Private Equity Portfolio Company Performance Through The Recession*

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Executive Summary

This study examines the economic and financial performance and survival of buyouts backed by private equity (PE) in the UK over the period leading up to and including the recent global recession. The performance of a sample of PE-backed buyouts is tracked over the period 1995-2010, and compared to a matched sample of private companies, non-PE-backed buyouts and listed companies. The data includes 302,385 company-year observations of which 15,392 are observations from PE-backed buyouts. The analysis of performance includes the recession period from 2007 onwards. Multivariate models determining productive efficiency and return on assets are estimated for the recession and the period prior to it, in order to isolate the relative performance of PE-backed buyouts during these periods. A detailed analysis of company insolvencies is also undertaken in order to examine the failure propensity of PE-backed buyouts relative to other forms of ownership. This analysis is based on a dataset involving the population of private and public companies in the UK comprising 8.9 million companies and 0.15 million insolvencies, including PE-backed buyouts, and covers the period from 1995 to 2010, therefore incorporating the peak of corporate insolvencies. We define insolvencies as entering formal administration or receivership proceedings.

The **three key findings** are as follows:

- Private equity-backed buyouts show a stronger economic performance in the period before and during the recent recession than a matched sample of private companies and listed companies. Private equity-backed buyouts show a higher return on assets, sufficient ability to cover the interest payments on their debt and higher gross margin in the recession period than before it. Growth in value added and profit is stronger than for listed companies during the recession period. Growth in turnover and employment remains positive for the PE-backed buyout sample.

- Controlling for deal size and industrial sector, PE-backed buyouts completed after 2003 (when there were significant changes to the UK insolvency regime) are significantly less likely to enter insolvency than both non-PE-backed buyouts and listed companies, and no more likely to do so than matched private companies. This was true even during the recession.

- Analysis of efficiency and profitability shows that PE-backed buyouts outperform matched companies and listed companies, controlling for industry sector risk and competition. The results imply almost 14% higher productivity and 5% higher return on assets (ROA) during the recession than matched private companies and listed companies. This robust relative performance of PE-backed buyouts strengthened during the recession period.

Overall, these results suggest that – contrary to some commentators' expectations – PE-backed buyouts are not more likely to fail than matched private companies and listed companies. In fact, productive efficiency and profitability was stronger than matched private

companies and listed companies during the recession period. The failure rate for PE-backed buyouts was lower than for non-PE-backed buyouts, and no worse than that for the population of companies as a whole.

Private equity portfolio companies generally have higher financial leverage than other companies, but also have stronger performance. Private equity portfolio companies on average have strong and stable profits along with interest coverage that allows them to weather economic downturns. Our evidence might suggest that private equity owners are proactively involved in helping to deliver stronger performance and taking timely action to assist investee companies and restructure their finances, if necessary in the event of financial distress.

Introduction

The second wave of private equity activity, which began in the late 1990s, showed particularly strong growth from 2004 and reached an all-time peak in 2007. From 2008, the deepest recession since the 1930s meant that prospects for many businesses became severely challenged, including those that had been subject to a buyout. During 2008 and 2009, the value of PE-backed buyouts plummeted to a fifteen year low. However, confidence appeared to be returning to the market in 2010 as the value of UK deals increased almost fourfold compared to the previous year (Figure 1, see Appendix: Charts and Tables).

The potential impact of high leverage on the stability and survival of PE-backed buyouts is a further strand of the debate brought to the fore by the advent of the credit crunch and recession beginning in 2007 when insolvencies began to rise through 2010. However, thus far robust evidence on the impact of the recession on companies with high leverage has been lacking.

In this study we analyse company performance and survival within the subsets of PE-backed buyouts and matched sample of private companies, listed companies and non-PE-backed buyouts. We analyse a large dataset of these company types comprising almost the whole UK population, covering the period before and throughout the recent recessionary cycle (1995-2010). We control for a wide range of firm-specific, industry and macro-economic factors that have been found to drive performance differences. The aim is to isolate the impact of private equity involvement on dimensions of company performance.

We examine the following questions relating to the performance and survival of PE-backed buyouts through the economic cycle:

- Do PE-backed buyouts outperform matched private companies and listed companies prior to and during the recession period in terms of efficiency and profitability?
- How do PE-backed buyouts differ in terms of financial characteristics to matched private companies and listed companies?
- Does the growth and performance of buyouts in general, and for PE-backed buyouts in particular, differ from that for companies that have not been subject to a buyout prior to and during the recession period? Does the likelihood of insolvency for buyouts in general, and for PE-backed buyouts in particular, differ from that for companies that have not been subject to a buyout prior to and during the recession period?

Private Equity-backed Buyouts

Private equity firms engage with investee companies by bringing to bear their experience, specifying contractual restrictions on the behavior of management and taking board seats (Acharya, et al., 2009b). Private equity firms also benefit generally both from detailed pre-purchase due diligence and full, timely information on the current trading of the businesses in which they invest. Their expertise in monitoring may enable portfolio firms to improve performance through exploiting opportunities for both cost efficiencies and growth. Private equity involvement may also enable timely restructuring, should portfolio companies experience trading difficulties and/or problems in servicing financial structures that could

reduce the likelihood of failure. Non-private equity backed firms, whether private or publicly listed, may be disadvantaged in some of these respects.

The high leverage that is a feature of some PE-backed buyouts places pressures on managers to perform, in order to be able to service the debt taken on by the company during acquisition. Although low borrowing rates often result in high leverage (Axelson et al., 2010), very high levels of leverage may create problems in servicing the debt, particularly if cash flow projections are not met and predicated asset sales are not completed. Lenders also typically specify, and closely monitor, detailed loan covenants (Citron et al., 2003; 2008). Higher leverage, therefore, may well be associated with a high probability of failure.

Previous Studies

Performance

The majority of academic performance studies at the portfolio company level to date relate to the first wave of PE in the 1980s, primarily in 'public to private' (P2P) PE-backed buyout activity, especially in the US (for reviews see Cumming, Siegel and Wright, 2007; Kaplan and Stromberg, 2009). This is an important sub-set of the buyout market but does not cover the full range of PE involvement in buyouts. These studies identified improvements in performance along a variety of measures, including growth (revenue and employment), profitability, operating performance and cash-flow, productivity, product and process innovations (including management practices) (Cumming et al., 2007).

Studies are now emerging covering the second wave of PE, in the late 1990s and 2000s. In the US, Guo et al (2009) find evidence that the gains in operating performance of PE-backed P2Ps are greater than their peers, although the effects seem less strong than in the first wave. Davis et al (2008, 2009), focusing on deals where existing management is replaced, show that PE involvement leads to productivity advantages, although the effects on employment are less clear cut. These PE-backed buyouts in the US where existing management is replaced report lower employment growth in existing establishments both pre- and in the initial years post-buyout, but engage in more job creation post-buyout than other firms. In France, Boucly et al (2008) find improvements in operating performance and employment, while Gaspar (2009) finds leveraged buyouts (LBOs) exhibit significantly higher operating returns of 2-3% relative to a matched control group, mostly due to an increase in gross margins, productivity gains and an improvement in working capital utilization.

Cressy et al. (2007) show that PE ownership adds significantly to increases in the operating profitability of PE-backed buyouts over the first three years after the buyout occurred. Similarly, for the UK, Meuleman, Amess, Wright and Scholes (2009) find that divisional buyouts display the greatest growth post buyout. Acharya and Kehoe (2008) find PE outperformance (alpha) is related to improvement in the EBITDA to sales ratio (margin), and greater growth in EBITDA multiple relative to that of quoted peers. Recent evidence based on the largest UK PE-backed buyouts, meeting the criteria of the Guidelines Monitoring Group, shows that these firms grew in revenue, profits and productivity during 2009 compared with 2008, and also performed better than benchmark listed corporations on these measures (BVCA/Ernst & Young, 2011). UK evidence also shows that while employment appears to fall initially, there is generally a subsequent significant increase. Overall, however, PE-backed buyouts experience employment changes that are not significantly different from firms which do not receive PE backing (Amess and Wright, 2007, 2010), with initial employment reductions on buyout being compensated by the establishment

of more viable businesses that result in subsequent job creation (Cressy et al., 2011; Wright and Bruining, 2008).

For the years 1995 to 2010 we undertake the following analyses of growth and performance and focus on relative performance between company types in different time periods i.e. during the pre-recession and the recession periods:

- Whether firms that have undergone a PE-backed buyout or non-PE-backed buyout display significantly greater growth in turnover, employment, value added, as reported in the accounts, and profits (pre-recession and through the recession) relative to matched private companies and listed companies
- Whether firms that have undergone a PE-backed buyout or non-PE-backed buyout display significantly greater profitability, turnover, working capital and leverage (pre-recession and through the recession) relative to matched private companies and listed companies
- Whether firms that have undergone a PE-backed buyout or non-PE-backed buyout display significantly greater productive efficiency relative to matched private companies and listed companies

Failure and Survival

There have been relatively few previous studies of buyout failure and survival. Studies relating to the first wave of PE-backed buyouts in the 1980s and early 1990s identified high leverage as a significant contributory factor to failure in the US (Kaplan and Stein, 1993; Andrade and Kaplan, 1998). Similarly, Wright, Wilson, Robbie and Ennew (1996) found that UK PE-backed buyouts that failed had higher leverage than those that did not fail. More recently, Stromberg (2008) found an 8% bankruptcy rate for the UK companies in his sample up to 2007. However, none of these studies considered comparable companies that had not been subject to a buyout as a control for PE influence. Wilson et al. (2010) provide an initial analysis of the extent to whether PE-backed buyouts were more likely to enter insolvency proceedings than companies that had not been subject to a buyout. They found that, for deals completed post-2003, there was no significant difference in the likelihood of entering insolvency proceedings between PE-backed deals (or management), and companies that had not been subject to a buyout. Their study only included deals completed up to 2009, and it was not clear whether the results held for the full period of the recession.

The current study includes the full cycle of the recession, and for the period 1995 to the end of 2010 we undertake the following analyses of failure, defined as entering formal insolvency proceedings (i.e. administration or receivership):

- An analysis of the financial and non-financial characteristics of failing firms; whether the extent of leverage in a firm significantly increases the likelihood of firm failure; and whether this is more acute for buyouts – whether PE-backed or non-PE-backed.
- Whether firms that have undergone a buyout (whether PE-backed or non-PE-backed) are significantly more likely to fail than other firms.
- Whether PE-backed buyouts are more or less likely to fail than other firms.

The Data

Although there has been some increase in the average sample size in studies relating to the second wave of PE, overall sample sizes generally remain relatively small compared with

those studies that examine the first wave. Cressy et al. (2007) use a sample of 122 UK buyouts and match with a sample of non-PE backed private companies for the period 1995-2000. Meuleman et al. (2009) focus only on a sample of 238 PE-backed private buyouts and do not include buyouts of listed corporations, nor do they offer comparisons with listed corporations. Acharya and Kehoe (2009a) use a sample of 66 large PE deals from 12 mature PE houses for the period 1996-2004. Similarly, with respect to studies of failure, Kaplan and Stein (1993) considered a sample of 124 large LBOs, 23 of which had defaulted on their debt, while Andrade and Kaplan (1998) examine 28 US LBOs that had entered Chapter 11 proceedings. Wright et al. (1996) examine a sample of 110 UK buyouts, of which 53 had entered insolvency proceedings (i.e. receivership in UK terminology). Stromberg (2008) examines longevity in a sample of 21,397 private equity transactions worldwide of which 570 had entered bankruptcy/ restructurings but did not include non-LBOs.

The database used in our study is considerably larger than in previous studies. It covers the population of UK companies that have filed accounts during 1995-2010 Q1 using data collected from Companies' House and the Insolvency Service. At the time of writing, the vast majority of companies had not filed accounts for the period covering most of 2010. This period incorporates the recovery from the early 1990's recession, a minor downturn period around 2000-3, a very stable period in terms of the insolvency rate from 2003-2006, and the recessionary cycle beginning in 2007, when insolvencies began to rise, through to 2010. The data consists of over 14 million records of accounting and other publicly available data for companies active in this period.

A subset of smaller UK firms have account filing exemptions. For the smallest companies we are able to access an abbreviated balance sheet and no profit and loss account, while medium-sized company accounts include a full balance sheet but an abbreviated profit and loss account. We have access to some profit and loss account data for around 40% of our unlisted companies.

We exclude registered companies that appear not to be active or trading and low asset companies. Overall, the sample used in the analysis comprises around 8.9 million observations of active/live companies and 153,500 incidences of insolvency. Within this total, we have full profit and loss account data on over 3.3 million companies in the years 1995-2010, including over 57,000 failures.

To this company population database we match information on UK management buyouts formed during the sample period. The buyout data was provided by the Centre for Management Buyout Research (CMBOR) which has monitored the population of buyout activity and the characteristics of buyout deals throughout this time period.[1] Thus we were able to identify and match to the accounting and other data the buyouts that occurred during 1995-2010. This gives 26,664 observations on live buyouts and 1,209 instances of insolvency.

The Measures

Financial characteristics

From company accounts we use information relating to sales (turnover), employment (as reported in annual accounts), value added (as reported in annual accounts), profits, leverage,

[1] The CMBOR database effectively comprises the population of management Buyouts and Buyins in the UK, whether private equity backed or not. Data is captured from a twice-yearly survey of private equity firms, intermediaries and banks and obtains a full response rate as respondents are incentivized to supply data through receipt of a free copy of a quarterly review of the Buyout market. Press and corporations' annual reports are also used to identify and check further deals. For further details see www.cmbor.org.

working capital and profitability. The last three of these variables are ratios. Only the measure of company size (total assets) is deflated, by using the GDP deflator for each year. We are able to examine the value of the financial ratio data in both levels and direction (changes). The sample chosen for the analysis includes companies that filed at least one set of accounts and survived until the start of each analysis year under consideration.

For the sub-sample of companies that submit 'abridged accounts' rather than full accounts, we examine insolvency risk using limited (balance sheet) accounting data.

Non-financial information

In order to control for non-financial company characteristics, we include non-financial data covering *operational risk* and *regulatory compliance*. These data cover: firm age, parentage (subsidiary or independently owned), family ownership or not, listed corporation or not, auditor information, and filing history. With respect to auditors we record whether there are audited accounts, audit qualifications and auditor changes. With respect of regulatory compliance we record the provision of cash flow statements, whether there was late filing of accounts and whether accounts filing was overdue. These data are supplemented with data from the register of County Court Judgments (CCJs). The CCJ information tracks the number and timing of court actions against a company for the recovery of debt (predominantly trade debt) including the value of the outstanding debt that has been verified in court. An additional variable tracks the number and timing of 'charges on assets' (fixed or floating) taken by creditors against the company in order to mitigate default risk on loans and mortgages. Companies that have more coordinated or vigilant creditors are more likely to be subject to court action to secure or recover debt and consequently more vulnerable to insolvency proceedings.

Economic data

The data is combined over the period 1995-2010 so we control for economic conditions by the inclusion of macroeconomic indicators. Aggregate macroeconomic factors are taken mainly from the Office for National Statistics (ONS). In addition, we are able to calculate and forecast the aggregate insolvency rate in the economy, and use this to control for changes in macroeconomic conditions. We refer to this variable as 'base hazard', as it reflects the company failure rate that is implied by macroeconomic developments.

Buyouts and Private Equity

Of particular interest is the inclusion of variables indicating the particular type of buyout. Additionally, we identify buyout deals pre- and post-2003. The period 1995-2003 was relatively turbulent, marked by recovery from the recession of the early 1990s and a short downturn in 2000-2003, accompanied by a decline in buyout numbers and value, and which also encapsulated the dot.com boom. In contrast, the period from 2003 onwards was a relatively stable period of low insolvency across all sectors and was also marked by the recovery of the buyout, culminating in the peak of the second wave in 2007. Data from 2003 onwards is therefore likely to provide a better test of buyout versus non-buyout performance and risk.

Findings

Performance sample

To analyse financial performance, we compare PE-backed buyouts with private companies and listed companies. We take all listed companies from all UK stock markets. In addition we

adopt a propensity matching method to identify a suitable matched sample of private companies for comparison with the buyouts. The matching process selects private companies from the same industrial sectors, assets size bands and age as the private equity sample. The final sample for our relative performance analysis consists of 302,385 company year observations, of which 32,474 are buyout observations, approximately 50% of which are PE-backed buyouts (15,392 observations), and 27,903 company year observations of listed companies.

Financial Ratios and Growth

We calculate financial ratios from accounting information reflecting profitability, leverage and debt coverage; working capital and growth in turnover, employment, value added and profit. We compare the mean values of these ratios for sub-samples of company types covering the whole sample period; a period pre-recession (2003-6) and the recession period beginning in 2007 when insolvencies began to rise.

The mean ROA, profit margin and interest coverage ratio for PE-backed buyouts was higher in the recession period from 2007 than in the pre-recession period (Table 1). In contrast, the mean debt to total assets ratio was lower in the recession period. The difference in the means for these profitability ratios was greater for PE-backed buyouts than for the matched private companies or the listed companies.

With respect to growth rates, PE-backed buyouts on average experienced greater growth in turnover, employment and value added in the recession period than in the non-recession period, but not in terms of profits. These increases were greater for PE-backed buyouts than for the matched private companies or the listed companies.

The mean working capital of PE-backed buyouts, as measured by the cash to total assets ratio, was greater in the recession period than prior to it; we observe a similar change with respect to matched private companies, but not listed companies. The reduction in the mean stock to total assets ratio was especially notable in PE-backed buyouts, both in terms of differences between the pre-recession and recession periods and in comparison with the matched private companies and the listed companies.

The annual trends in the above ratios are shown for each accounting year in Table 2. Over the period, for PE-backed buyouts, the ROA, gross margin and debt measures are higher in 2007 than in earlier years (Table 2A). Although ROA was lower in 2008 and 2009, gross margin and coverage rose to their highest levels over the period. The total debt to assets ratio was sharply lower after 2007 for PE-backed buyouts as well as listed companies, but was higher in 2008 and 2009 for matched private companies, while their coverage ratio was lower in 2008 and 2009 than it had been in 2007. For listed companies, gross margin and coverage were higher in 2008 and 2009 than they had been in 2007.

Private equity-backed buyouts on average generally experienced lower growth in turnover, employment and value added than listed companies and matched private companies prior to the recession (Table 2B). Private equity-backed buyouts on average had higher cash to total assets ratios than matched private companies but this ratio was lower than for listed companies in the years prior to recession (Table 2C). During 2008 and 2009, the average cash to total assets ratio in PE-backed buyouts increased while it fell in listed companies. Most notable was the sharp fall in stock to total assets ratios in 2008 and 2009 in PE-backed buyouts, while in contrast these ratios increased during these years in listed companies and matched private companies.

Multivariate Analysis Determining Productive Efficiency

In order to examine differences in productive efficiency we specify a production function model. In this model we relate total output (value added) to labour and capital inputs, together with controls for sector and competition, and then isolate productivity differentials for company type. The production function specification is Cobb-Douglas:

$$Q = \propto L^{\beta} \, . K^{\beta 1} . e$$

where $$Ln(Q) = \alpha + \beta \, Ln(L) + \beta 1 \, Ln \, (K) + Controls + e$$

We estimate production function models over the whole sample period, and then the pre-recession period and the recession period itself. We estimate specifications inclusive of time trends (Table 3A) and time dummies (Table 3B). The models appear well specified with strongly significant and positive signs on capital and labour inputs in line with prior expectations. The coefficients, labour and capital elasticities, imply constant returns to scale consistent with theoretical expectations. The signs on the PE dummy variable are positive and significant in all specifications and time periods. The results suggest a positive productivity differential of PE-backed buyouts over matched private companies and listed companies, which is actually stronger in the recession period. The differential is around 11% before the recession, rising to almost 14% during the downturn.

Multivariate Analysis Determining Profitability (ROA)

A multivariate model determining ROA is specified as a function of industry risk, age, competition and company types. Again we isolate the effects of PE relative to other ownership types. The models are reported inclusive of time trends and dummies and are estimated for the whole period, pre recession and recession. The models appear well specified and we note industry risk and company age are positively related to ROA, while industry concentration reduces profits (Tables 4A and 4B). The coefficients on the PE dummy variables are significant and positive in all specifications, implying a positive profitability differential for private equity over other company types of between 3.1% and 4.8%. The differential is higher in the recession period and strongly significant.

Failure

i. Likelihood of insolvency

Our dataset for examining failure rates includes the whole company population. A significant proportion of this population consists of small companies with low levels of assets and few creditors. These companies are unlikely to be forced into insolvency, even when performance is poor and/or they exhibit negative net worth; instead, they tend to exit via voluntary dissolution. Insolvency risk is an increasing and decreasing function of asset size and is more likely when there are bank, trade and other creditors involved with the company. Consequently the overall failure rate in the population is relatively low but does, of course, vary over the economic cycle. From this base level of insolvency risk we model the risk of company types over different assets sizes and industry sectors. Initially we isolate the failure rate of buyout types whilst controlling only for sector concentration, asset size, the age of the company and age risk, whether the company is a subsidiary, family owned or listed, and macroeconomic indicators. We then add variables relating to leverage, notably the debt to total assets ratio and changes in that ratio. We distinguish between buyout types, looking at whether the firm is a PE-backed buyout or a non-PE-backed buyout. We report the

coefficients on these dummy variables and calculate the 'average marginal effect' which indicates the increase/decrease in risk by company type. The analysis uses the data-base of buyouts and non-buyouts with full company accounts (Table 5). Table 5 provides summary statistics on the sample size and the observed failure rate of company types over the time period. In comparing failure rates however, it is important to control for age, size and sector. We estimate a series of multivariate models in order to generate meaningful comparisons of insolvency risk by company type.

Our initial analysis (Table 6) confirms a strong inverted U-shaped relationship between insolvency risk and asset size. We also observe a negative relationship between insolvency risk and company age, outside the 3-9 years period. Companies in the 3-9 years age categories have a significantly higher failure rate as they pass from the 'honeymoon' period towards being established. We include a dummy variable 'agerisk 3-9' to capture the higher failure rate of young companies. It is during this period that they are likely to encounter problems associated with growth, financing, management etc. (see Hudson, 1987) and parent support for subsidiaries. Family firms are significantly less likely to fail than non-family firms, while listed corporations are more likely to enter insolvency than unlisted companies of a similar size. We also find that firms with high leverage, as measured by debt to total assets, and with greater changes in leverage are significantly more likely to fail

We estimate the models using data from larger companies that submit full accounts (full accounts) and then include the population that submit abridged accounts (all companies). The results are consistent in both samples. Controlling for these size, sector, age and company type (Tables 6 & 7), the buyout identifiers indicate that buyouts are generally more risky than the non-buyout population over the whole sample period, all other things being equal. Private equity-backed buyouts are riskier than non-PE-backed buyouts over the sample as a whole.

However, the results change when we split the sample into pre- and post-2003 periods. The rationale for doing so reflects the impact of the Enterprise Act 2002, which introduced important changes in the UK insolvency regime. These changes introduced more flexibility into the insolvency system, which particularly benefitted PE-backed businesses. Looking at these two distinct time periods, we find that post-2003 PE-backed buyouts are not riskier than the population of matched private companies and listed companies, if we control for the other variables noted above. Private equity-backed buyouts completed pre-2003 display a higher risk of failure than matched private companies and listed companies. This may partly reflect the fate of deals from the previous recession of the 1990s and the effects of deals completed during the dot.com boom and bust. We infer that this change from 2003 onwards could reflect increased experience of PE firms.

We conducted the same analyses using the dataset with all companies, not just those with full accounts, where the base insolvency rate is low (Tables 7 and 7a). The results are consistent with the above analysis, except that we find that PE-backed buyouts post-2003 are marginally riskier than the overall population base, although they exhibit lower insolvency risk than listed companies. This reflects the previous observation that small companies are very unlikely to become insolvent, even with negative net worth.

Figure 2 presents the trend in the average marginal effects of company type on insolvency risk generated from the multivariate model (Table 7). This effectively tracks the insolvency rate of PE-backed buyouts, matched private companies, listed companies and non-PE-backed buyouts over time whilst controlling for size and sector. PE-backed buyouts exhibit a lower failure rate than non-PE-backed buyouts and listed companies.

In addition to the variables in the above analysis, we then analysed the data using the full range of risk-related company characteristics available. We estimate the likelihood of insolvency using data on companies that submit full accounts, and for the whole sample using the variables that are common to both sets of firms, such as balance sheet financial ratios and our measures of compliance and operational risk.

We control for risk factors associated with insolvency, notably regulatory compliance (provision of cash flow statements, late filing of accounts, overdue accounts); operational risk involving monitoring by auditors (audited accounts; audit qualification; auditor change) and active creditors (County Court Judgements; Charges on assets); and financial characteristics (liquidity and profitability measures) (Tables 8 and 9). Our analysis finds that PE-backed buyouts are less likely to enter insolvency than matched private companies and listed companies. We infer from this finding that PE-backed buyouts are better able to resolve problems in a timely manner through financing restructuring, active management, etc.

ii. Buyout only sample

We also examine the likelihood of failure for just the sample that has been subject to a buyout. This analysis involved full accounts for 19,602 buyouts. We control for selected financial ratios and non-financial variables, and these are all significant and attract the appropriate signs in our regressions, as before (Table 10).

We distinguish between PE-backed buyouts and non-PE-backed buyouts both pre- and post-2003. Relative to non-PE-backed buyouts, PE-backed buyouts pre-2003 are significantly more likely to fail. However, this is not the case in our post-2003 sample.

The results, based on abridged accounts for 26,664 buyouts, again show that the selected financial ratios are all highly significant with the appropriate signs. The results in relation to PE-backed buyouts pre- and post-2003 are again consistent with our earlier findings, namely that post 2003 PE-backed buyouts have a lower insolvency risk than other buyouts.

Of particular note is that while the debt to total assets ratio is significant, the change in debt to total assets ratio is not significant in distinguishing buyouts that fail from those that do not.

Conclusion

At the onset of the recession, some commentators were pessimistic about the prospects for PE-backed buyouts in the UK. They believed that PE-backed buyouts would be worse affected than other comparable businesses, having been in some cases acquired at relatively high multiples, and using comparatively high levels of leverage. This study has examined the economic and financial performance and survival of these PE-backed buyouts in the UK over the period leading up to and including the recent global recession, compared to a sample of matched private companies and listed companies.

It has found that – contrary to some commentators' expectations – PE-backed buyouts are not more likely to fail than matched private companies and listed companies. In particular, during the recent recession, productive efficiency and profitability was stronger than comparable private firms and listed companies during the recession period. Further, the failure rate for PE-backed buyouts was lower than for non-PE-backed buyouts, and no worse than the population of companies as a whole.

Our analysis indicates that while PE portfolio companies generally have higher financial leverage, this is often in parallel with stronger productivity growth. Private equity portfolio

companies on average generate strong and stable profit along with adequate interest coverage that allows them to weather economic downturns. Our evidence might reflect the high degree of proactive involvement by PE firms, enabling them to take timely action to assist investees and restructure finances if necessary in the event of financial distress.

Case Vignettes

Minivator

Kingswinford-based stairlift manufacturer Minivator underwent an initial buyout in 2000 and a secondary buy-out led by private equity firm Gresham in August 2004. The secondary buyout enabled one of the two buyout team members to retire and enabled the remaining partner to further develop the company.

The company had seen its sales more than treble between 2001 and the time of the secondary buy-out. Management believed that the company still had scope for significant sales growth over the following five years. For the private equity backer, the deal was attractive because there was a strong and committed management team in place who were capable of realising further growth, and the company had a strong market position as the second largest provider of stairlifts in the UK and the third largest in the world.

Following the secondary buyout, the biggest challenge was to develop the management infrastructure to support the rapid growth. Increased importance was placed on cash flow management and general financial reporting, with KPIs becoming a central part of running the business. An open culture has been developed to support both customers and employees and this has helped make service quality one of the highest in the sector.

Minivator increased the number of its patented products from one to nine either pending or taken out. Significant sums were spent on R&D during Gresham period of ownership and in addition the company increased the apprentice scheme through tailored NVQ Level 2 and 3 programmes.

Following Gresham's investment, turnover doubled. The company grew 28 per cent in 2008 compared with an industry growth rate of 5-6 per cent. Employee numbers more than doubled from 150 to over 350. Growth was achieved entirely organically. Minivator was able to take advantage of developments in the stairlift industry as well as to capture market share from other operators. A five year marketing agreement signed in 2008 with Help the Aged, following which direct sales more than doubled. The company also significantly expanded internationally, opening operations in North America and Germany. In March 2010 the company was sold to Handicare Group of Norway for £42 million.

United Biscuits

United Biscuits, the UK's largest biscuit group, resulted from the merger of two Scottish family businesses, McVitie & Price and MacFarlane Lang, in 1948. In 1960 the business added Crawford's Biscuits and MacDonald's Biscuits. Subsequent brands added include Jaffa Cakes, Hula Hoops and McCoy's crisps. The group employs 7,000 people at 14 UK locations.

United Biscuits, was taken private in April 2000 in a £1.26 billion deal involving three PE firms and Kraft, the US food group. In 2006, following media speculation about an IPO, United Biscuits underwent a £1.6 billion secondary buyout led by Blackstone and PAI. Financing for the deal comprised 80 per cent debt, some being bought back in 2009, and the vendor loan note taken out at the time of the buyout has been repaid.

United Biscuit's board comprises six non executives (three from PAI, three from Blackstone), an executive chairman and three additional executive directors. In the only board change since the buyout, the sponsors recently appointed an internal candidate as CEO. The board, with the support of the PE backers, has been very active in steering the business

since the buyout. United Biscuits has focused on revenue and EBITDA growth, sustainability, and customer value, the importance of which has been emphasized by the recent recession. The strategy has centred firstly on continued market share gains in the UK and Northern Europe and secondly on internationalization, notably in emerging markets including construction of a manufacturing plant in India. A substantial number of products have either been newly launched or improved. Since the buyout, turnover has grown by about 20% and EBITDA by 25%.

The PE backers have been actively involved in procurement and lean manufacturing. In terms of procurement, leveraging the scale of the rest of the PE backers' portfolios has enabled United Biscuits to obtain better deals for amongst others: insurance, employee benefits and travel. As a result of the company-wide initiative on lean manufacturing, the company now has in-house experts focussed on improving manufacturing processes in the UK and Northern European plants. On buyout, the pension deficit was halved through a cash injection and has been further reduced since then.

The board, with PE backer support, has also focussed on Corporate Social Responsibility (CSR). The company won the BVCA award for CSR Buyout of the year in 2010. Carbon emissions have been cut despite volume growth. Trans-fats and salt have been taken out of products and this has been well received by customers. Fuel usage and carbon emissions have been cut through network optimization of delivery routes and teaming up with other industry players, even competitors, to consolidate deliveries to the retailers. Water usage has been cut by 27% in the last 3 years through investment in a recycling plant.

The Works

Founded in 1981 and based in Sutton Coldfield, The Works was a value bookstore selling discount books and a complimentary range of non-book products including art and craft materials, stationery and children's toys and games. In July 2003 the firm was bought from its founders by management and Primary Capital for £25 million. At this time turnover was circa £70 million with EBITDA of over £5 million and 1,500 employees. In April 2005 Hermes, the fund management group owned by BT's pension scheme, backed a £50 million secondary management buyout of the company from Primary Capital. At the time of this buyout The Works operated about 225 stores across the UK, turnover having risen to over £90 million and EBITDA at circa £6.5 million. Hermes stated that there were opportunities to improve the performance and margins of the business.

The new management team made a number of changes to the retail model that were to prove very costly, and in early 2008 the company suffered cash flow problems and could not service its debt. The debt provider HSBC and Hermes were unable to agree on a refinancing package and in January 2008 the then 317-strong chain was put into administration. The stores were leased by The Works, rather than owned, so its assets were primarily unsold stock. The administrator Kroll closed about 92 stores, resulting in around 450 job losses but in May 2008 Endless (the turnaround private equity investor) bought The Works for an estimated £17 million and shortly thereafter introduced the current management team (led by the chairman Anthony Solomon) who co-invested with Endless. At acquisition the deal was made up of £5 million cash from Endless and a £12 million debt rollover from HSBC.

The Works fell into administration as a result of a number of changes being made to the very successful, proven discount retail model. These included alterations to store layout and a move to sell full price book products to directly compete with mainstream book retailers. This strategy moved the business away from its strong 'value' proposition and as a result sales and margins both fell and a number of stores became loss making. There was

poor cost control and the business' significant financial gearing and subsequent cash pressures resulted in failure. Industry experts suggested that Endless faced an uphill battle to resuscitate the company. However, Endless were able to commit resource and expertise to the challenge, introducing the management team who have been fundamental to delivering the restructuring and significant improvement in trading performance.

Three key members of the new management team brought in by Endless (two of whom were also the co-investors) had been responsible for turning around the retailer The Original Factory Shop which they bought in 2002 for £7 million and sold for £39 million two years later. In the case of The Works the team cut costs and headcount, particularly at the head office, improved margins by sourcing products from the Far East, smartened up in-store merchandising and returned the chain to its discount roots. The administration process had enabled the unprofitable stores to be closed and therefore allowed Endless to acquire the remainder which started to perform well under new management. When it failed, the business had been losing significant money, (reputedly an eight figure loss) but in the first year of ownership, to April 2009, the management team and Endless achieved an astonishing turnaround, delivering an EBITDA of £3.1 million. The turnaround having been completed, turnover in the year to April 2010 was £106 million with an EBITDA of £10.4 million (9.8% of turnover), being a fantastic result and superior financial performance compared to all historic periods. The business now faces an exciting future, having fully restored and further developed the unique retail model of The Works, with significant opportunity to grow the store base and profits in the coming years.

References

Acharya, V., Hahn, M and Kehoe, C, 2009a, 'Corporate Governance and Value Creation: Evidence from Private Equity', Working Paper, NY Stern.

Acharya, V., Kehoe, C. and Reyner, 2009b, 'Private Equity **vs** PLC Boards: A Comparison of Practices and Effectiveness', *Journal of Applied Corporate Finance*, Vol. 21(1), pp. 45–56.

Amess, K. Wright, M. 2007, 'The Wage and Employment Effects of Leveraged Buyouts in the U.K., *International Journal of Economics and Business*, Vol. 14(2), pp. 179-195.

Andrade, G. and Kaplan, S. 1998, 'How costly is financial (not economic) distress? Evidence from highly leveraged transactions that became distressed', *Journal of Finance,* Vol. 53, pp. 1443-1493.

Axelson, U., Jenkinson, T., Strömberg, P., and Weisbach, M., 2010, 'Borrow cheap, buy high? The determinants of leverage and pricing in buyouts', Available at SSRN: http://ssm.com/abstract+1596019.

Boucly, Q., Thesmar, D. and Sraer, D., 2009, 'Leveraged buyouts – evidence from French deals'. In Gurung, A. and Lerner, J. (eds). *The Global Economic Impact of Private Equity Report 2009, Globalization of Alternative Investments, Working Papers Volume 2*, World Economic Forum., pp.47-64.

BVCA/Ernst & Young, 2011, *Third Annual BVCA Report on the Performance of Portfolio Companies*. London: BVCA.

Citron, D., Wright, M., Rippington, F. and Ball, R., 2003, 'Secured creditor recovery rates from management buy-outs in distress', *European Financial Management*, Vol. 9, pp. 141-162.

Citron, D. and Wright, M., 2008, 'Bankruptcy costs, leverage and multiple secured creditors: the case of MBOs', *Accounting and Business Research*, Vol. 38, pp. 71-90.

Cressy, R., Malipiero, A. and Munari, F., 2007, 'Playing to their strengths? Evidence that specialization in the Private Equity industry confers competitive advantage', *Journal of Corporate Finance*, 13: 647-669.

Cressy, R., Munari, F. And Malipieor, A., 2011, 'Creative destruction? Evidence that buyouts shed jobs to raise returns', *Venture Capital*, Vol. 13, No. 1, pp.1-22.

Cumming, D., Siegel, D.S. and Wright, M., 2007, 'Private Equity, Leveraged Buy-outs and Governance', *Journal of Corporate Finance*, Vol. 13, pp. 439-460.

Davis, S., Lerner, J., Haltiwanger, J., Miranda, J. and Jarmin, R. 2008, 'Private equity and employment'. In Lerner, J. and Gurung, A.(eds). *The Global Impact of Private Equity Report 2008, Globalization of Alternative Investments, Working Papers Volume 1*, World Economic Forum, pp43-64.

Davis, S., Lerner, J., Haltiwanger, J., Miranda, J. and Jarmin, R. 2009, 'Private equity, jobs and productivity'. In Gurung, A. and Lerner, J. (eds). *The Global Economic Impact of Private Equity Report 2009, Globalization of Alternative Investments, Working Papers Volume 2,* World Economic Forum., pp25-46.

Gaspar, J., 2009, 'The Performance of French LBO firms: New data and new results', Paris: ESSEC Working Paper.

Gilligan, J. and Wright, M., 2010, *Private Equity Demystified*.2nd edition. London:ICAEW.

Guo, S, Hotchkiss, E S and Song W, 2009, 'Do Buyouts (Still) Create Value', Journal of Finance, forthcoming.

Hudson , J 1987, 'The Age, Regional and Industrial Structure of Company Liquidations', *Journal of Business Finance and Accounting,* Vol. 14, pp. 199-213.

Kaplan, S. N. and Stein, J., 1993, 'The evolution of buy-out pricing in the 1980s', *Quarterly Journal of Economics*, Vol.108, pp. 313-357.

Kaplan, S.N. and Stromberg, P., 2009, 'Leveraged buyouts and private equity', *Journal of Economic Perspectives*, Vol. 23, pp. 121-146.

Robbie, K. and Wright, M., 1995, 'Managerial and ownership succession and corporate restructuring: the case of management buy-ins', *Journal of Management Studie*s, Vol. 32, pp. 527-50.

Meuleman, M., Amess, K., Wright, M., and Scholes, L. 2009, 'Agency, Strategic Entrepreneurship and the Performance of Private Equity Backed Buyouts', *Entrepreneurship Theory and Practice*, Vol. 33, pp. 213-240.

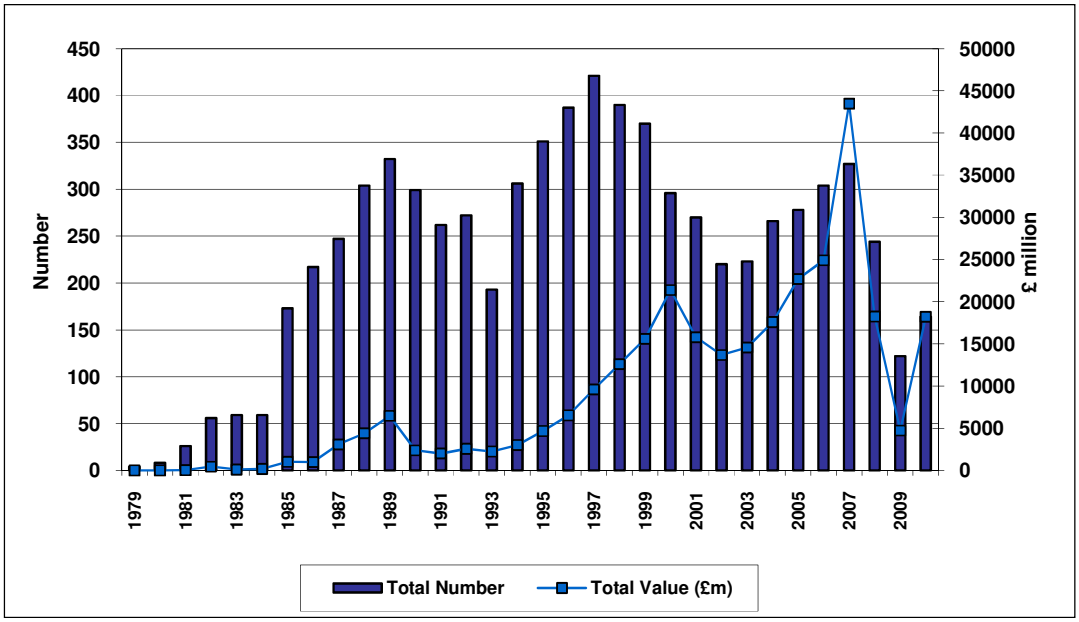
Wright, M. and Bruining, H., 2008, *Private Equity and Management Buyouts*, Cheltenham: Edward Elgar.

Wright, M, Wilson, N., Robbie, K. and Ennew, C. 1996, 'An analysis of failure in UK buy-outs and buy-ins', *Managerial and Decision Economics*, Vol. 17, pp. 57-70.

Wright, M., Hoskisson, R., Busenitz, L and Dial, J. 2000, 'Entrepreneurial Growth through Privatization: The Upside of Management Buy-outs', *Academy of Management Review*, Vol. 25, pp. 591-601.

Appendix: Charts and Tables

Figure 1: UK Private Equity Backed Buyouts and Buy-ins



Source: CMBOR/Barclays Private Equity/Ernst & Young

Table 1: Analysis of the Performance of PE-Backed Companies and Impact of the Recession

		PE Backed		Matched Private		Listed	
		Pre: Recession	Recession	Pre: Recession	Recession	Pre: Recession	Recession
Profit & Debt		Mean	Mean	Mean	Mean	Mean	Mean
	ROA	7.707	9.670	5.581	5.712	0.765	1.038
	Gross Margin	36.484	37.947	35.192	35.755	37.470	39.132
	Debt/TA	35.904	33.636	38.565	38.249	26.459	25.731
	Coverage	25.416	31.942	27.353	25.097	17.930	17.959
Ave Annual Change							
	Growth Turnover	0.117	0.139	0.214	0.195	0.364	0.286
	Growth Employment	0.036	0.056	0.051	0.061	0.161	0.141
	Growth Value Added	0.164	0.200	0.243	0.184	0.325	0.159
	Growth Profit	0.358	0.275	0.447	0.270	0.273	-0.001
Working Capital							
	Cash/TA	8.860	10.068	7.490	8.158	13.117	13.357
	Debtors/TA	23.606	22.036	11.454	10.594	11.575	10.271
	Creditors/TL	28.381	28.980	13.506	13.666	18.297	17.175
	Stock/TA	11.127	9.649	8.119	8.115	5.687	5.109

Note: Ratios are percentages; annual changes are fractions

Table 2: Relative Performance of PE-Backed, Listed and Matched Private Companies

A. Profit and Debt (%)

Year	PE Backed				Listed				Matched Private			
	ROA	Gross Margin	Debt/TA	Coverage	ROA	Gross Margin	Debt/TA	Coverage	ROA	Gross Margin	Debt/TA	Coverage
1999	7.13	30.66	36.99	20.78	3.92	31.38	22.14	23.38	5.37	30.44	37.57	29.58
2000	5.54	30.76	37.50	22.18	2.29	34.83	21.88	19.96	4.81	29.69	38.21	29.08
2001	5.29	31.48	36.99	21.34	0.07	36.32	23.06	16.48	4.54	30.84	38.77	28.83
2002	4.78	33.27	37.96	21.60	-0.74	36.61	24.53	15.25	4.29	32.72	39.04	30.18
2003	5.82	35.10	38.01	24.95	0.11	37.09	25.77	18.49	4.71	33.61	39.14	31.53
2004	7.24	35.96	36.25	23.70	1.02	37.48	27.27	18.45	5.54	34.69	38.85	27.73
2005	8.73	37.35	34.82	26.03	1.10	37.71	26.59	17.26	5.68	35.77	38.43	25.97
2006	8.86	37.36	34.76	26.83	1.19	38.23	26.09	17.99	6.12	36.08	38.10	25.57
2007	10.14	37.46	34.54	30.57	1.68	38.87	25.58	18.56	6.45	35.79	37.90	25.85
2008	9.65	37.91	33.48	31.67	0.94	39.19	26.82	15.72	5.45	35.45	38.59	24.64
2009	8.61	39.16	31.85	36.02	1.66	40.58	23.67	21.86	4.36	36.51	38.29	24.29

B. Annual Changes in Turnover, Employment, Value Added and Profit (fractions)

Year	PE Backed				Listed				Matched Private			
	Annual Changes in:				Annual Changes in:				Annual Changes in:			
	Turnover	Employment	Value Added	Profit	Turnover	Employment	Value Added	Profit	Turnover	Employment	Value Added	Profit
1999	0.15	0.07	0.19	0.08	0.31	0.16	0.39	0.11	0.19	0.08	0.25	0.27
2000	0.18	0.05	0.16	0.12	0.47	0.24	0.35	-0.04	0.23	0.07	0.24	0.25
2001	0.14	0.07	0.22	0.15	0.44	0.25	0.23	-0.22	0.20	0.07	0.23	0.24
2002	0.07	0.02	0.17	0.16	0.27	0.13	0.34	-0.09	0.16	0.06	0.25	0.34
2003	0.11	0.03	0.19	0.28	0.30	0.07	0.41	0.29	0.17	0.04	0.24	0.39
2004	0.12	0.03	0.18	0.45	0.35	0.12	0.32	0.36	0.22	0.04	0.26	0.51
2005	0.13	0.04	0.14	0.38	0.38	0.19	0.29	0.27	0.23	0.06	0.23	0.40
2006	0.11	0.05	0.14	0.32	0.41	0.23	0.30	0.22	0.23	0.06	0.25	0.48
2007	0.18	0.06	0.28	0.46	0.38	0.20	0.28	0.18	0.23	0.06	0.24	0.45
2008	0.12	0.06	0.16	0.21	0.28	0.13	0.10	-0.08	0.19	0.07	0.15	0.16
2009	0.09	0.04	0.10	-0.02	0.10	0.04	0.04	-0.20	0.10	0.04	0.13	0.07

C. Cash and Working Capital (%)

Year	PE Backed				Listed				Matched Private			
	Cash/Ta	Debtors/TA	Creditors/TL	Stock/ta	Cash/Ta	Debtors/TA	Creditors/TL	Stock/ta	Cash/Ta	Debtors/TA	Creditors/TL	Stock/ta
1999	7.65	24.94	27.44	13.20	8.55	14.13	20.40	8.47	6.245	13.58	14.94	8.82
2000	6.94	24.79	27.19	12.68	9.96	12.54	20.50	7.38	6.448	13.16	14.56	8.33
2001	7.57	24.74	26.95	12.77	10.44	11.56	19.40	6.48	6.617	12.51	13.98	8.20
2002	8.20	23.61	27.00	12.27	9.96	11.54	18.33	6.42	6.722	12.05	13.78	8.12
2003	8.21	23.24	27.76	11.94	10.42	11.99	18.08	6.25	6.894	11.88	13.83	8.15
2004	8.66	23.77	28.22	11.36	12.28	12.00	17.98	6.22	7.334	11.63	13.53	8.24
2005	9.06	23.75	28.97	11.12	13.95	11.64	18.56	5.68	7.713	11.31	13.32	8.14
2006	9.39	23.63	28.48	10.24	14.73	11.27	18.50	5.41	7.812	11.16	13.44	7.98
2007	10.00	22.72	29.01	10.00	14.31	10.90	17.66	5.20	8.148	10.93	13.52	7.94
2008	10.03	21.74	28.33	9.60	12.69	10.21	16.82	5.02	8.064	10.52	13.53	8.05
2009	10.31	21.19	30.34	8.99	12.26	9.48	16.89	5.43	8.440	9.88	14.46	8.78

Table 3: Multivariate Models Determining Productive Efficiency

A. Value Added = f (Labour, Capital, Age, Industry Risk, Competition, Time Trend and Company Type)

Dep: Ln(Value Added)	1995-2009			Pre:Recession			Recession		
	Coefficient	**t-statistic**	**Significance**	**Coefficient**	**t-statistic**	**Significance**	**Coefficient**	**t-statistic**	**Significance**
Constant	-28.69770	-30.749	0.000	-36.11899	-6.497	.000	7.97811	.726	.468
Ln (Labour)	0.50165	421.494	0.000	.49992	246.834	.000	.51125	200.103	.000
Ln(Capital)	0.47478	341.807	0.000	.47438	202.280	.000	.46433	152.767	.000
Ln(Age)	-0.01501	-8.030	0.000	-.01352	-4.235	.000	-.03311	-7.009	.000
PE Backed	**0.12671**	14.973	**0.000**	**.11182**	7.306	**.000**	**.13737**	6.954	**.000**
MBO	0.17410	17.313	0.000	.16822	9.897	.000	.16526	7.807	.000
MBI	0.02065	0.946	0.344	.06334	1.679	.093	.00789	.169	.865
Listed	-0.01240	-1.783	0.075	-.03819	-3.176	.001	-.07992	-5.154	.000
Family	-0.04735	-7.131	0.000	-.06880	-6.114	.000	-.08849	-6.746	.000
Subsidiary	0.06306	13.623	0.000	.04763	5.993	.000	.07580	7.818	.000
Industry Risk	0.00983	3.045	0.002	.00404	.724	.469	.02316	2.873	.004
HHI Competition	-0.00001	-5.721	0.000	-.00001	-6.364	.000	.00000	1.208	.227
Time Trend	0.01692	36.306	0.000	.02064	7.441	.000	-.00120	-.218	.827
R2	0.890			0.889			0.869		
F	545000.000			18379.000			10628.000		
Significance	0.000			0.000			0.000		

B. Value Added = f (Labour, Capital, Age, Industry Risk, Competition, Time Dummies and Company Type)

Dep: Ln(Value Added)	1995-2009			Pre:Recession			Recession		
	Coefficient	**t-statistic**	**Significance**	**Coefficient**	**t-statistic**	**Significance**	**Coefficient**	**t-statistic**	**Significance**
Constant	5.12991	191.396	.000	5.27859	115.626	.000	5.57087	88.213	.000
Ln (Labour)	0.50135	421.439	.000	0.49990	246.823	.000	0.51127	200.107	.000
Ln(Capital)	0.47501	342.025	.000	0.47439	202.283	.000	0.46432	152.761	.000
Ln(Age)	-0.01520	-8.128	.000	-0.01347	-4.221	.000	-0.03319	-7.025	.000
PE Backed	**0.12708**	15.012	**.000**	**0.11192**	7.312	**.000**	**0.13713**	6.941	**.000**
MBO	0.17562	17.463	.000	0.16847	9.911	.000	0.16510	7.799	.000
MBI	0.02048	.938	.348	0.06336	1.679	.093	0.00781	.168	.867
Listed	-0.01267	-1.821	.069	-0.03812	-3.171	.002	-0.07966	-5.137	.000
Family	-0.04748	-7.148	.000	-0.06870	-6.105	.000	-0.08848	-6.745	.000
Subsidiary	0.06217	13.425	.000	0.04762	5.992	.000	0.07525	7.754	.000
Industry Risk	0.00689	2.133	.033	0.00385	.691	.489	0.02274	2.820	.005
HHI Competition	-0.00001	-6.301	.000	-0.00001	-6.374	.000	0.00000	1.170	.242
Time Dummies	**YES**			**YES**			**YES**		
R2	0.890			0.889			0.869		
F	36328.000			15754.000			9811.000		
Significance	0.000			0.000			0.000		

Table 4: Multivariate Models Determining Return on Assets (ROA)

A. ROA = f (Age, Industry Risk, Competition, Time Trend and Company Type)

Dep: ROA	1995-2009			Pre:Recession			Recession		
	Coefficient	**t-statistic**	**Significance**	**Coefficient**	**t-statistic**	**Significance**	**Coefficient**	**t-statistic**	**Significance**
Constant	-16.14850	-1.175	.240	-872.42278	-10.72	0.00	1953.26820	11.96	0.00
PE Backed	**3.05007**	21.658	**.000**	**2.86597**	11.18	**0.00**	**4.82476**	14.61	**0.00**
MBO	3.51693	21.767	.000	3.77382	13.84	0.00	4.11230	11.73	0.00
MBI	0.27018	.754	.451	0.64934	1.05	0.29	1.25703	1.59	0.11
Listed	-2.87800	-27.916	.000	-3.94477	-22.35	0.00	-3.83195	-17.19	0.00
Family	-0.04583	-.428	.669	-0.33022	-1.82	0.07	-0.54711	-2.64	0.01
Subsidiary	0.54686	7.615	.000	0.40579	3.30	0.00	0.92433	6.18	0.00
Industry Risk	0.13165	2.636	.008	0.10547	1.21	0.23	0.29727	2.37	0.02
HHI Competition	-0.00004	-1.932	.053	-0.00018	-4.28	0.00	0.00021	3.98	0.00
Ln(AGE)	0.79492	29.391	.000	0.70729	15.30	0.00	0.77878	11.51	0.00
Time Trend	0.00706	1.031	.303	0.43476	10.71	0.00	-0.97381	-11.97	0.00
R2	0.110			0.132			0.130		
F	353.000			172.000			122.000		
Significance	0.000			0.000			0.000		

B. ROA = f (Age, Industry Risk, Competition, Time Dummies and Company Type)

Dep: ROA	1995-2009			Pre:Recession			Recession		
	Coefficient	**t-statistic**	**Significance**	**Coefficient**	**t-statistic**	**Significance**	**Coefficient**	**t-statistic**	**Significance**
Constant	-2.3843	-9.36	0.00	-0.40198	-0.93	0.35	-3.09	-4.95	0.00
PE Backed	**3.1150**	22.13	**0.00**	**2.86956**	11.20	0.00	**4.82556**	14.61	0.00
MBO	3.5451	21.95	0.00	3.77912	13.86	0.00	4.11297	11.73	0.00
MBI	0.2934	0.82	0.41	0.64780	1.05	0.30	1.25702	1.59	0.11
Listed	-2.8548	-27.71	0.00	-3.94243	-22.33	0.00	-3.83261	-17.19	0.00
Family	-0.0586	-0.55	0.58	-0.32881	-1.81	0.07	-0.54748	-2.64	0.01
Subsidiary	0.5258	7.32	0.00	0.40618	3.30	0.00	0.92618	6.19	0.00
Industry Risk	0.2270	4.55	0.00	0.10677	1.23	0.22	0.29886	2.38	0.02
HHI Competition	0.0000	-0.74	0.46	-0.00018	-4.31	0.00	0.00021	3.98	0.00
Ln(AGE)	.81034	29.98	0.00	0.70890	15.34	0.00	0.77895	11.52	0.00
Time Dummies	**YES**			**YES**			**YES**		
R2	0.116			0.132			0.130		
F	244.000			144.000			111.000		
Significance	0.000			0.000			0.000		

Table 5: Determinants of Insolvency: Company Year Observations and Failure Rates

Year	Companies	Insolvencies	Failure Rate		
			All Companies	PE Buyouts	Listed
1995-1998	174968	7716	4.41	7.61	2.44
1999	133441	6334	4.75	7.94	8.23
2000	284424	8191	2.88	8.76	4.36
2001	400159	10556	2.64	6.89	4.07
2002	445758	11663	2.62	7.07	5.70
2003	551072	11036	2.00	5.68	3.83
2004	723735	10437	1.44	4.60	1.97
2005	825976	11183	1.35	4.15	2.45
2006	938550	12260	1.31	3.66	2.43
2007	1048356	13142	1.25	3.02	2.76
2008	1151106	18613	1.62	3.81	4.27
2009	1343715	20510	1.53	3.81	4.69
2010	916633	11872	1.30	2.63	2.64

Table 6: Discrete Time Hazard Model (Full Accounts), Controlling for Age, Size, Sector, Competition and Company Type

Discrete Time Duration Models: hazard models with time-varying covariates and macro dependent baseline hazard rate (1995-2010) - Full Accounts						
Independent	(1) b/se	(1) Ave. Marginal Effect	(2) b/se	(2) Ave. Marginal Effect	(2) b/se	(2) Ave. Marginal Effect
Log Total Assets	1.5785***		1.5768***		1.5313***	
	(0.0221)		(0.0221)		(0.0221)	
(Log Total Assets)^2	-0.0546***		-0.0546***		-0.0539***	
	(0.0008)		(0.0008)		(0.0008)	
Log Age	-0.1348***		-0.1357***		-0.1202***	
	(0.0052)		(0.0052)		(0.0052)	
Agerisk 3-9 years	0.2640***		0.2638***		0.2527***	
	(0.0094)		(0.0094)		(0.0094)	
Subsidiary Company	-0.1101***		-0.1117***		-0.1775***	
	(0.0112)		(0.0112)		(0.0116)	
Herfindahl-Hirschman Ind	0.0001***		0.0001***		0.0001***	
	(0.0000)		(0.0000)		(0.0000)	
Family Company	-0.2438***	-0.0040***	-0.2434***	-0.0040***	-0.2411***	
	(0.0100)	(0.0002)	(0.0100)	(0.0002)	(0.0100)	
Listed Company	0.7341***	0.0177***	0.7277***	0.0175***	0.7677***	0.0188***
	(0.0408)	(0.0013)	(0.0408)	(0.0013)	(0.0407)	(0.0014)
PE Backed Buyout	0.4716***	0.0100***	0.4692***	0.0099***	0.4249***	0.0088***
	(0.0478)	(0.0012)	(0.0478)	(0.0012)	(0.0477)	(0.0012)
Management Buyout non-PE	0.1643**	0.0030**	0.1610*	0.0029*	0.1446*	0.0026*
	(0.0628)	(0.0012)	(0.0627)	(0.0012)	(0.0625)	(0.0012)
Management Buyin non-PE	0.7902***	0.0197***	0.7856***	0.0196***	0.7443***	0.0181***
	(0.1169)	(0.0041)	(0.1167)	(0.0041)	(0.1170)	(0.0039)
Change Debt/TA			0.0540***	0.0009***	0.0302***	0.0005***
			(0.0057)	(0.0001)	(0.0060)	(0.0001)
Debt/TA					0.5580***	0.0094***
					(0.0172)	(0.0003)
Macro Base Hazard	2.2101***		2.2092***		2.2126***	
	(0.0426)		(0.0426)		(0.0426)	
Constant	-17.5872***		-17.5668***		-17.1992***	
	(0.1555)		(0.1556)		(0.1553)	
Industry Dummies	Yes		Yes		Yes	
Failed= 57,761						
N	3320392		3320392		3320392	
Log Likelihood	-277017.805		-276980.852		-276474.263	
LR Chi-Square	27762.264		27854.226		29420.202	
Pseudo R2	0.0490		0.0491		0.0508	

Note: Tables 6-11 report results for key variables. Full results are available upon request. Robust standard errors are shown in brackets.

Table 6a: Discrete Time Hazard Model (Full Accounts), Pre- and Post-2003 Buyouts

Discrete Time Duration Models: hazard models with time-varying covariates
and macro dependent baseline hazard rate (1995-2010) - Full Accounts

Independent	(1) b/se	(1) Ave. Marginal Effect	(2) b/se	(2) Ave. Marginal Effect	(2) b/se	(2) Ave. Marginal Effect
Log Total Assets	1.5779***		1.5762***		1.5307***	
	(0.0221)		(0.0221)		(0.0221)	
(Log Total Assets)^2	-0.0546***		-0.0546***		-0.0538***	
	(0.0008)		(0.0008)		(0.0008)	
Log Age	-0.1348***		-0.1357***		-0.1202***	
	(0.0052)		(0.0052)		(0.0052)	
Agerisk 3-9 years	0.2639***		0.2637***		0.2527***	
	(0.0094)		(0.0094)		(0.0094)	
Subsidiary Company	-0.1101***		-0.1118***		-0.1776***	
	(0.0112)		(0.0112)		(0.0116)	
Herfindahl-Hirschman Ind	0.0001***		0.0001***		0.0001***	
	(0.0000)		(0.0000)		(0.0000)	
Family Company	-0.2438***	-0.0040***	-0.2434***	-0.0040***	-0.2411***	-0.0039***
	(0.0100)	(0.0002)	(0.0100)	(0.0002)	(0.0100)	(0.0002)
Listed Company	0.7338***	0.0177***	0.7273***	0.0175***	0.7674***	0.0188***
	(0.0408)	(0.0013)	(0.0408)	(0.0013)	(0.0407)	(0.0014)
PE Backed Pre 2003	0.5071***	0.0110***	0.5058***	0.0109***	0.4587***	0.0097***
	(0.0516)	(0.0014)	(0.0516)	(0.0014)	(0.0515)	(0.0013)
PE Backed Post 2003	0.2810*	0.0054	0.2734	0.0053	0.2427	0.0046
	(0.1244)	(0.0027)	(0.1252)	(0.0027)	(0.1259)	(0.0026)
MBO Pre 2003	0.1676*	0.0031*	0.1650*	0.0030*	0.1451*	0.0026*
	(0.0700)	(0.0014)	(0.0700)	(0.0014)	(0.0697)	(0.0013)
MB0 Post 2003	0.1519	0.0028	0.1460	0.0026	0.1425	0.0026
	(0.1390)	(0.0027)	(0.1389)	(0.0027)	(0.1382)	(0.0027)
MBI Pre 2003	0.6630***	0.0155***	0.6617***	0.0155***	0.6188***	0.0141***
	(0.1441)	(0.0045)	(0.1439)	(0.0045)	(0.1443)	(0.0043)
MBI Post 2003	1.0789***	0.0183***	1.0657***	0.0180***	1.0280***	0.0174***
	(0.1932)	(0.0033)	(0.1930)	(0.0033)	(0.1929)	(0.0033)
Change Debt/TA			0.0540***	0.0009***	0.0302***	0.0005***
			(0.0057)	(0.0001)	(0.0060)	(0.0001)
Debt/TA					0.5579***	0.0094***
					(0.0172)	(0.0003)
Macro Base Hazard	2.2102***		2.2092***		2.2127***	
	(0.0426)		(0.0426)		(0.0426)	
Constant	-17.5837***		-17.5631***		-17.1959***	
	(0.1556)		(0.1556)		(0.1553)	
Industry Dummies	Yes		Yes		Yes	
Failed= 57,761						
N	3320392		3320392		3320392	
Log Likelihood	-277014.778		-276977.822		-276471.429	
LR Chi-Square	27786.804		27879.398		29444.724	
Pseudo R2	0.0490		0.0491		0.0508	

Figure 2: Average Marginal Effects (Failure Hazard), Company Type By year

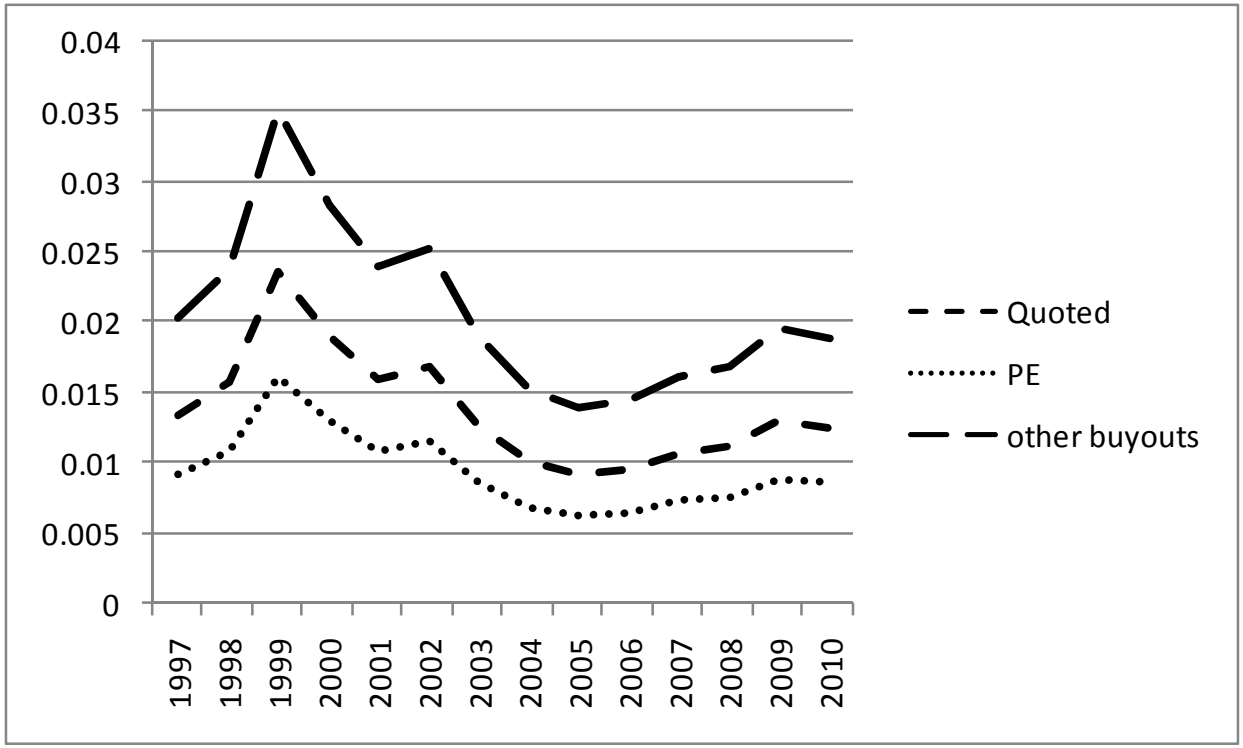


Table 7: Discrete Time Hazard Model (All Accounts), Controlling for Age, Size, Sector, Competition and Company Type

Discrete Time Duration Models: hazard models with time-varying covariates
and macro dependent baseline hazard rate (1995-2010) - All Companies

Independent	(1) b/se	(1) Ave. Marginal Effect	(2) b/se	(2) Ave. Marginal Effect	(2) b/se	(2) Ave. Marginal Effect
Log Total Assets	1.7887***		1.7859***		1.7718***	
	(0.0181)		(0.0181)		(0.0181)	
(Log Total Assets)^2	-0.0627***		-0.0627***		-0.0629***	
	(0.0007)		(0.0007)		(0.0007)	
Log Age	-0.1323***		-0.1330***		-0.1138***	
	(0.0037)		(0.0037)		(0.0036)	
Agerisk 3-9 years	0.2677***		0.2669***		0.2547***	
	(0.0059)		(0.0059)		(0.0058)	
Subsidiary Company	-0.0413***		-0.0403***		-0.0366***	
	(0.0083)		(0.0083)		(0.0083)	
Herfindahl-Hirschman Ind	0.0001***		0.0001***		0.0001***	
	(0.0000)		(0.0000)		(0.0000)	
Family Company	-0.2642***	-0.0043***	-0.2647***	-0.0043***	-0.2625***	
	(0.0056)	(0.0001)	(0.0056)	(0.0001)	(0.0056)	
Listed Company	0.8872***	0.0230***	0.8806***	0.0227***	0.9402***	0.0250***
	(0.0407)	(0.0015)	(0.0407)	(0.0015)	(0.0408)	(0.0016)
PE Backed Buyout	0.5296***	0.0115***	0.5278***	0.0114***	0.5126***	0.0110***
	(0.0438)	(0.0012)	(0.0438)	(0.0012)	(0.0438)	(0.0012)
Management Buyout non-PE	0.2224***	0.0041***	0.2194***	0.0041***	0.2284***	0.0043***
	(0.0484)	(0.0010)	(0.0484)	(0.0010)	(0.0483)	(0.0010)
Management Buyin non-PE	0.7594***	0.0185***	0.7562***	0.0184***	0.7541***	0.0183***
	(0.0930)	(0.0031)	(0.0930)	(0.0031)	(0.0930)	(0.0031)
Change Debt/TA			0.0812***	0.0014***	0.0510***	0.0009***
			(0.0035)	(0.0001)	(0.0037)	(0.0001)
Debt/TA					0.7441***	0.0124***
					(0.0100)	(0.0002)
Macro Base Hazard	2.1066***		2.1135***		2.0943***	
	(0.0282)		(0.0282)		(0.0281)	
Constant	-19.2573***		-19.2340***		-19.1836***	
	(0.1213)		(0.1214)		(0.1211)	
Industry Dummies	Yes		Yes		Yes	
Failed = 153,513						
N	8937764		8937764		8937764	
Log Likelihood	-740644.081		-740389.456		-737984.781	
LR Chi-Square	65757.632		66555.384		72380.029	
Pseudo R2	0.0457		0.0460		0.0491	

Table 7a: Discrete Time Hazard Model (All Accounts), Pre- and Post-2003 Buyouts

Discrete Time Duration Models: hazard models with time-varying covariates
and macro dependent baseline hazard rate (1995-2010) - All Companies

Independent	(1) b/se	(1) Ave. Marginal Effect	(2) b/se	(2) Ave. Marginal Effect	(2) b/se	(2) Ave. Marginal Effect
Log Total Assets	1.7884***		1.7856***		1.7715***	
	(0.0181)		(0.0181)		(0.0181)	
(Log Total Assets)^2	-0.0627***		-0.0626***		-0.0629***	
	(0.0007)		(0.0007)		(0.0007)	
Log Age	-0.1323***		-0.1330***		-0.1138***	
	(0.0037)		(0.0037)		(0.0036)	
Agerisk 3-9 years	0.2677***		0.2669***		0.2547***	
	(0.0059)		(0.0059)		(0.0058)	
Subsidiary Company	-0.0414***		-0.0404***		-0.0366***	
	(0.0083)		(0.0083)		(0.0083)	
Herfindahl-Hirschman Ind	0.0001***		0.0001***		0.0001***	
	(0.0000)		(0.0000)		(0.0000)	
Family Company	-0.2642***	-0.0043***	-0.2647***	-0.0043***	-0.2625***	-0.0043***
	(0.0056)	(0.0001)	(0.0056)	(0.0001)	(0.0056)	(0.0001)
Listed Company	0.8870***	0.0230***	0.8804***	0.0227***	0.9400***	0.0250***
	(0.0407)	(0.0015)	(0.0407)	(0.0015)	(0.0408)	(0.0016)
PE Backed Pre 2003	0.5596***	0.0123***	0.5565***	0.0122***	0.5365***	0.0116***
	(0.0475)	(0.0013)	(0.0475)	(0.0013)	(0.0475)	(0.0013)
PE Backed Post 2003	0.3759***	0.0075***	0.3803***	0.0076***	0.3879***	0.0078***
	(0.1120)	(0.0027)	(0.1120)	(0.0027)	(0.1119)	(0.0027)
MBO Pre 2003	0.2337***	0.0044***	0.2316***	0.0043***	0.2381***	0.0045***
	(0.0556)	(0.0012)	(0.0556)	(0.0012)	(0.0555)	(0.0012)
MB0 Post 2003	0.1859	0.0034	0.1801	0.0033	0.1967*	0.0036*
	(0.0978)	(0.0019)	(0.0976)	(0.0019)	(0.0976)	(0.0020)
MBI Pre 2003	0.6110***	0.0138***	0.6098***	0.0137***	0.6025***	0.0135***
	(0.1201)	(0.0035)	(0.1201)	(0.0035)	(0.1200)	(0.0035)
MBI Post 2003	1.0145***	0.0170***	1.0071***	0.0168***	1.0155***	0.0170***
	(0.1430)	(0.0024)	(0.1431)	(0.0024)	(0.1433)	(0.0024)
Change Debt/TA			0.0811***	0.0014***	0.0509***	0.0009***
			(0.0035)	(0.0001)	(0.0037)	(0.0001)
Debt/TA					0.7440***	0.0124***
					(0.0100)	(0.0002)
Macro Base Hazard	2.1066***		2.1135***		2.0943***	
	(0.0282)		(0.0282)		(0.0281)	
Constant	-19.2552***		-19.2320***		-19.1818***	
	(0.1213)		(0.1214)		(0.1211)	
Industry Dummies	Yes		Yes		Yes	
Failed = 153,513						
N	8937764		8937764		8937764	
Log Likelihood	-740640.266		-740385.804		-737981.305	
LR Chi-Square	65784.662		66581.516		72404.881	
Pseudo R2	0.0457		0.0460		0.0491	

Table 8: Discrete Time Hazard Model (Full Accounts), Controlling for Risk Characteristics

Full Accounts	Discrete Time Duration Models: hazard models with time-varying covariates and macro dependent baseline hazard rate (1995-2010)										
Control Variables	**Variable**	(1) b/se	Ave. dydx	(2) b/se	Ave. dydx	(3) b/se	Ave. dydx	(4) b/se	Ave. dydx	(5) b/se	Ave. dydx
Size, Age, Type	Size Dummy	-0.4868***		-0.2974***		-0.5464***		-0.2992***		-0.3775***	
		(0.0119)		(0.0123)		(0.0121)		(0.0126)		(0.0129)	
	Size Dummy	-0.3687***		-0.3569***		-0.3077***		-0.3329***		-0.2767***	
		(0.0131)		(0.0133)		(0.0131)		(0.0135)		(0.0135)	
	Log Age	-0.1095***		-0.1034***		-0.0987***		-0.1002***		-0.0915***	
		(0.0051)		(0.0051)		(0.0050)		(0.0050)		(0.0050)	
	Agerisk 3-9 years	0.1954***		0.1644***		0.1422***		0.1633***		0.1000***	
		(0.0095)		(0.0095)		(0.0096)		(0.0095)		(0.0097)	
	Subsidiary Company	-0.2132***		-0.2697***		-0.1718***		-0.2747***		-0.2217***	
		(0.0120)		(0.0120)		(0.0121)		(0.0123)		(0.0124)	
	Herfindahl-Hirschman	0.0001***		0.0001***		0.0001***		0.0001***		0.0001***	
		(0.0000)		(0.0000)		(0.0000)		(0.0000)		(0.0000)	
	Family Company	-0.1739***	-0.0028***	-0.1565***	-0.0025***	-0.1470***	-0.0024***	-0.1570***	-0.0025***	-0.1369***	-0.0022***
		(0.0101)	(0.0002)	(0.0101)	(0.0002)	(0.0102)	(0.0002)	(0.0101)	(0.0002)	(0.0102)	(0.0002)
	Listed Company	0.5681***	0.0125***	0.5024***	0.0106***	0.4723***	0.0096***	0.4990***	0.0105***	0.4257***	0.0084***
		(0.0398)	(0.0011)	(0.0399)	(0.0010)	(0.0403)	(0.0010)	(0.0400)	(0.0010)	(0.0406)	(0.0010)
Financial Characteristics	Cash/Total Assets			-1.3556***				-1.3341***		-1.1796***	
				(0.0249)				(0.0249)		(0.0249)	
	Trade debtors/Total Assets			0.4209***				0.4092***		0.4102***	
				(0.0170)				(0.0171)		(0.0174)	
	Trade Creditors/Total Liabilities			0.5323***				0.5749***		0.5080***	
				(0.0153)				(0.0156)		(0.0161)	
	Inventory/Working Capital			0.0208***				0.0191***		0.0170***	
				(0.0004)				(0.0004)		(0.0004)	
	Retained Earnings/Total Assets			-0.0937***				-0.0910***		-0.0819***	
				(0.0033)				(0.0033)		(0.0035)	
	Return on Assets			-0.2201***				-0.2131***		-0.1800***	
				(0.0087)				(0.0087)		(0.0087)	
	Change in Profit			-0.0048***				-0.0042***		-0.0037***	
				(0.0004)				(0.0004)		(0.0004)	
Debt	EBITDA/Interest Paid							-0.0004***	-0.0000***	-0.0004***	-0.0000***
								(0.0000)	(0.0000)	(0.0000)	(0.0000)
	Debt/TA							0.1679***	0.0026***	0.1473***	0.0024***
								(0.0183)	(0.0003)	(0.0184)	(0.0003)
Compliance	Audited	0.4847***		0.3736***		0.4177***		0.3631***		0.3253***	
		(0.0122)		(0.0120)		(0.0125)		(0.0121)		(0.0125)	
	Cashflow Statement	-0.1971***		-0.2389***		-0.1469***		-0.2336***		-0.1872***	
		(0.0154)		(0.0155)		(0.0154)		(0.0155)		(0.0154)	
	Accounts Overdue	0.0018***		0.0017***		0.0011***		0.0017***		0.0011***	
		(0.0001)		(0.0001)		(0.0001)		(0.0001)		(0.0001)	
	Late filing last accounts	0.0047***		0.0040***		0.0033***		0.0040***		0.0029***	
		(0.0001)		(0.0001)		(0.0001)		(0.0001)		(0.0001)	
	Charge on Assets	0.7431***		0.5954***		0.6993***		0.5842***		0.5642***	
		(0.0131)		(0.0130)		(0.0132)		(0.0131)		(0.0132)	
Operational Risk	County Court Judgements/Total Liabilities					3.0065***				2.7056***	
						(0.0222)				(0.0224)	
	Account Qualification - Severe					0.8581***				0.6697***	
						(0.0447)				(0.0441)	
	Account Qualification - Going Concern					1.1862***				0.8798***	
						(0.0209)				(0.0217)	
	Change in Auditor					0.2241***				0.1945***	
						(0.0143)				(0.0143)	
	PE Backed Pre 2003	0.4821***	0.0102***	0.3880***	0.0077***	0.5083***	0.0108***	0.3662***	0.0072***	0.4074***	0.0080***
		(0.0511)	(0.0013)	(0.0509)	(0.0012)	(0.0518)	(0.0013)	(0.0509)	(0.0012)	(0.0513)	(0.0012)
Buyout Type	PE Backed Post 2003	0.0993	0.0017	0.1370	0.0024	0.1054	0.0018	0.1321	0.0023	0.1444	0.0025
		(0.1238)	(0.0023)	(0.1235)	(0.0023)	(0.1236)	(0.0022)	(0.1233)	(0.0023)	(0.1221)	(0.0023)
	Macro Base Hazard	2.0454***		2.0068***		1.9380***		2.0128***		1.9155***	
		(0.0421)		(0.0415)		(0.0426)		(0.0415)		(0.0420)	
Macro Conditions	Constant	-6.7192***		-6.6231***		-6.6552***		-6.6346***		-6.5891***	
		(0.0586)		(0.0582)		(0.0588)		(0.0583)		(0.0587)	
Industry	Industry Dummies	Yes		Yes		Yes		Yes		Yes	
Failed=57,761	N	3320392		3319295		3320392		3319295		3319295	
	Log Likelihood	-273359.940		-265500.035		-264455.775		-265321.920		-258342.547	
	LR Chi-Square	41802.649		53044.513		64545.277		53275.583		72111.175	
	Pseudo R2	0.0615		0.0883		0.0921		0.0889		0.1128	

Table 9: Discrete Time Hazard Model (All Accounts), Controlling for Risk Characteristics

ALL Companies	Discrete Time Duration Models: hazard models with time-varying covariates and macro dependent baseline hazard rate (1995-2010)									
Control Variables	**Variable**	(1) b/se	Ave. dydx	(2) b/se	Ave. dydx	(3) b/se	Ave. dydx	(4) b/se	Ave. dydx	(5) b/se	Ave. dydx
Size, Age, Type	Size Dummy	-0.4677***		-0.4560***		-0.5288***		-0.4335***		-0.4936***	
		(0.0066)		(0.0067)		(0.0066)		(0.0068)		(0.0068)	
	Size Dummy	-0.4346***		-0.3291***		-0.3646***		-0.3335***		-0.2712***	
		(0.0109)		(0.0110)		(0.0109)		(0.0110)		(0.0111)	
	Log Age	-0.0962***		-0.1031***		-0.0834***		-0.0966***		-0.0838***	
		(0.0035)		(0.0036)		(0.0034)		(0.0036)		(0.0035)	
	Agerisk 3-9 years	0.2100***		0.1603***		0.1581***		0.1577***		0.1147***	
		(0.0059)		(0.0059)		(0.0059)		(0.0059)		(0.0060)	
	Subsidiary Company	-0.1592***		-0.2988***		-0.1337***		-0.2706***		-0.2302***	
		(0.0087)		(0.0088)		(0.0088)		(0.0088)		(0.0088)	
	Herfindahl-Hirschman Index	0.0001***		0.0001***		0.0001***		0.0001***		0.0001***	
		(0.0000)		(0.0000)		(0.0000)		(0.0000)		(0.0000)	
	Family Company	-0.1950***	-0.0032***	-0.1708***	-0.0028***	-0.1653***	-0.0026***	-0.1749***	-0.0028***	-0.1496***	-0.0024***
		(0.0057)	(0.0001)	(0.0057)	(0.0001)	(0.0057)	(0.0001)	(0.0057)	(0.0001)	(0.0057)	(0.0001)
	Listed Company	0.5329***	0.0114***	0.4415***	0.0090***	0.4471***	0.0089***	0.4674***	0.0096***	0.4009***	0.0077***
		(0.0395)	(0.0011)	(0.0398)	(0.0010)	(0.0400)	(0.0010)	(0.0398)	(0.0010)	(0.0407)	(0.0009)
Financial Characteristics	Cash/Total Assets			-1.9783***				-1.9046***		-1.7272***	
				(0.0168)				(0.0169)		(0.0168)	
	Trade debtors/Total Assets			0.4951***				0.5110***		0.5182***	
				(0.0088)				(0.0089)		(0.0091)	
	Trade Creditors/Total Liabilities			0.1992***				0.3180***		0.2926***	
				(0.0072)				(0.0084)		(0.0084)	
	Retained Earnings/Total Assets			-0.1966***				-0.1827***		-0.1685***	
				(0.0018)				(0.0019)		(0.0020)	
	Change in Networth			-0.0099***				-0.0089***		-0.0071***	
				(0.0006)				(0.0006)		(0.0006)	
Debt	Debt/Total Assets							0.4005***	0.0096***	0.3582***	0.0057***
								(0.0122)	(0.0002)	(0.0124)	(0.0002)
Compliance	Audited	0.4118***		0.3796***		0.3464***		0.3945***		0.3398***	
		(0.0071)		(0.0070)		(0.0072)		(0.0070)		(0.0072)	
	Accounts Overdue	0.0015***		0.0014***		0.0006***		0.0014***		0.0006***	
		(0.0000)		(0.0000)		(0.0000)		(0.0000)		(0.0000)	
	Late filing last accounts	0.0051***		0.0044***		0.0038***		0.0044***		0.0033***	
		(0.0000)		(0.0000)		(0.0000)		(0.0000)		(0.0000)	
	Charge on Assets	0.8748***		0.7550***		0.8317***		0.7417***		0.7160***	
		(0.0085)		(0.0084)		(0.0086)		(0.0084)		(0.0085)	
Operational Risk	County Court Judgements/Total Liabilities					3.0882***				2.8207***	
						(0.0128)				(0.0128)	
	Account Qualification - Severe					0.9101***				0.7842***	
						(0.0331)				(0.0323)	
	Account Qualification - Going Concern					1.1756***				0.9014***	
						(0.0169)				(0.0173)	
	Change in Auditor					0.2283***				0.2008***	
						(0.0090)				(0.0091)	
Buyout Type	PE Backed Pre 2003	0.4339***	0.0089***	0.3350***	0.0065***	0.4540***	0.0091***	0.3433***	0.0066***	0.3771***	0.0072***
		(0.0470)	(0.0012)	(0.0468)	(0.0010)	(0.0475)	(0.0012)	(0.0468)	(0.0011)	(0.0471)	(0.0011)
	PE Backed Post 2003	0.1054	0.0018	0.0705	0.0012	0.1091	0.0019	0.0856	0.0015	0.1020	0.0017
		(0.1111)	(0.0020)	(0.1110)	(0.0020)	(0.1109)	(0.0020)	(0.1110)	(0.0020)	(0.1100)	(0.0019)
	Macro Base Hazard	1.9481***		1.9107***		1.8596***		1.9008***		1.8294***	
		(0.0273)		(0.0272)		(0.0275)		(0.0273)		(0.0275)	
Macro Conditions	Constant	-6.9228***		-6.7465***		-6.8403***		-6.9173***		-6.8594***	
		(0.0366)		(0.0368)		(0.0366)		(0.0370)		(0.0370)	
Industry	Industry Dummies	Yes		Yes		Yes		Yes		Yes	
Failed = 153,513											
N		8937764		8937764		8937764		8937764		8937764	
Log Likelihood		-730494.044		-708051.238		-704818.411		-707540.408		-686072.748	
LR Chi-Square		108806.152		129322.475		177013.409		129747.649		190765.293	
Pseudo R2		0.0588		0.0877		0.0918		0.0883		0.1160	

Table 10: Discrete Time Hazard Model (Buyouts Only), Controlling for Risk Characteristics (Full Accounts)

Discrete Time Duration Models: hazard models with time-varying covariates and macro dependent baseline hazard rate (1995-201

Variable	(1) b/se	Ave. dydx	(2) b/se	Ave. dydx	(3) b/se	Ave. dydx	(4) b/se	Ave. dydx	(5) b/se	Ave. dydx
Log Total Assets	-0.1622***		-0.1500***		-0.1713***		-0.1513***		-0.1570***	
	(0.0256)		(0.0259)		(0.0259)		(0.0259)		(0.0261)	
Cash/Total Assets	-2.1955***		-2.1054***		-1.8314***		-2.0904***		-1.7683***	
	(0.4555)		(0.4440)		(0.4520)		(0.4441)		(0.4409)	
Trade Creditors/Total Liabilities	0.4310*		0.5128**		0.9058***		0.5165**		0.8986***	
	(0.1924)		(0.1949)		(0.2237)		(0.1954)		(0.2229)	
Inventory/Working Capital	0.0177***		0.0165***		0.0141***		0.0164***		0.0133***	
	(0.0025)		(0.0025)		(0.0026)		(0.0025)		(0.0026)	
Return on Assets	-0.6908***		-0.6533***		-0.5571***		-0.6421***		-0.5291***	
	(0.1039)		(0.1038)		(0.1019)		(0.1032)		(0.1033)	
EBITDA/Irterest Paid					-0.0006**	-0.0000**			-0.0008**	-0.0000**
					(0.0002)	(0.0000)			(0.0002)	(0.0000)
Debt/TA					0.6242***	0.0246***			0.5616***	0.0217***
					(0.1630)	(0.0066)			(0.1688)	(0.0065)
Charge In Debt/TA					0.0519	0.0020	0.0594	0.0023	0.0500	0.0019
					(0.0340)	(0.0013)	(0.0323)	(0.0013)	(0.0341)	(0.0013)
Cashflow Statement	-0.2090**		-0.1730*		-0.2231**		-0.1634*		-0.1868*	
	(0.0761)		(0.0772)		(0.0736)		(0.0778)		(0.0778)	
Accounts Overdue	0.0023***		0.0021***		0.0023***		0.0021***		0.0021***	
	(0.0006)		(0.0006)		(0.0006)		(0.0006)		(0.0006)	
Late filing last accounts	0.0051***		0.0041***		0.0050***		0.0041***		0.0040***	
	(0.0007)		(0.0008)		(0.0007)		(0.0008)		(0.0008)	
Charge on Assets	0.4942***		0.4831***		0.4857***		0.4860***		0.4747***	
	(0.0774)		(0.0781)		(0.0772)		(0.0781)		(0.0779)	
County Court Judgements/Total Liabilities			3.5625***				3.5684***		3.5850***	
			(0.3823)				(0.3840)		(0.3793)	
Account Qualification - Going Concern			0.9447***				0.9386***		0.8700***	
			(0.1564)				(0.1561)		(0.1590)	
PE Backed Pre 2003	0.3021***	0.0121***	0.3117***	0.0122***	0.2868***	0.0115***	0.3143***	0.0123***	0.2992***	0.0117***
	(0.0850)	(0.0035)	(0.0860)	(0.0034)	(0.0851)	(0.0035)	(0.0860)	(0.0034)	(0.0861)	(0.0034)
PE Backed Post 2003	0.1825	0.0077	0.1747	0.0072	0.1848	0.0078	0.1698	0.0070	0.1776	0.0073
	(0.1451)	(0.0065)	(0.1463)	(0.0064)	(0.1448)	(0.0065)	(0.1460)	(0.0063)	(0.1459)	(0.0064)
Base Hazard	1.4798***		1.3515***		1.4698***		1.3534***		1.3307***	
	(0.3429)		(0.3451)		(0.3425)		(0.3457)		(0.3450)	
Constant	-3.5753***		-3.7013***		-3.5474***		-3.6932***		-3.6878***	
	(0.8301)		(0.8032)		(0.8150)		(0.8017)		(0.7935)	
industry	Yes		Yes		Yes		Yes		Yes	
N	19602		19602		19602		19602		19602	
Log Likelihood	-3180.695		-3119.756		-3164.283		-3118.393		-3105.736	
LR Chi-Square	563.992		659.166		572.749		665.179		864.560	
Pseudo R2	0.0893		0.1067		0.0940		0.1071		0.1108	

Table 11: Discrete Time Hazard Model (Buyouts Only), Controlling for Risk Characteristics (All Accounts)

Discrete Time Duration Models: hazard models with time-varying covariates and macro dependent baseline hazard rate (1995-2010)

Variable	(1) b/se	Ave. dydx	(2) b/se	Ave. dydx	(3) b/se	Ave. dydx	(4) b/se	Ave. dydx	(5) b/se	Ave. dydx
Log Total Assets	-0.1449***		-0.1245***		-0.1535***		-0.1247***		-0.1312***	
	(0.0187)		(0.0187)		(0.0187)		(0.0187)		(0.0188)	
Cash/Total Assets	-2.1252***		-1.9972***		-1.9397***		-1.9898***		-1.8521***	
	(0.3486)		(0.3380)		(0.3454)		(0.3377)		(0.3366)	
Inventory/Working Capital	0.0193***		0.0170***		0.0179***		0.0170***		0.0159***	
	(0.0020)		(0.0020)		(0.0020)		(0.0020)		(0.0021)	
Debt/TA					0.6446***	0.0261***	0.0185	0.0007	0.5273***	0.0208***
					(0.1328)	(0.0054)	(0.0294)	(0.0012)	(0.1365)	(0.0054)
Change In Debt/TA					0.0090	0.0004			0.0043	0.0002
					(0.0304)	(0.0012)			(0.0309)	(0.0012)
Accounts Overdue	0.0024***		0.0022***		0.0024***		0.0022***		0.0022***	
	(0.0005)		(0.0005)		(0.0005)		(0.0005)		(0.0005)	
Late filing last accounts	0.0058***		0.0046***		0.0056***		0.0046***		0.0045***	
	(0.0006)		(0.0006)		(0.0006)		(0.0006)		(0.0006)	
Charge on Assets	0.5742***		0.5626***		0.5774***		0.5623***		0.5651***	
	(0.0670)		(0.0676)		(0.0671)		(0.0676)		(0.0677)	
County Court Judgements/Total Liabilities			3.3816***				3.3802***		3.3923***	
			(0.2879)				(0.2882)		(0.2910)	
Account Qualification - Going Concern			1.1159***				1.1150***		1.0463***	
			(0.1296)				(0.1297)		(0.1321)	
PE Backed Pre 2003	0.2560***	0.0106***	0.2461***	0.0100***	0.2334**	0.0097**	0.2460***	0.0100***	0.2305**	0.0093**
	(0.0709)	(0.0030)	(0.0719)	(0.0030)	(0.0713)	(0.0030)	(0.0719)	(0.0030)	(0.0723)	(0.0030)
PE Backed Post 2003	0.1254	0.0053	0.1068	0.0044	0.1141	0.0048	0.1083	0.0045	0.0997	0.0041
	(0.1261)	(0.0056)	(0.1260)	(0.0054)	(0.1262)	(0.0056)	(0.1260)	(0.0054)	(0.1260)	(0.0053)
Base Hazard	1.9146***		1.7949***		1.9160***		1.7981***		1.7883***	
	(0.2963)		(0.3001)		(0.2969)		(0.3004)		(0.3008)	
Constant	-3.9413***		-4.1799***		-3.9714***		-4.1844***		-4.1993***	
	(0.5965)		(0.5928)		(0.5931)		(0.5920)		(0.5912)	
industry	Yes		Yes		Yes		Yes		Yes	
N	26664		26664		26664		26664		26664	
Log Likelihood	-4448.388		-4340.541		-4436.724		-4340.362		-4333.070	
LR Chi-Square	685.260		830.160		688.485		830.850		823.733	
Pseudo R2	0.0777		0.1001		0.0801		0.1001		0.1016	