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# The employment consequences of private equity acquisitions: The case of institutional buy outs

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ABSTRACT

There is a growing controversy as to the impact of private equity acquisitions, especially in terms of their impact on employment and subsequent organizational performance. It has been suggested that closer owner supervision and the injection of a new management team revitalize the acquired organization and unlock dormant capabilities and value. However, both politicians and trade unionists suggest that private equity acquirers may significantly reallocate value away from employees to short term investors, typically through layoffs and reduced wages, which may undermine future organizational sustainability. This article investigates this in the context of a sample of institutional buy outs (IBOs) undertaken in the UK between 1997 and 2006. Specifically we examine the impact of IBOs on both employment and remuneration against two control groups of non-acquired firms. In designing our study we follow the empirical approach taken by Conyon et al. (2001, 2002) in investigating the employment consequences of regular takeovers. Our main finding is a significant loss in employment in firms subject to an IBO in the year immediately following the acquisition as well as lower wage rates, when compared to either of the two control groups. Furthermore, we find no evidence of a subsequent improvement either in productivity or profitability in the acquired businesses.



## 1. Introduction

This article investigates the consequences of private equity takeovers on employment and remuneration, focusing specifically on institutional buy outs (IBOs). There is a growing public policy interest in the role of private equity investors. Central to this debate is a concern that private equity may represent an extreme form of capitalism, seeking to maximize short term shareholder wealth while paying little attention to the interests of broader stakeholder groups or organizational sustainability. Indeed, both politicians and trade union representatives have raised serious concerns regarding the potential consequences of private equity acquisitions for the welfare of employees in acquired firms, calling for stronger regulation and greater transparency in respect of the activities of private equity acquirers (Barber, 2007; Treasury Select Committee, 2007). Central to this is the concern that private equity acquirers may seek to gain at employees' expense, specifically in terms of layoffs and lower wages, which not only leaves them worse off, but may also undermine the future viability of the

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firm (International Trade Union Confederation, 2007). In contrast, proponents of the industry suggest that closer owner supervision may reduce the agency problem, with the injection of new managers and managerial approaches more closely aligned to the agenda of shareholder value maximization, optimizing organizational outcomes (BVCA, 2006).

Running parallel to concerns in the policy community, an emerging strand of academic enquiry has begun to examine the employment consequences of private equity takeovers, largely motivated by the seminal work of Shleifer and Summers (1988), who suggested that acquisitions may provide an opportunity for managers to challenge any implicit contracts between employees and the firm, thereby expropriating the former. However, in the context of private equity, much of this work has suffered from a lack of precision as to what exactly constitutes a private equity takeover. This is especially important since the consequences for employees are expected to depend on the type of private equity takeover in question. Private equity is a term frequently used to refer to two substantially different types of corporate investment (Wood and Wright, 2010). The first type is venture capital, which consists of early stage investment in firms that have not yet been floated on the stock market. This type of investment is typically combined with significant input by the venture capitalist in the firm's strategic direction. The broad consensus is that the effects of venture capital are typically positive (Wood and Wright, 2010). Conversely, the second type of investment, i.e. private equity itself, refers to the purchase by an investor, or the facilitation of the purchase, of a firm. Once the purchase has been completed, either new management is put in place or at least there is a change in management style in an attempt to enhance returns. Many of the initial studies, as Davis et al. (2011:1) note, conflated the two. Private equity takeovers of mature firms can themselves be divided into several sub-categories, although, once more, these are often conflated in the literature (Wood and Wright, 2009). Firstly, in the case of management buy outs (MBOs), the existing management team buys out external shareholders, supported by private equity. Secondly, in the case of management buy ins (MBIs), outside managers take over control, again supported by private equity (Wood and Wright, 2009). Finally, institutional buy outs (IBOs) involve private equity and other institutional investors; here managers do not hold any shares at all, unless this is part of their reward package (Renneboog et al., 2007).

Both Davis et al. (2011) and Wright et al. (2009) correctly note that recent criticisms of private equity tend to focus on the later stage buy outs rather than the involvement of venture capitalists at the early stage of an organization's life-cycle. However, a significant proportion of existing empirical work has ignored this distinction and presents results for very large numbers of private equity transactions dominated by management buy outs. This is problematic as it fails to recognize the heterogeneity of the expected employment consequences of such acquisitions and consequently presents findings that are unclear as to the precise impact of the most contentious element of private equity financing.

Notwithstanding the issues discussed above, there remains much controversy over the employment consequences of private equity takeovers and whether they are particularly likely to leave workers worse off. MBIs and IBOs normally bring about a change in management. Theoretically, Jensen (2007) argues that IBOs provide a solution to perceived agency problems and therefore serve to re-establish the link between the business and its owners, specifically the desire on the part of owners to maximize returns, promoting downsizing as an antidote to previous managerial empire building. Hence, there is a greater likelihood of breaches of implicit contracts that the incumbent management had with the workforce. Unlike incumbent managers, external managers are also expected to be less willing and able to cost intangible human assets, other than in terms of immediate salary and wage related expenses (c.f. Aoki, 2010). Such breaches are especially likely in IBOs compared to other types of private equity acquisitions.

In terms of empirical evidence, research on the employment consequences of MBOs suggests that the consequences may be beneficial, as managers may use their insider knowledge to force cooperative work arrangements with employees, leaving both parties better off (Wright et al., 2007). In contrast, the evidence surrounding MBIs and IBOs is more mixed. Amess and Wright (2007) note a small decline in employment following an MBI. Thornton (2007) finds that over the longer time employees of firms subject to MBIs face job losses and insecurity. Looking at a combination of types of private equity (PE) takeover, Amess and Wright, 2012 fail to find significant effects; Cressy et al. (2007) find that employment initially drops but then increases. Based on a panel of case studies, Froud et al. (2007) conclude that MBIs and IBOs reduce jobs and weaken organizational capabilities. Both Clark (2009) and Ernst et al. (2013) argue that, in the case of IBOs and MBIs, the new management team are expected to be incentivized to focus on immediate profits, a key source of which may be through the liquidation of assets, the usage of strategies such as outsourcing, and squeezing employees through cutting jobs, intensifying work, and forcing through less favourable conditions of employment. Clark (2013) finds that employees are generally less well off after MBIs and IBOs, with the firm being viewed by its new owners primarily as a vehicle for financial engineering, rather than something in its own right. In contrast, Wilson et al. (2012) find evidence of productivity improvements in private equity takeovers during the recent financial crisis, against a control group of firms that were not subject to such acquisitions. Based on US evidence, Davis et al. (2008) find an initial decline in jobs, but that this is not lasting. Davis et al. (2011) find that the effects on employment are limited, but with some unevenness in outcomes according to sector. Finally, it has been argued that IBOs typically saddle the acquired firm with significant levels of debt, which increases the risk in terms of exposure to interest rate movements and increases pressure to generate sufficient profits to meet interest commitments (Westcott, 2009), with obviously negative implications for employment.

In this study we seek to avoid the lack of precision found in earlier studies by focusing exclusively on the employment consequences of institutional buy outs (IBOs), as these are more likely to lend themselves to the type of negative employment consequences politicians and trade union representatives are most concerned about. We investigate whether the number of employees, employee productivity, wages and profitability are affected over an 11-year window around the year of acquisition. In total, we investigate 106 IBOs undertaken in the UK between 1997 and 2006. We also utilize two

control samples of non-acquired firms, the first matches each acquired firm in terms of size and industry while the second is matched in terms of prior profitability. Therefore, our study focuses on the types of private equity acquisition most likely to have negative consequences for employees and, as a result, is capable of providing greater empirical clarity to a highly contentious issue. The use of control samples means that we can more clearly distinguish between what happens according to ownership type rather than as a result of structural changes in specific industries or the economy at large.

This paper builds on an earlier pilot study conducted by the authors (Goergen et al., 2011). The present study benefits from three major methodological improvements. First, this study includes extensive regression analysis whereas there was no regression analysis in the pilot study. Second, this study also benefits from a second matched sample of firms that were not taken over, matched against acquired firms in terms of pre-event profitability. Barber and Lyon (1996) argue that the usual test statistics may not be well specified if samples exhibiting exceptionally good or bad pre-event operating profitability are compared with control samples not matched by pre-event profitability. Third, the present study also benefits from a much larger sample size of 106 private equity takeovers (compared to only 73 takeovers) and a longer period of study both in absolute terms (i.e. 1997–2006 compared to 2000–2006 only) and in relative terms (by tracking private equity targets over the 6 years before the takeover and the 4 years subsequent to it compared to only the 3 years preceding the takeover and the 3 years after it (i.e. year-6 to year 4 compared to year-3 to year 3)). Given these differences, the results from the current study are not only more robust, but also more detailed than those from the pilot study.[1]

The remainder of the paper is organized as follows. The next section explains the sample selection, the research methodology and introduces and justifies our variables. This is followed by our empirical analysis while our conclusions are presented in the final section.

## 2. Data and methodology

### 2.1. Sample selection

Our sample consists of private equity takeovers in the UK for the period 1997–2006. We start with the list of IBOs obtained from Thomson One Banker. The latter defines IBOs as "highly leveraged transaction[s] where one or more institutional investors act together to lead or initiate a buyout deal". In contrast, MBOs and MBIs are led by the incumbent management team and a new management team, respectively, and backed only by institutional investors. We then check whether all acquisitions are actual IBOs and exclude those that are not. We also include acquisitions that have been omitted by Thomson One Banker. These include 7 acquisitions that are classed as acquisitions made by so called strategic investors, which the database used to define as long-term investors in contrast to institutional investors that are assumed to have shorter investment horizons. Given that this distinction is debatable, we add these cases to our sample. We also include acquisitions by financial acquirers as *Thomson One Banker*'s definition of these acquisitions is equivalent to that of IBOs. We end up with a total of 106 acquisitions of UK listed firms completed during 1997 and 2006 (see Appendix A for a more detailed discussion of the sample selection process).

In order to assess the employment effects of IBOs, we aim to collect data for all the targets for the 6 years preceding the year of the acquisition and for the 4 years following that year.[2] Since our sample companies are all public companies, obtaining data on the firms prior to acquisition is typically straightforward. Nevertheless, in a number of cases we are unable to obtain a complete 6-year panel of prior data since some of our target companies were acquired relatively soon after becoming listed. So, as can be seen from Panel B of Table 1, the further back we go before the acquisition the further the number of targets for which we have a complete set of prior data is reduced. In what follows, we shall refer to the year of the acquisition as year 0. Years preceding the acquisition year are referred to as year-1, year-2, etc. and years following the acquisition are referred to as year 1, year 2, etc.

In order to study the employment effects of private equity takeovers we compare the sample with the target firms to two samples of matched non-acquired firms. The first sample of matched firms is obtained by matching each target firm with a non-acquired firm within the same industry sector, as evidenced by the same 3-digit SIC code, and with the closest turnover in the year of the acquisition (or the preceding year if the target firm does not report turnover for the acquisition year). Four of the target firms cannot be matched as their SIC code is not available from *Datastream*. For another five target firms there is no suitable firm with an identical 3-digit SIC code. The matched firm also has to survive for at least 2 years after the takeover year of the target firm it is matched with. We are able to match 95 of our PE takeover targets according to the latter criterion. An additional two PE takeover targets are matched by relaxing this criterion as the only suitable non-target firm survives for just 1 year after the acquisition year. This results in a total of 97 firms matched by industry and size.

The second sample of matched firms is obtained by matching each target firm with a non-target firm with identical pre-event profitability and survival up until at least the 2nd year. Our measure of pre-event profitability is earnings before

[1] In detail, we find a significant drop in employment in the acquired firms for both years 1 and 2 post-acquisition whereas in the pilot study we only found a significant drop for year 1; significantly lower wages in the acquired firms post-acquisition as compared to the two control samples whereas in the pilot study there were no such differences; significantly lower productivity as well as profitability before the acquisition, which persists post-acquisition when compared to the pre-event profitability matched firms whereas the pilot study did not find any such differences.

[2] We do not collect data for the year of the acquisition (i.e. year 0) since the acquisition itself tends to significantly distort the acquired firm's reporting pattern with many not publishing any financial statements for that year.

**Table 1**
Annual breakdown of private equity acquisitions and industry-and-size matched companies and performance-matched companies.

There are 106 sample companies. Each sample firm is matched with a control firm with the same 3-digit SIC code, which survives for at least year 2 and with the closest possible turnover in the year of the acquisition or the preceding year to form the first control sample. An alternative control sample is formed by matching each sample firm with a control firm which survives for at least year 2 and with the closest pre-event performance (EBIT/turnover). Panel A reports the annual breakdown of the sample firms in terms of the year of the completion of the acquisition as well as that of the two samples of control firms. Panel B reports the availability of data for the sample firms and the two control samples. Year 0 is the year when the acquisition was completed.

*Panel A: Annual breakdown of private equity acquisitions and industry-and-size matched companies and performance-matched companies*

| Year | | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No of companies | Sample companies | 2 | 15 | 16 | 9 | 2 | 4 | 11 | 7 | 14 | 26 |
| | Industry-and-size matched companies | 2 | 13 | 14 | 9 | 2 | 4 | 11 | 7 | 12 | 23 |
| | Performance matched companies | 2 | 15 | 16 | 9 | 2 | 4 | 10 | 7 | 14 | 26 |

Panel B: Availability of data for private equity acquisitions and industry-and-size matched companies and performance-matched companies for 6 years before and 4 years after the acquisition

| Year | | −6 | −5 | −4 | −3 | −2 | −1 | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No of companies | Sample companies | 79 | 86 | 93 | 98 | 105 | 103 | | 68 | 68 | 59 | 56 |
| | Industry-and-size matched companies | 73 | 80 | 86 | 89 | 91 | 90 | | 89 | 88 | 85 | 80 |
| | Performance matched companies | 85 | 89 | 96 | 96 | 102 | 103 | | 102 | 100 | 90 | 89 |

interest and tax (EBIT) divided by turnover in year-1 (or year-2 if data for year-1 are not available). Barber and Lyon (1996) argue that the usual test statistics are only well specified in the case of samples that perform either exceptionally well or exceptionally poorly if these firms are matched with firms of a similar pre-event profitability.[3] We are able to match 105 of our target firms with a non-target firm with identical pre-event profitability. For the 105 target firms that could be matched the average (median) difference in performance with their matched firm is 1.42% (0.03%). This suggests that the matching is of reasonable quality. The industry classification of our sample is based on the Fama and French 10 industry sectors (or portfolios).[4]

Panel A of Table 1 reports the distribution of the 106 acquisitions in terms of the year of the acquisition. There is a peak in the number of IBOs between 1998 and 2000, mirroring the peak in regular takeovers during the same period (see e.g. Martynova and Renneboog, 2006). Panel B shows the availability of data on the target firms and the two samples of matched firms across time relative to the takeover year, i.e. year 0. As the targets of private equity takeovers are typically delisted from the stock exchange and become private companies, it is not always straightforward to identify and/or trace the private firm. Nevertheless, the Companies House register and the FAME database enable us to locate data for years 1 and 2 following the takeover year for 68 firms and for years 3 and 4 for 59 firms and 56 firms, respectively. Unfortunately, despite being able to locate the financial accounts for a small number of companies, their operation and size were so different compared to the pre-acquisition period that we decided to exclude these companies from the sample.

### 2.2. Methodology

Our main research question is whether targets of takeovers by private equity investors experience decreases in the number of employees while adjusting for differences in employee-related expenses and differences in productivity. We follow Conyon et al. (2001, 2002) approach. Conyon et al. use the same set-up as in Nickell (1984). This consists of firms that have quadratic cost functions, Cobb–Douglas technologies as well as output constraints and that are price takers in the markets for production factors (see also Bresson et al. (1996)). Firms will then minimize their costs subject to their output constraints. Assuming profit maximization and rational expectations, firms will then use quantities of labour and capital such that the marginal revenue from labour equals the wage rate and the marginal revenue from capital equals the user cost of capital. One can then derive a demand for labour function which depends on the expected quantity of output and the ratio of the expected wage rate to the expected user cost of capital. Once this is re-expressed in terms of the observed variables, one obtains the following general adjustment model or demand for employment for firm $i$:

$$L_{it} = \alpha L_{i,t-1} + \beta_1 W_{it} + \beta_2 W_{i,t-1} + \delta_1 Q_{it} + \delta_2 Q_{i,t-1} + \gamma_i + \eta_t + \varepsilon_{it} \quad (1)$$

[3] In the pilot study, we followed the approach by Smart and Waldfogel (1994) which consists of calculating the difference in abnormal profits between the target firms and the control sample. These abnormal profits are defined as the difference between the actual change in profitability and the change in profitability as predicted by financial analysts in the year before the acquisition announcement. While this difference-in-surprises approach overcomes the problem of wrongfully attributing changes in profitability to the acquisition when in actual fact these changes would have happened anyway, this approach is very demanding in terms of data as it requires earnings forecasts made in the year preceding the acquisition for both the target firm and the control firm.

[4] The definition of the industry sectors can be found at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_10_ind_port.html.

where the natural logarithm of the number of employees is $L_{it}$; the natural logarithm of real wages is $w_{it}$ (in relative terms to the cost of capital to the user) and the natural logarithm of real output over value added is $Q_{it}$. $\gamma_i$ is unobserved fixed, firm-specific effects; $\eta_t$ is time-specific effects; and $\varepsilon_{it}$ is an error term. Real turnover (following Conyon et al. (2001)) serves as an approximation for real output, as the latter is not commonly reported in company accounts.[5] Given the difficulties with estimating this user cost of capital across firms, in line with Conyon et al. (2001) and most of the literature on the demand for labour (see e.g. Hijzen and Swaim (2010)), for each firm we set the user cost of capital equal to one.[6] We normalize all right-hand side variables by dividing them with the average number of employees for the same year.

We augment the above labour demand model by three dummy variables to capture the potential effect of IBOs on employment. The first dummy variable is Target firm. This dummy is set to one if the observation relates to a target firm, and zero otherwise. This dummy measures whether there is a long-run trend in employment in the target firms independent of the takeover. The second dummy variable is Post-takeover. This dummy is set to one for the post-takeover years for both the target firms and their matched firms, and zero otherwise. In other words, this dummy equals one for all firm-year observations relating to years 1–4, independent of whether they relate to target firms or control firms. This dummy measures a possible industry- or market-wide trend in employment during years 1–4. Finally, the third dummy is Post-takeover ∗ Target firm. This dummy is the interaction of the previous two dummies. It captures a possible employment effect which is limited to the target firms in the post-takeover period. If this dummy is negative and significant, this suggests that there is a reduction in employment in the target firms after their takeover which is absent in the control firms.

The labour demand model is estimated using three different estimation techniques. These are ordinary least squares (OLS), fixed-effects or within-groups OLS (WG) and the generalized method of moments as a system (System GMM). All three estimation techniques allow for unbalanced panels, i.e. panels where the number of annual observations varies across firms. OLS suffers from possible omitted-variable bias. In addition, alpha, the coefficient on the lagged dependent variable, is likely to be upward biased under OLS as the lagged dependent variable on the right-hand side will be correlated with the error term $\gamma_i$ which will contain the omitted variable(s). Under WG, the time mean is differenced away from each variable which results in time-invariant $\gamma_i$ being differenced away from the above equation. However, as a result of this transformation, the transformed $\eta_t$ will be correlated with the lagged dependent variable (via $\eta_{t-1}$) which is likely to cause alpha to be downward biased, especially – as in our case – when the number of periods in the panel is small. Hence, both OLS and WG suffer from a biased alpha, but the bias being in opposite directions. Blundell and Bond's (1998) generalized method of moments as a system of first-differenced equations (with the lags of the dependent variable and the independent variables as instrumental variables) and the equations in levels (with the first differences of the variables as instruments)[7] addresses the omitted variable bias.[8] Effectively, this makes System GMM a hybrid regression technique which should generate an estimated value of alpha lying somewhere between the OLS estimate (which tends to be upward biased) and the WG estimate (which tends to be downward biased). However, before we discuss the results from the estimation of the labour demand model, we report the descriptive statistics for all the variables included in the model.

## 3. Empirical analysis

This section starts with the univariate analysis of the variables included in the labour demand model as well as two additional variables which are EBIT over turnover and EBIT over employees. These two additional variables are profitability ratios. As the above labour demand equation does not include a measure of profitability, but low profitability may be a reason why a firm is targeted by private equity investors, it is important to examine such measures and to compare the target firms' profitability with that of the control firms.[9] The remainder of the section focuses on the regression analysis.

### 3.1. Univariate analysis

All the tables on the univariate results (i.e. Tables 2–4) are laid out in the same way. Panel A contains the actual descriptive statistics (the mean, the median and the number of observations) for the sample of the targets as well as the two

[5] Nickell et al. (1992) discuss the validity of this proxy.

[6] Hijzen and Swaim (2010) suggest another reason for treating the cost of capital as a constant. Keeping the cost of capital constant reduces the risk of mistaking shifts in the labour demand function for changes in the slope of the demand function.

[7] Using Monte-Carlo simulations, Blundell and Bond (1998) found that the simple version of the generalized method of moments consisting of first-differencing the equation to be estimated and then using the lagged levels of the dependent variable as well as the lagged levels of the independent variables as instruments (see Arellano and Bond (1991)) does not perform well in two situations. The first situation amounts to the coefficient on the lagged dependent variable being close to unity (this seems to be the case for our data as the estimated coefficient on the lagged dependent variable is close to one across the three estimation techniques). The second one consists of the variance of the fixed effects $\gamma_i$ being large. In these situations, System GMM has been shown to perform better. There is a further reason why it makes sense to use System GMM in our context. Indeed, one of our explanatory variables is time invariant and would thus be differenced away under first-differences GMM.

[8] The first set of regressions is regressions in first differences and the instruments are the (lagged) levels of the dependent and independent variables. As the instruments are in the form of lags and are not first-differenced, they include the industry dummies. However, the regressions themselves do not include the industry dummies. The second set of regressions is regressions in levels and the instruments are the first differences of the dependent and independent variables. In contrast to the first set of regressions, the set of instruments does not include the industry dummies whereas the regressions include these dummies.

[9] Later on in the regression analysis, we augment the labour demand model by EBIT over turnover, the inverse of turnover and the industry dummies, all three of which are used to select the control variables. We are grateful to an anonymous referee for this suggestion.

**Table 2**
Employment growth.

Employment growth is measured by the growth rate in the number of employees, i.e. the percentage growth rate in the average annual number of employees. Panel A reports descriptive statistics for the sample companies, the industry-and-size matched companies and the performance matched companies. Panel B reports tests for the differences in means (medians) between each year and the subsequent year for the sample companies, the industry-and-size matched companies and the performance matched companies, respectively. Panels C and D contain for each year the tests for the differences in means (medians) between the sample companies and the industry-and-size matched companies and the differences in means (medians) between the sample companies and the performance matched companies, respectively. The numbers in italic in Panels C and D are the tests for the differences in means (medians) based on paired observations. The asterisks indicate a 1% (***), 5% (**) and 10% (*) level of statistical significance.

***Panel A: Descriptive statistics***

| | | Year -6 | Year -5 | Year -4 | Year -3 | Year -2 | Year -1 | Year 1 | Year 2 | Year 3 | Year 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample companies | Mean | | 36.71 | 15.40 | 11.59 | 12.58 | 9.77 | −1.69 | −0.94 | 0.44 | −3.74 |
| | Median | | 10.81 | 6.11 | 3.05 | 2.97 | 4.04 | −4.80 | 0.25 | 0.59 | −1.16 |
| Industry-and-size matched companies | Mean | | 9.92 | 10.95 | 16.93 | 28.17 | 31.31 | 19.29 | 4.86 | −0.68 | −3.92 |
| | Median | | 5.17 | 4.32 | 4.12 | 0.00 | 2.17 | 2.45 | 0.63 | −1.44 | −1.95 |
| Performance matched companies | Mean | | 17.30 | 12.90 | 12.83 | 572.96 | 7.07 | 28.56 | 4.30 | 1.88 | 1.71 |
| | Median | | 2.77 | 3.35 | 4.84 | 3.03 | 4.69 | 8.93 | 2.19 | −1.16 | 0.73 |
| Observations | Sample companies | | 79 | 86 | 93 | 98 | 102 | 67 | 64 | 58 | 56 |
| | Industry-and-size matched companies | | 72 | 80 | 86 | 89 | 89 | 88 | 87 | 85 | 79 |
| | Performance matched companies | | 85 | 89 | 92 | 96 | 102 | 102 | 100 | 90 | 87 |

***Panel B: Test statistics for differences in means and differences in medians between years for a given sample***

| | | Difference between year -5 and year -4 | Difference between year -4 and year -3 | Difference between year -3 and year -2 | Difference between year -2 and year -1 | Difference between year -1 and year 1 | Difference between year 1 and year 2 | Difference between year 2 and year 3 | Difference between year 3 and year 4 |
|---|---|---|---|---|---|---|---|---|---|
| Sample companies | *t*-Test for differences in means | 1.753* | 0.650 | −0.172 | 0.589 | 2.071** | −0.128 | −0.447 | 1.431 |
| | Wilcoxon test for differences in medians | 1.385 | 1.140 | −0.348 | 0.075 | 2.860*** | −1.326 | 0.026 | 0.856 |
| Industry-and-size matched companies | *t*-Test for differences in means | −0.255 | −0.613 | −0.649 | −0.146 | 0.723 | 2.410** | 1. 920* | 1.062 |
| | Wilcoxon test for differences in medians | 0.410 | 0.074 | 0.894 | −0.516 | −0.019 | 0.779 | 2.170** | 0.543 |
| Performance matched companies | *t*-Test for differences in means | 0.536 | 0.011 | −0.971 | 1.033 | −2.600*** | 2.936*** | 0.811 | 0.045 |
| | Wilcoxon test for differences in medians | −0.288 | −0.620 | 0.639 | −0.045 | −1.758** | 2.474*** | 0.692 | 0.158 |

***Panel C: Test statistics for differences in means and differences in medians between sample companies and industry-and-size matched companies***

| | Year -5 | Year -4 | Year -3 | Year -2 | Year -1 | Year 1 | Year 2 | Year 3 | Year 4 |
|---|---|---|---|---|---|---|---|---|---|
| *t*-Test for differences in means | 2.108** | 0.867 | −0.553 | −1.071 | −1.446 | −2.696*** | −1.722* | 0.427 | 0.051 |
| | *2.301*** | *1.355* | *−0.510* | *−1.117* | *−1.545* | *−3.084**** | *−1.416** | *0.752* | *0.904* |
| Wilcoxon test for differences in medians | 1.501 | 0.656 | −0.450 | 0.668 | 0.104 | −2.760*** | −1.101 | 1.061 | 0.518 |
| | *2.551*** | *0.956* | *−0.400* | *0.197* | *−0.967* | *−2.949**** | *−2.040*** | *1.054* | *1.250* |

***Panel D: Test statistics for differences in means and differences in medians between sample companies and performance matched companies***

| | Year -5 | Year -4 | Year -3 | Year -2 | Year -1 | Year 1 | Year 2 | Year 3 | Year 4 |
|---|---|---|---|---|---|---|---|---|---|
| *t*-Test for differences in means | 1.407 | 0.450 | −0.178 | −1.003 | 0.743 | −2.824*** | −1.719* | −0.440 | −1.335 |
| | *1.225* | *0.665* | *−0.463* | *−0.998* | *0.339* | *−2.940**** | *−1.233* | *−1.206* | *−0.440* |
| Wilcoxon test for differences in medians | 2.559** | 1.121 | −0.601 | 0.068 | 0.056 | −3.720*** | −1.246 | −0.436 | −1.195 |
| | *2.160*** | *1.139* | *−0.616* | *−0.304* | *−0.090* | *−2.774**** | *−0.772* | *−1.355* | *−1.022* |

**Table 3**
Wages over employees.

Wages are total wages and salaries in £000s. Employees are the annual average number of employees. Panel A reports descriptive statistics for the sample companies, the industry-and-size matched companies and the performance matched companies. Panel B reports tests for the differences in means (medians) between each year and the subsequent year for the sample companies, the industry-and-size matched companies and the performance matched companies, respectively. Panels C and D contain for each year the tests for the differences in means (medians) between the sample companies and the industry-and-size matched companies and the differences in means (medians) between the sample companies and the performance matched companies, respectively. The numbers in italic in Panels C and D are the tests for the differences in means (medians) based on paired observations. The asterisks indicate a 1% (***), 5% (**) and 10% (*) level of statistical significance.

***Panel A: Descriptive statistics***

| | | Year -6 | Year -5 | Year -4 | Year -3 | Year -2 | Year -1 | Year 1 | Year 2 | Year 3 | Year 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample companies | Mean | 20.35 | 21.90 | 24.60 | 25.78 | 27.61 | 29.46 | 28.52 | 30.87 | 31.00 | 34.01 |
| | Median | 15.63 | 16.46 | 18.98 | 20.03 | 20.40 | 21.55 | 22.61 | 25.87 | 24.81 | 28.07 |
| Industry-and-size matched companies | Mean | 23.28 | 24.77 | 26.54 | 29.95 | 30.80 | 30.17 | 38.43 | 41.11 | 44.17 | 44.21 |
| | Median | 17.50 | 17.70 | 19.11 | 20.13 | 21.75 | 22.43 | 25.88 | 27.73 | 29.55 | 33.31 |
| Performance matched companies | Mean | 21.05 | 22.38 | 22.99 | 26.27 | 28.51 | 30.89 | 33.81 | 37.15 | 39.23 | 42.86 |
| | Median | 18.15 | 18.33 | 18.97 | 20.11 | 21.75 | 23.17 | 25.93 | 26.83 | 29.75 | 31.04 |
| Observations | Sample companies | 79 | 86 | 93 | 98 | 105 | 103 | 68 | 68 | 59 | 56 |
| | Industry-and-size matched companies | 72 | 80 | 86 | 89 | 91 | 89 | 89 | 88 | 85 | 81 |
| | Performance matched companies | 85 | 89 | 96 | 96 | 102 | 103 | 102 | 100 | 89 | 89 |

***Panel B: Test statistics for differences in means and differences in medians between years for a given sample***

| | | Difference between year -6 and year -5 | Difference between year -5 and year -4 | Difference between year -4 and year -3 | Difference between year -3 and year -2 | Difference between year -2 and year -1 | Difference between year -1 and year 1 | Difference between year 1 and year 2 | Difference between year 2 and year 3 | Difference between year 3 and year 4 |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample companies | *t*-Test for differences in means | −0.646 | −1.002 | −0.435 | −0.641 | −0.552 | 0.253 | −0.728 | −0.040 | −0.879 |
| | Wilcoxon test for differences in medians | −0.548 | −1.227 | −0.699 | −0.543 | −0.483 | −0.319 | −1.319 | −0.242 | −0.979 |
| Industry-and-size matched companies | *t*-Test for differences in means | −0.421 | −0.444 | −0.669 | −0.155 | 0.141 | −1.242 | −0.325 | −0.371 | −0.005 |
| | Wilcoxon test for differences in medians | −0.478 | −0.441 | −0.819 | −0.658 | −0.432 | −1.394 | −1.014 | −0.627 | −0.880 |
| Performance matched companies | *t*-Test for differences in means | −0.653 | −0.282 | −1.206 | −0.666 | −0.641 | −0.745 | −0.760 | −0.436 | −0.663 |
| | Wilcoxon test for differences in medians | −0.492 | −0.374 | −0.829 | −1.079 | −0.798 | −1.248 | −0.908 | −1.004 | −0.714 |

***Panel C: Test statistics for differences in means and differences in medians between sample companies and industry-and-size matched companies***

| | Year -6 | Year -5 | Year -4 | Year -3 | Year -2 | Year -1 | Year 1 | Year 2 | Year 3 | Year 4 |
|---|---|---|---|---|---|---|---|---|---|---|
| t-test for differences in means | −1.017 | −0.943 | −0.542 | −0.959 | −0.771 | −0.199 | −1.343 | −1.567 | −1.717* | −1.991** |
| | *−0.679* | *−0.804* | *−0.377* | *−0.818* | *−0.622* | *−0.045* | *−0.499* | *−1.330* | *−1.256* | *−1.495* |
| Wilcoxon test for differences in medians | −0.998 | −0.188 | −0.446 | −0.393 | −0.577 | −0.525 | −1.431 | −1.244 | −1.497 | −1.528 |
| | *−0.559* | *−0.635* | *−0.021* | *−0.673* | *−0.301* | *−0.512* | *−0.383* | *−0.905* | *−0.360* | *−0.806* |

***Panel D: Test statistics for differences in means and differences in medians between sample companies and performance matched companies***

| | Year -6 | Year -5 | Year -4 | Year -3 | Year -2 | Year -1 | Year 1 | Year 2 | Year 3 | Year 4 |
|---|---|---|---|---|---|---|---|---|---|---|
| *t*-Test for differences in means | −0.344 | −0.207 | 0.638 | −0.168 | −0.277 | −0.376 | −1.345 | −1.392 | −1.831* | −1.513 |
| | *−0.165* | *0.084* | *0.187* | *−0.620* | *−0.850* | *−0.760* | *−1.390* | *−1.720** | *−2.462*** | *−2.064*** |
| Wilcoxon test for differences in medians | −1.130 | −1.042 | 0.021 | −0.056 | −0.531 | −0.845 | −1.422 | −0.921 | −1.651* | −1.186 |
| | *−0.467* | *−0.315* | *0.068* | *−0.154* | *−1.072* | *−1.062* | *−1.383* | *−1.725** | *−2.544*** | *−2.265*** |

**Table 4**
Turnover over Employees.

Turnover is company turnover in £000s. Employees is the annual average number of employees. Panel A reports descriptive statistics for the sample companies, the industry-and-size matched companies and the performance matched companies. Panel B reports tests for the differences in means (medians) between each year and the following year for the sample companies, the industry-and-size matched companies and the performance matched companies, respectively. Panels C and D contain for each year the tests for the differences in means (medians) between the sample companies and the industry-and-size matched companies and the differences in means (medians) between the sample companies and the performance matched companies, respectively. The numbers in italic in Panels C and D are the tests for the differences in means (medians) based on paired observations. The asterisks indicate a 1% (***), 5% (**) and 10% (*) level of statistical significance.

***Panel A: Descriptive statistics***

| | | *Year -6* | *Year -5* | *Year -4* | *Year -3* | *Year -2* | *Year -1* | *Year 1* | *Year 2* | *Year 3* | *Year 4* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample companies | Mean | 94.47 | 104.54 | 120.75 | 120.17 | 126.06 | 130.82 | 134.64 | 153.64 | 155.73 | 173.18 |
| | Median | 59.58 | 59.32 | 65.82 | 71.43 | 75.82 | 78.39 | 91.84 | 101.58 | 100.03 | 103.26 |
| Industry-and-size matched companies | Mean | 243.40 | 226.75 | 230.42 | 248.49 | 281.55 | 241.41 | 231.34 | 275.56 | 267.93 | 276.95 |
| | Median | 72.07 | 78.99 | 84.21 | 82.32 | 91.59 | 99.91 | 106.67 | 122.51 | 119.35 | 130.15 |
| Performance matched companies | Mean | 123.89 | 119.80 | 115.45 | 117.52 | 146.10 | 161.22 | 181.82 | 219.27 | 238.66 | 252.14 |
| | Median | 85.36 | 91.52 | 89.50 | 89.66 | 93.20 | 101.77 | 110.96 | 112.16 | 136.74 | 143.25 |
| Observations | Sample Companies | 79 | 85 | 92 | 98 | 105 | 103 | 67 | 68 | 59 | 56 |
| | Industry-and-size matched companies | 72 | 80 | 86 | 89 | 91 | 89 | 89 | 88 | 85 | 81 |
| | Performance matched companies | 85 | 89 | 96 | 96 | 102 | 103 | 102 | 100 | 90 | 89 |

***Panel B: Test statistics for differences in means and differences in medians between years for a given sample***

| | | *Difference between year -6 and year -5* | *Difference between year -5 and year -4* | *Difference between year -4 and year -3* | *Difference between year -3 and year -2* | *Difference between year -2 and year -1* | *Difference between year -1 and year 1* | *Difference between year 1 and year 2* | *Difference between year 2 and year 3* | *Difference between year 3 and year 4* |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample companies | *t*-Test for differences in means | −0.503 | −0.624 | 0.021 | −0.226 | −0.173 | −0.135 | −0.740 | −0.074 | −0.565 |
| | Wilcoxon test for differences in medians | −0.499 | −0.693 | −0.599 | −0.772 | −0.596 | −0.719 | −1.206 | −0.174 | −0.353 |
| Industry-and-size matched companies | *t*-Test for differences in means | 0.138 | −0.038 | −0.173 | −0.275 | 0.351 | 0.115 | −0.486 | 0.074 | −0.098 |
| | Wilcoxon test for differences in medians | −0.566 | −0.412 | −0.424 | −0.821 | −0.275 | −0.669 | −1.011 | −0.220 | −0.657 |
| Performance matched companies | *t*-Test for differences in means | 0.229 | 0.340 | −0.172 | −1.640 | −0.604 | −0.623 | −0.871 | −0.399 | −0.277 |
| | Wilcoxon test for differences in medians | −0.802 | −0.033 | −0.086 | −1.122 | −0.459 | −0.718 | −0.850 | −1.181 | −0.704 |

***Panel C: Test statistics for differences in means and differences in medians between sample companies and industry-and-size matched companies***

| | *Year -6* | *Year -5* | *Year -4* | *Year -3* | *Year -2* | *Year -1* | *Year 1* | *Year 2* | *Year 3* | *Year 4* |
|---|---|---|---|---|---|---|---|---|---|---|
| *t*-Test for differences in means | −1.504 | −1.866* | −1.530 | −1.738* | −1.772* | −1.726* | −1.431 | −1.478 | −1.233 | −1.603 |
| | *−1.413* | *−1.759** | *−1.332* | *1.414* | *−1.560* | *−1.555* | *−0.379* | *−1.117* | *−0.867* | *−0.964* |
| Wilcoxon test for differences in medians | −1.289 | −1.441 | −1.252 | −1.201 | −1.519 | −1.382 | −1.176 | −1.033 | −1.046 | −1.184 |
| | *−1.547* | *−1.993** | *−1.683** | *−1.133* | *−1.971*** | *−1.858** | *−0.293* | *−0.726* | *−0.476* | *−0.606* |

***Panel D: Test statistics for differences in means and differences in medians between sample companies and performance matched companies***

| | *Year -6* | *Year -5* | *Year -4* | *Year -3* | *Year -2* | *Year -1* | *Year 1* | *Year 2* | *Year 3* | *Year 4* |
|---|---|---|---|---|---|---|---|---|---|---|
| *t*-Test for differences in means | −1.463 | −0.860 | 0.240 | 0.132 | −0.836 | −1.068 | −1.349 | −1.471 | −1.825* | −1.667* |
| | *−1.562* | *−1.554* | *−1.426* | *−1.662* | *−2.240*** | *−2.080*** | *−1.453* | *−1.956** | *−2.108*** | *−2.104*** |
| Wilcoxon test for differences in medians | −2.555** | −2.795*** | −2.373** | −1.783* | −2.337** | −2.301** | −1.761* | −1.409 | −2.143** | −2.209** |
| | *−1.872** | *−2.361*** | *−2.465*** | *−3.012**** | *−3.267**** | *−3.308**** | *−2.277*** | *−2.494*** | *−3.139**** | *−3.164**** |

samples of control firms. Panel B investigates whether there are any significant changes in the variable of interest over time for each of the three samples by conducting both *t*-tests for differences in means and a non-parametric Wilcoxon test for differences in medians. Finally, Panels C and D investigate whether there are significant differences for each given year between the sample firms on one side and the industry-and-size matched firms and the performance matched firms, respectively, on the other side. As stated in the methodology section, all of the monetary amounts are expressed in real terms, with a base year of 2003.

Table 2 is on employment growth. Panel A suggests that there is a decrease in employment as reflected by negative average (median) growth rates in the target firms in years 1, 2 and 4 (1 and 4) after the acquisition. A decrease in the average and median employment growth rate can also be observed for years 3 and 4 for the industry-and-size matched firms, suggesting that there is an industry-wide reduction in employment, maybe as a reaction to the reduction in employment in the target firms. However, apart from the median growth rate in year 3, the growth rates for the performance matched firms are always positive. Panel B shows that the drop in employment in year 1 in the target firms is statistically significant. In contrast, the negative average (median) growth rates that are observed for the industry-and-size matched firms in years 3 and 4 and for the performance matched firms in year 3 are not statistically significant drops, except for the industry-and-size matched firms for year 3. When the target firms are compared to the industry-and-size matched firms (Panel C) and the profitability matched firms (Panel D), employment growth is significantly lower in the former in years 1 and 2. All of the *t*-tests for the differences in means and the non-parametric tests for the differences in medians are significant at the one per cent level for year 1. In addition, some of the test statistics are also significant in year 2 at the 10 per cent level or better. To sum up, Table 2 suggests that there is a significant decline in employment in the target firms after the acquisition which is not observed in either sample of control firms.

Table 3 reports the descriptive statistics for wages over employees. For virtually the entire 11-year period (see Panel A), average as well as median wages are the lowest in the target firms as compared to the industry-and-size matched firms and the profitability matched firms. Further, Panel B does not suggest that there are any significant changes over time for the target firms and the control firms. When the target firms are compared to the two samples of control firms (see Panels C and D) there is some evidence that wages are significantly lower in the former than in the latter after the takeover. Hence, while there is no evidence of employees of the target firms earning wages above the market rate before the takeover, there is some evidence that their wages fall below the market rate during the years following the takeover.

Panel A of Table 4 shows that (real) turnover over employees, our proxy for (real) output or productivity, tends to be lower for the sample firms for most of the period when compared to the control firms. Surprisingly however, Panel B does not suggest any significant trends over time such as an improvement in the productivity of the sample firms post-takeover. Finally, Panels C and D suggest that the lower productivity for the sample firms observed in Panel A is statistically significant. Interestingly, the lower productivity of the sample firms disappears post-takeover when these are compared to the industry-and-size matched firms (albeit initial differences were less pronounced) whereas it remains when these are compared to the profitability matched firms (where differences in productivity pre-takeover were much more pronounced). This suggests that private equity houses are not able to improve the relatively low productivity of their target firms after the takeover.

EBIT over turnover is one of the two profitability variables covered by the univariate study, but not included in the labour demand model. The descriptive statistics are not reported in tabular form due to space constraints. The average for EBIT over turnover is highly volatile for the sample firms and the profitability matched firms, but somewhat less so for the industry-and-size matched firms. However, the median profitability ratio is much less volatile over time. Comparing the median profitability ratio across the sample firms and control firms suggests that the former do not perform any worse than the latter. Further, there is no evidence suggesting any significant trends in the profitability ratio for any of the three samples. Although there is some evidence for years -6 and -5 that the sample firms performed worse than the industry-and-size matched firms, there is no such evidence of underperformance for the remaining years of the period of study. Finally, there is no evidence either that the target firms perform differently from the profitability matched firms after the takeover.

EBIT over employees is the other variable not included in the labour demand model. Again, the descriptive statistics are not reported in tabular form due to space constraints. Similar to EBIT over turnover, the average for the ratio of EBIT over employees is highly volatile, making it problematic to infer any patterns over time and across samples. However, the median profitability ratio is much less volatile. Further, the numbers suggest that the target firms underperform compared to the two samples of control firms, but that this underperformance disappears in years 3 and 4. When compared to the industry-and-size matched sample, the profitability of the target firms is significantly lower over most of the period ranging from year -6 to year 1. However after year 1, there are no longer significant differences in profitability between the two samples. In contrast, when the target firms are compared to the profitability matched firms (these were matched by EBIT over turnover) the underperformance of the target firms persists across the entire period of study ranging from year -6 to year 4. Hence, it would be wrong to state that there is strong, consistent evidence that the relative profitability of the target firms improves after the takeover.

### *3.2. Regression analysis*

Table 5 reports the results from the estimation of the labour demand model. As stated in the methodology section, the model is estimated using three different estimation techniques which are OLS in levels, WG (fixed effects) regressions and

**Table 5**
Labour demand model.

This table reports the results from estimating the labour demand model on all the available observations (sample companies, size-and-industry matched companies and performance matched companies). Log (Employees$_t$) is the natural logarithm of the average annual number of employees for year t. Log(Wages over Employees$_t$) is the natural logarithm of wages (total wages and salaries in £000s) over the annual average number of employees for year t. Log(Turnover over Employees$_t$) is the natural logarithm of company turnover in £000s over the annual average number of employees for year t. All monetary amounts are expressed in real terms, with a base year of 2003. Post-takeover dummy is set to one if year t is a post-acquisition year, and zero otherwise. For the control companies, Post-takeover dummy is also set to one for the calendar years following the acquisition of the equivalent sample firm. Target firm dummy is set to one if the firm is a target firm, and zero otherwise. Post-takeover * target firm dummy is the interaction of the Post-takeover dummy and the Target firm dummy. This interaction is one for the post-acquisition years of the target companies, and zero otherwise. The values in parentheses are the *p*-values. $m_1$ and $m_2$ are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as $N(0,1)$ under the null of no serial correlation. The Sargan statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ with $k$ degrees of freedom under the null of valid instruments. While the Sargan statistic is not robust to heteroskedasticity and autocorrelation, it is not weakened by many instruments. Hence, the Hansen test which is robust, but weakened by many instruments, is also reported. All System GMM regressions use instruments in levels dated t-3 to t-5 for the equations in first differences and first-differenced instruments dated t-2 for the equations in levels. The industry dummies in regressions (8) to (13) are based on the Fama and French 10 industry sectors.

| Variable | OLS (1) | OLS (2) | OLS (3) | WG (4) | System GMM (5) | System GMM (6) | System GMM (7) | OLS (8) | OLS (9) | OLS (10) | System GMM (11) | System GMM (12) | System GMM (13) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| log(Employees $_{t-1}$) | 0.962 | 0.961 | 0.962 | 0.773 | 0.984 | 0.997 | 0.973 | 0.554 | 0.556 | 0.556 | 0.151 | 0.159 | 0.165 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.007) | (0.009) | (0.004) |
| log(Wages over Employees$_t$) | −0.449 | −0.452 | −0.452 | −0.377 | −0.400 | −0.621 | −0.466 | −0.208 | −0.211 | −0.212 | 0.071 | 0.064 | 0.067 |
| | (0.013) | (0.013) | (0.013) | (0.073) | (0.040) | (0.002) | (0.016) | (0.081) | (0.077) | (0.077) | (0.730) | (0.754) | (0.749) |
| log(Wages over Employees$_{t-1}$) | 0.381 | 0.383 | 0.382 | 0.277 | 0.306 | 0.455 | 0.311 | 0.172 | 0.172 | 0.174 | −0.022 | −0.027 | −0.013 |
| | (0.033) | (0.032) | (0.033) | (0.043) | (0.121) | (0.048) | (0.126) | (0.125) | (0.125) | (0.122) | (0.855) | (0.835) | (0.917) |
| log(Turnover over Employees$_t$) | −0.319 | −0.318 | −0.318 | −0.381 | −0.238 | −0.162 | −0.178 | −0.698 | −0.695 | −0.695 | −0.786 | −0.760 | −0.749 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.047) | (0.174) | (0.110) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| log(Turnover over Employees$_{t-1}$) | 0.326 | 0.325 | 0.326 | 0.222 | 0.207 | 0.146 | 0.179 | 0.276 | 0.277 | 0.276 | 0.053 | 0.048 | 0.042 |
| | (0.000) | (0.000) | (0.000) | (0.001) | (0.059) | (0.181) | (0.090) | (0.000) | (0.000) | (0.000) | (0.555) | (0.596) | (0.639) |
| 1/log(Turnover$_t$) | – | – | – | – | – | – | – | −56.517 | −56.295 | −56.298 | −100.514 | −97.850 | −97.505 |
| | | | | | | | | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Log(Profit over Turnover$_t$) | – | – | – | – | – | – | – | 0.011 | 0.010 | 0.011 | 0.032 | 0.024 | 0.027 |
| | | | | | | | | (0.202) | (0.252) | (0.201) | (0.342) | (0.487) | (0.444) |
| Post-takeover dummy$_t$ | −0.043 | – | -0.010 | 0.025 | −0.069 | – | −0.036 | −0.005 | – | 0.020 | 0.035 | – | 0.057 |
| | (0.051) | | (0.666) | (0.449) | (0.444) | | (0.685) | (0.742) | | (0.249) | (0.407) | | (0.202) |
| Target firm dummy | −0.018 | – | 0.026 | – | −0.136 | – | 0.056 | −0.038 | – | −0.005 | −0.019 | – | 0.021 |
| | (0.311) | | (0.205) | | (0.159) | | (0.178) | (0.027) | | (0.804) | (0.916) | | (0.907) |
| Post takeover$_t$ * target firm dummy$_t$ | – | −0.099 | −0.118 | −0.146 | – | −0.126 | −0.151 | – | −0.089 | −0.092 | – | −0.071 | −0.082 |
| | | (0.000) | (0.000) | (0.000) | | (0.007) | (0.001) | | (0.000) | (0.000) | | (0.034) | (0.010) |
| Year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry dummies | No | No | No | No | No | No | No | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.973 | 0.973 | 0.973 | – | – | – | – | 0.986 | 0.986 | 0.986 | – | – | – |
| F-test (*p*-value) | 2220.85 | 2285.16 | 2130.36 | 134.27 | – | – | – | 920.50 | 940.68 | 927.90 | – | – | – |
| | (0.000) | (0.000) | (0.000) | (0.000) | | | | (0.000) | (0.000) | (0.000) | | | |
| $m_1$ (*p*-value) | 5.99 | 6.05 | 6.05 | 0.236 | −2.77 | −2.62 | −2.95 | 8.07 | 8.04 | 8.02 | −0.05 | −0.43 | -0.24 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.001) | (0.009) | (0.003) | (0.000) | (0.000) | (0.000) | (0.957) | (0.666) | (0.813) |
| $m_2$ (*p*-value) | 4.15 | 4.09 | 4.07 | 0.095 | 0.07 | 0.12 | 0.17 | 7.17 | 7.15 | 7.08 | −0.36 | −0.36 | −0.51 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.942) | (0.901) | (0.866) | (0.000) | (0.000) | (0.000) | (0.716) | (0.719) | (0.610) |
| Sargan test (*p*-value) | – | – | – | – | 152.50 | 47.18 | 133.91 | – | – | – | 349.21 | 339.04 | 331.61 |
| | | | | | (0.000) | (0.733) | (0.000) | | | | (0.000) | (0.000) | (0.000) |
| Hansen test (*p*-value) | – | – | – | – | 85.88 | 48.92 | 71.75 | – | – | – | 108.90 | 108.00 | 106.64 |
| | | | | | (0.016) | (0.670) | (0.142) | | | | (0.642) | (0.689) | (0.675) |
| No. of observations | 2295 | 2295 | 2295 | 2295 | 2295 | 2295 | 2295 | 1873 | 1873 | 1873 | 1873 | 1873 | 1873 |

System GMM. Regressions (1)–(7) exclude industry dummies whereas regressions (8)–(13) include industry dummies based on the Fama and French 10 industry sectors as well as the two other selection variables for the control firms. As a reminder, one of the control sample is obtained by matching the target firms with non-acquired firms with the same 3-digit SIC code, and with the closest turnover in the year of the acquisition (or the preceding year if the target firm does not report turnover for the acquisition year). The other control sample is obtained by matching the target firms with non-acquired firms with identical pre-event profitability measured by EBIT over turnover in year -1 (or year -2 if data for year -1 are not available). We add these three selection variables to regressions (8)–(13) of Table 5. We include the inverse of (the logarithm of) turnover given that the regressions also include turnover over employees. Including turnover rather than its inverse creates severe multicollinearity. Note that the WG estimation technique does not allow for industry dummies as these would effectively be dropped when each variable is transformed into its deviation from its time mean. In contrast, the OLS and System GMM techniques allow for the inclusion of industry dummies.[10]

Overall, the labour demand model fits the data as all of the variables forming the basic model have the expected sign and are also typically highly significant. The coefficient on lagged employment is highly significant and close to one in regressions (1)–(7), suggesting persistence in the employment figures across time.[11] When the three selection variables are included (regressions (8)–(13)), the coefficient on the lagged dependent variable, while still being significantly different from zero, drops in size. This drop is mainly due to the size and high significance of the inverse of log of turnover.

As expected, the value of the coefficient is the highest in the OLS regressions and the lowest in the WG regressions. While the value of the coefficient obtained from the System GMM regressions should typically be somewhere between the lower WG coefficient and the higher OLS coefficient, it is actually quite close to the latter. This suggests that for the particular case of our data set the WG regressions seem to be more prone to bias than the OLS regressions.[12] Except for the System GMM regressions augmented by the selection variables (i.e. regressions (11)–(13)), the coefficient on contemporaneous wage levels is significant and negative as expected. The coefficient on contemporaneous output is negative and significant in all the regressions, except in the two WG regressions. The coefficient on lagged turnover over employees is significant and positive in nine out of the 13 regressions as expected. The coefficient on lagged output is significant and positive as expected in the majority of the regressions. The various regressions include up to three of the above mentioned dummies which measure potential employment effects across time and across the samples of the target firms and the control firms.

Except for the first OLS regression (regression (1)), the coefficient on the post-takeover dummy is never significant. The significant coefficient in the first OLS regression suggests that there is industry- or market-wide reduction in employment across all three samples. Moreover, the target firm dummy is not significant in any of the regressions, except for regression (8).[13] Hence, there is no systematic evidence of a drop in employment in the target firms independent of the IBO. Finally and more importantly, the coefficient on the interaction term between the two previous dummy variables is always negative and highly significant (at the 1 per cent level, except for regression (12) where it is significant at the 5 per cent level). This effect is observed independent of whether the other two dummies are included and independent of whether industry dummies and the two selection variables (the inverse of the log of turnover and the log of profit over turnover) are included. More importantly, as the effect is consistently observed across the three estimation techniques it is very robust and not dependent on either the estimation technique used or the inclusion (or not) of the selection variables.

Hence, our results suggest that there is a drop in employment in the target firms post-takeover which cannot be justified by differences in productivity and/or labour costs. There is no equivalent drop in the control firms suggesting that the effect we observe is not an industry- or market-wide effect, but an effect which is limited to the target firms.

To further test the robustness of our results, instead of pooling the available observations for all three samples we re-run the regressions after matching each firm-year observation for the target firms with an actual firm-year observation for each of the two control samples. In other words, if there is no observation for a given target firm for a particular year we also exclude the equivalent firm-year observation for the control firm, and vice-versa. The results, which are not reported in tabular form, confirm the above results. We also re-estimate the regressions separately for each of the three samples, including a post-takeover *period* dummy, which is set to one for years falling within the post-acquisition period for the target firms *as well as* the equivalent period for the control firms (the results are not reported in a table). The latter is only significant and negative in the regressions based on the target firms, confirming our earlier results.

## 4. Conclusion

This study provides empirical evidence on an extremely topical issue – the impact of private equity takeovers on employment in the acquired firms. We overcome a key methodological weakness of prior research in this field by focusing exclusively on the employment consequences of institutional buy outs (IBOs) as these are more likely to lend themselves

[10] See footnote 8 as to the inclusion of industry dummies in the System GMM regressions.

[11] As mentioned above, this suggests that System GMM is more appropriate than first-differences GMM.

[12] A closer look at Table 5 suggests that the OLS regressions suffer from first-order serial correlation as the $m_1$ test statistic is highly significant. As the WG regressions are based on the deviation of each observation from its time mean, first-order serial correlation is not a concern whereas second-order serial correlation is. Fortunately, the $m_2$ test statistic is not significant for any of the WG regressions. Similarly, second-order correlation only is a concern for the System GMM regressions, but none of these regressions are subject to this type of serial correlation.

[13] As this dummy is time invariant, it cannot be included in the WG regression.

to the type of negative employee consequences politicians and trade union representatives are most concerned about. Specifically, we examine whether there are changes to employee numbers, employee productivity, employee remuneration as well as profitability over an 11-year window around the year of the takeover. In total we investigate 106 IBOs undertaken in the UK between 1997 and 2006, compared with two control samples of firms that remain independent, matched in terms of size as well as industry and in terms of prior profitability, respectively. Although the study is based on a single liberal market economy, the UK, it can be argued that the findings have a broader relevance in shedding light on the potential impact of private equity in lightly regulated, mature markets. Replication of this study in other such contexts would make for a more detailed picture, albeit one that could not readily be accommodated within a single article.

Our core finding is that of a significant loss in employment in firms subject to an IBO immediately following the takeover, when compared to both of our control groups, with a coterminous tendency for wages to fall below the market rate. Furthermore, we find no evidence of improved productivity or profitability subsequent to the takeover. Whilst employees may acquiesce in wage cuts in return for the preservation of jobs, such takeovers are also more likely to result in job losses. Yet, despite (or because of) pay cuts and job losses, productivity in the sample firms remained significantly lower than in the control firms. This suggests that any supposed disciplinary benefits from job cuts (either in terms of ejecting the lowest strata of performers and/ or incentivizing surviving staff) have not resulted in material gains. Indeed, the productivity and profitability of the sample firms remain lower than for the control firms during the 4-year period following the takeover, suggesting that a climate of insecurity in tenure and reward reduces employee productivity and firm profitability (c.f. Schweiger and Denisi 1991: 110). As Bucholtz and Ribbens (1994: 556) note, employees have investments in firm specific human capital. Hence, they may react negatively to a new managerial style that increases employment risk to such an extent that it outweighs any disciplinary benefits of insecurity. In short, the findings presented here suggest that IBOs and their impact on managerial practices do not appear to be an effective mechanism for turning round failing firms.

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## Appendix A. Sample selection criteria

1. Targets must be listed on the London Stock Exchange (i.e. the Official List, the techMARK, the AIM or the USM).
2. The acquisition must have been completed between 1 January 1997 and 31 December 2006.
3. *Thomson One Banker* lists a total of 49 acquisitions under acquisition technique "institutional buyout" (IBO), of which two acquisitions relating to venture capital trusts (VCTs) were excluded.
4. Thomson One Banker lists a total of 67 acquisitions under acquisition technique "financial acquiror" (excluding MBOs and MBIs), of which 14 were excluded for the following reasons:
   a. 1 Acquisition was made by a family;
   b. 1 Acquisition by a sovereign wealth fund;
   c. MBOs/MBIs;
   d. 1 Acquisition without detailed acquisition data in *Thomson One Banker*;
   e. 1 Acquisition consisting of the founder shareholder taking the firm private;
   f. 1 Acquisition by 3i plc which is a listed investment trust;
   g. 2 Acquisitions of investment trusts; and
   h. 1 Acquisition which does not involve 100% of the target's equity.
5. We add six acquisitions made by a "strategic investor". Thomson One Banker no longer makes this distinction and most of these transactions are now listed under acquisition technique "financial acquiror".

N.B. As *Thomson One Banker*'s distinction between an institutional investor (buyout)[14] and a financial investor[15] is neither consistent nor in line with the academic literature, we decided to merge both types. To illustrate the inconsistencies relating to this distinction, Blackstone is listed as a financial investor for the case of the 1998 acquisition of Savoy Hotel plc, but is listed as an institutional buy out investor for the case of the 2006 acquisition of Center Parcs (UK) Group plc.

## Appendix B. Supporting information

Supporting information associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.euroecorev.2014.06.015.

[14] "A highly leveraged transaction where one or more institutional investors act together to lead or initiate a buyout deal".

[15] "A financial company (buyout firm, venture capital company, merchant bank, commercial bank, etc.) and the target's main industry is non-financial and it must be acquired for financial rather than strategic reasons."

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