) | (-0.996) |
| S&P 500 return | | | | | | | | 0.000 | | |
| | | | | | | | | (0.178) | | |
| Moodys default rate | | | | | | | | 0.494 | | |
| | | | | | | | | (1.511) | | |
| Delaware filing | | | | | | | | -0.021* | | |
| | | | | | | | | (-1.882) | | |
| S. Distr. of NY filing | | | | | | | | -0.040*** | | |
| | | | | | | | | (-2.658) | | |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes |
| FF49 industry fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Dummies missing firm financials | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 611 | 545 | 420 | 526 | 425 | 561 | 432 | 303 | 318 | 553 |
| Pseudo (Adj) R-squared | 0.179 | 0.157 | 0.191 | 0.032 | (0.117) | 0.211 | 0.206 | 0.197 | (0.115) | 0.179 |

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## Appendix Table A4: Robustness – Currently vs. formerly PE-backed companies

*Ever PE-backed* is a dummy variable for whether the defaulted firm has been controlled by a PE fund, currently or in the past. *PE-backed at default* is a dummy variable for whether the firm is currently backed by a PE fund. Coefficients (with t-statistics below, calculated using standard errors clustered by default year) are statistically significant at the 10% (*), 5% (**), and 1% (***) levels.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| VARIABLES | Bankruptcy filing (logit) | Pre-pack in Ch.11 (logit) | Months in default (Tobit) | Months in def. (OLS), Ch. 11 only | Survives as independent company | Survives as independent (Ch.11 only) | Equity stay in control (Ch.11 only) | Recovery rate | Capital infusion bef. default |
| Ever PE-backed | 0.097 | 0.078 | -2.650* | -3.655** | -0.099 | -0.102 | -0.955*** | -0.053 | -0.020 |
| | (1.377) | (1.187) | (-1.705) | (-2.250) | (-1.436) | (-1.116) | (-36.603) | (-0.907) | (-0.261) |
| PE-backed at default | -0.152** | 0.007 | -1.154 | -0.085 | 0.173*** | 0.205** | 0.978*** | 0.042 | 0.185* |
| | (-1.988) | (0.093) | (-0.624) | (-0.050) | (2.988) | (2.498) | (94.712) | (0.747) | (1.941) |
| On Compustat | 0.020 | 0.043 | 0.754 | 0.424 | -0.028 | 0.006 | 0.005 | 0.005 | 0.006 |
| | (0.498) | (0.666) | (0.385) | (0.214) | (-0.632) | (0.091) | (0.660) | (0.205) | (0.167) |
| Public debt outstanding | -0.026 | -0.007 | -0.592 | 0.818 | 0.078*** | 0.094** | -0.010 | 0.047 | -0.080*** |
| | (-0.605) | (-0.160) | (-0.342) | (0.372) | (2.653) | (2.088) | (-0.764) | (1.039) | (-2.629) |
| Distressed industry | -0.082 | -0.189*** | -2.248 | -1.760 | -0.015 | -0.056 | -0.003 | 0.035 | 0.066 |
| | (-0.775) | (-2.845) | (-0.724) | (-0.443) | (-0.274) | (-0.751) | (-0.329) | (0.538) | (0.812) |
| Median specific assets | | | | | | | -0.019 | | |
| | | | | | | | (-0.911) | | |
| S&P 500 return | | | | | | | 0.000 | | |
| | | | | | | | (0.282) | | |
| Moodys default rate | | | | | | | 0.236 | | |
| | | | | | | | (1.589) | | |
| Distressed ind*specific assets | 0.176 | 0.652** | 6.402 | 7.385 | -0.304 | -0.470* | 0.001 | -0.276* | -0.068 |
| | (0.617) | (2.369) | (0.552) | (0.539) | (-1.533) | (-1.710) | (0.032) | (-1.825) | (-0.401) |
| Industry market-to-book ratio | -0.216*** | 0.068 | -8.171** | -4.734 | 0.276** | 0.237 | -0.005 | 0.049 | 0.186 |
| | (-3.128) | (0.372) | (-2.252) | (-1.140) | (2.257) | (1.237) | (-0.187) | (0.295) | (1.621) |
| Log sales | 0.029** | -0.024 | 1.546*** | 1.354*** | -0.012 | 0.000 | -0.001 | 0.013 | 0.031*** |
| | (2.133) | (-1.111) | (3.437) | (3.130) | (-0.773) | (0.007) | (-0.818) | (0.720) | (2.847) |
| EBITDA/sales | 0.021 | 0.400* | 5.386 | 5.318 | 0.490*** | 0.692** | -0.050 | 0.117 | -0.076 |
| | (0.206) | (1.958) | (1.261) | (0.914) | (3.191) | (2.320) | (-1.476) | (0.923) | (-0.666) |
| Sales growth | 0.058 | -0.177 | -1.591 | -3.046* | -0.081 | -0.132* | 0.013 | -0.099 | 0.080** |
| | (0.766) | (-1.539) | (-0.935) | (-1.844) | (-1.252) | (-1.785) | (1.357) | (-1.705) | (2.535) |
| Total debt/assets | 0.040 | 0.155 | -2.855 | -4.294** | -0.045 | -0.047 | 0.010 | -0.068** | -0.048 |
| | (0.681) | (1.490) | (-1.345) | (-2.399) | (-0.899) | (-0.756) | (0.585) | (-2.436) | (-1.039) |
| Industry fixed effects | Yes | Yes | Yes | Yes | No | Yes | No | Yes | Yes |
| Year fixed effects | Yes | Yes | Yes | Yes | No | Yes | No | Yes | Yes |
| Dummies missing firm financ. | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 611 | 457 | 570 | 462 | 611 | 469 | 325 | 347 | 602 |
| Adjusted R-squared | 0.153 | 0.196 | 0.032 | 0.133 | 0.195 | 0.216 | 0.201 | 0.116 | 0.17 |

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