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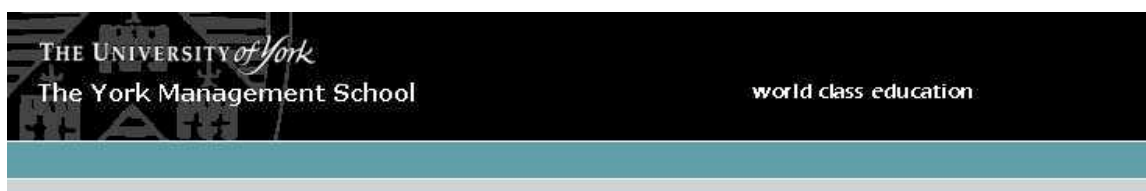
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**Labour demand and wage effects of takeovers
that involve employee layoffs**

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This paper is circulated for discussion purposes only and its contents should be considered preliminary

Labour demand and wage effects of takeovers that involve employee layoffs

1.1 Introduction

1.1.1 Research motivation

The issue of whether mergers and acquisitions lead to economic efficiency is divisive, as is confirmed by mixed empirical evidence. There is no general agreement on the dominating motive for such transactions. Consequently, the sources of takeover gains are unknown. Synergy realisation and management disciplining have been suggested as the main driving forces of efficiency improvements. However, it is not well understood how such factors may create value. One suggestion is that better labour management and more efficient labour usage reduces demand for labour during post-takeover years (Conyon et al., 2002). Profit maximising managers may undertake workforce reductions to realise the synergetic and better labour management gains created by mergers. However, any workforce reduction should be undertaken on the basis of the level of decline in labour demand. This implies that decline in labour demand should be steeper in mergers that involve employee layoffs than in mergers that do not.

To contribute to the growing body of literature on the employment effect of takeovers, this chapter empirically investigates the following three interrelated issues. First, recent empirical studies show that mergers significantly reduce labour demand (Conyon et al., 2002; Gugler and Yurtoglu, 2004). The question is: what factors lead to this decline in labour demand? One reason for this post-merger labour demand reduction could be the fact that mergers may create market power (Stigler, 1950). With this enhanced market power firms reduce the output and raise product prices, to increase their profitability using lower levels of input. Alternatively, improved labour productivity has been suggested as one of the main reasons for post-takeover workforce

reductions. Labour productivity could be improved through elimination of duplicative facilities (synergy) and/or better labour management (discipline). There is some empirical support for both synergetic and disciplining sources of efficiency improvement. Lichtenberg and Siegel (1987) argue that the main reason for efficiency improvement is management disciplining, as targets were poorly-performing plants and their performance is improved significantly after mergers. McGuckin and Nguyen (1995b) conclude that one of the important motives of mergers could be synergy, as acquired plants were well-performing companies before acquisition and they further improved their performance after acquisition. Conyon et al. (2002) report that related and hostile acquisitions increase efficiency post-merger, as such acquisitions cause large falls in labour demand, in comparison to unrelated and friendly acquisitions, respectively.

To contribute to this literature the chapter investigates whether post-merger demand for labour to produce the combined output is lower in merging businesses than in non-merging businesses. We analyse the effect of mergers on labour demand, holding output and wages constant as well as controlling for firm-specific fixed effects and industry-wide changes. We assess synergy and the disciplining role of takeovers by investigating the labour demand effect of related versus unrelated and hostile versus friendly mergers. We also investigate whether merger-related employee layoffs can be linked to the fall in labour demand arising from efficiency improvement.

As a main question of interest, this chapter investigates whether there is any relationship between decline in labour demand and reductions in the *absolute* number of workers post-merger. In other words, we are interested in understanding whether managers undertake employee layoffs on the basis of decline in labour demand. If decline in labour demand is the major factor in this decision-making process, then mergers that involve employee layoffs should lead to a different level of decline in labour demand from that in mergers that do not.

To empirically examine this issue we divide the full sample into two sub-samples depending on whether an acquisition involves employee layoffs, on the basis of employee layoff information reported in newspapers: the ‘layoff’ sub-sample (hereafter ‘layoff’ acquisitions), which includes acquisitions that involve merger-related employee layoffs during two post-takeover years, as reported by newspapers, and the ‘non-layoff’ sub-sample (hereafter ‘non-layoff’ acquisitions), which includes acquisitions that do not involve employee layoffs. Data on the merger-related employee layoffs is collected by screening major national newspapers. On the basis of this data, we use a ‘layoff’ dummy to investigate the difference in the labour demand and employment cost of ‘layoff’ and ‘non-layoff’ acquisitions.

Finally, a related question is: what is the wage growth effect of mergers that involve employee layoffs? Efficiency enhancement relating to labour usage should significantly improve firm profitability, as suggested by the positive feedback mechanism of labour demand (Victorisz and Harrison, 1973). In turn, improved firm profitability may also benefit employees, among other stakeholders, through increased wages and better work conditions. Therefore takeovers should benefit employees by proportionately increasing their share of the rent (assuming that there is a fair bargaining mechanism within the businesses). Thus, increased labour productivity and firm profitability should eventually benefit employees through wage increases, better work places and pension schemes. In this regard, the chapter investigates whether wage growth in merging firms is different from wage growth in non-merging firms. Mergers may lead to efficiency improvement in labour usage, which could be achieved through synergies (for instance, elimination of duplicative activities) or by instituting better labour management. Thus, mergers may also affect wages by improving employee profitability resulting from decline in labour demand. Decline in labour demand should also benefit employees.

In sum, understanding the issues of whether there is a merger-related shift in labour demand is the key factor in understanding the motivations behind corporate takeovers. However, there is very little empirical evidence on this issue. An innovation of this chapter is that it attempts to link decline in labour demand with the reduction in the absolute number of workers. With this evidence the chapter also contributes to a better understanding of the objectives of the decision-makers in undertaking these transactions.

1.2 Related literature and hypotheses development

1.2.1 The effect of ownership change on labour demand

Although both theoretical and empirical research on mergers and acquisitions are well established, there is no widely accepted theory that explains the labour market outcome of such corporate transactions. Merger theories are inconclusive on the link between ownership change and labour market outcome. *The value-creation* theory of takeovers predicts that takeovers will negatively affect jobs in the short run, although the long-run effect depends on the complementarities of the merging businesses and success of the merging business. In contrast, *the value-destruction theory* predicts that takeovers should not negatively affect employment levels in the short run, but in the long run such takeovers could destroy jobs, as businesses eventually decline due to bad management. *The value-redistribution theory* predicts that takeovers will negatively affect employment by causing the implicit contracts to be breached (Shleifer and Summers, 1988).

As discussed above, one of the main motives of mergers and acquisitions is to achieve efficiency improvement through economies of scale and scope. Economies of scale could be achieved through altering the input – output relationship in the production process. One of the main inputs that can easily be altered to extract more synergetic gains is the labour input. As

summarised by Conyon et al. (2002), if merged businesses require a different optimal employment level from that produced by simply combining the individual workforces, then any profit-maximising firm will need to adjust its employment levels during the post-merger period. Recent empirical results indicate that mergers cause significant rationalisation in the use of labour and the authors interpret this as being consistent with the value-creating theory of takeovers (Conyon et al., 2002, 2004; Gugler and Yurtoglu, 2004).

In contrast, efficiency improvement and better asset performance under the new ownership may create new jobs and lead to better work conditions (Holmstrom, 1988). Using plant level data from the US food industry, McGuckin et al. (1998) show significantly higher employment growth (16%) for an average acquired plant in comparison to an average non-acquired plant. However, when firm level data is used this difference between acquired and non-acquired firm employment becomes insignificant. Using the OLS method, McGuckin and Nguyen (2001) report that ownership-changing plants increase their workforce 19% (3.3% when the IV estimation method is used) faster than plants having no ownership change. However, there is a size effect: non-ownership-changing larger plants (plants in the top 15 percentile of the size distribution) increase their labour force faster than larger ownership-changing plants.

Post-merger workforce adjustment does not need to occur instantaneously and the speed of movement to the new equilibrium depends on the costs of this adjustment. In addition, the type of workforce adjustment (increase or decrease) depends on the returns to scale of the production technology of the combined firms. If the production technology exhibits constant returns to scale, then mergers should not change output and employment levels. If the production technology exhibits increasing returns to scale, then the merged firm should be able to use a smaller amount of combined labour to produce the output amount equal to the combined individual outputs of the merging firms. However, the merged firms may not achieve this synergy instantaneously and

labour adjustments may take several years to achieve the new equilibrium, meaning that the effect of takeovers on labour and the labour output relationship could be dynamic. We test the following hypothesis:

Q4-H1. Takeovers reduce demand for labour, as merged businesses gradually achieve synergy and improve labour management.

Early studies consider employment and wage growth in merging firms relative to non-merging firms and conclude that mergers improve labour productivity (Lichtenberg and Siegel, 1990; McGuckin and Nguyen, 2001). However, one limitation of these studies is that they do not investigate the factors that may lead to such efficiency improvements. Furthermore, these studies consider all ownership change as homogenous. More recent studies suggest that synergy or management disciplining may improve labour efficiency and therefore they investigate the labour demand effect of related versus unrelated, and hostile versus friendly mergers (Conyon et al., 2002; Gugler and Yurtoglu, 2004).

The scope of synergy, and the subsequent value created by takeovers, differ depending on the relatedness of the merging businesses. If related businesses merge, then there are more opportunities for achieving synergies and a greater level of cost savings by eliminating duplicative activities. Consequently, related takeovers lead to a higher increase in productivity than unrelated takeovers (Rumelt, 1974). Therefore it is reasonable to expect that related acquisitions may lead to a higher level of decline in labour demand and a subsequent higher level of workforce reductions, as confirmed by recent empirical research (Conyon et al., 2002; Gugler and Yurtoglu, 2004).

As there is more scope for synergy in related acquisitions than in unrelated acquisitions, it is possible to achieve higher levels of labour demand reduction in the former than in the latter. Therefore the labour demand effect of takeovers should be more pronounced in related

acquisitions than in unrelated acquisitions. Hence we classify mergers in terms of relatedness (related versus unrelated) to test the following hypothesis:

Q4-H2. *Decline in labour demand is greater in related acquisitions than in unrelated acquisitions.*

Similarly, the management disciplining theory also predicts staff downsizing, possibly in the auxiliary establishments and among white-collar staff. Lichtenberg and Siegel (1990) distinguish between the effects of takeovers on auxiliary establishment employees and production establishment employees. In ownership-changing auxiliary establishments employment declines by 16.7%, while in production establishments this reduction is only 4.5%. As hostile takeovers are associated with management disciplining, it is reasonable to expect that such takeovers improve efficiency more than friendly takeovers do. Similarly, we expect labour productivity to be higher after acquisitions involving employee layoffs than acquisitions not involving workforce reductions.

Recent studies distinguish between related and unrelated takeovers as well as between hostile and friendly takeovers. The Conyon et al. (2002) results indicate that related mergers cause significantly higher labour usage rationalisations than unrelated mergers. Rejecting the popular proposition that hostile takeovers lead to job destruction and wage cuts, Conyon et al. (2001) report that both hostile and friendly takeovers reduce demand for labour at the same level (7.5%). However, the reduction in the *absolute* number of employees is significantly higher after hostile takeovers than after friendly takeovers, as such takeovers are followed by substantial falls in output as a result of divestments and other types of asset re-sale, as reported by Haynes et al. (2000). In addition to this, Gugler and Yurtoglu (2004) report that mergers reduce employment even after controlling for divestments and these authors confirm the US versus UK differences described above in the employment effect of mergers: in the US mergers do not adversely affect

employment, while in Europe employment declines by 10% and in the UK in particular employment declines by 12% during the merger year¹. Therefore we test the following hypothesis:

Q4-H3. *Decline in labour demand is greater in hostile acquisitions than in friendly mergers.*

1.2.2 The association between decline in labour demand and workforce reduction

Cappelli (2000) argues that one of main reasons for post-merger workforce reduction is the decrease in labour demand. According to this argument, there should be a link between decline in labour demand and reductions in *absolute* number of employees post-merger. In other words, decrease in labour demand should be greater after ‘layoff’ acquisitions than after ‘non-layoff’ acquisitions. However, no study has compared the labour demand and wage effects of these two types of acquisitions.

Briefly, in contrast to the view that a substantial proportion of takeover gains comes from labour restructuring, such as employee layoffs and wage cuts, the recent research shows that mergers cause labour productivity improvement. However, it is unclear whether merger-related

¹ Gugler and Yurtoglu (2004) suggest that such a differential effect of mergers is the result of ‘sclerotic’ and rigid labour markets in the EU countries. In the EU, labour markets are regulated more strictly than in the US and therefore firms have higher labour adjustment costs in the EU than in the US. Different labour adjustment costs in the EU and US imply that mergers and acquisitions have different effects on labour demand in these economies. Specifically, mergers result in higher levels of employee layoffs in the EU than in the US, as in the US firms can continuously make labour adjustments to optimal levels and do not need to use mergers and acquisitions for this purpose.

employee layoffs lead to labour productivity improvement. For example, McGuckin and Nguyen (1995a) report that ownership-changing plants experience improvement in labour productivity, measured as relative labour productivity (RLP), where this improvement is not necessarily related to the employment reduction². Using the same sample with plant level data, McGuckin et al. (1998) provide evidence indicating that employment increases by 16% and labour productivity increases by 16% in a typical acquired plant.

Under an active market for corporate control, synergy or better labour management should reduce post-merger labour demand. Acquirers should undertake employee layoffs depending on the changes in labour demand. We investigate whether decline in labour demand is greater in acquisitions with employee layoffs than in acquisitions that do not involve layoffs. We also investigate the differences in employee profitability and the wage effect of takeovers in the ‘layoff’ and ‘non-layoff’ sub-samples.

Q4-H4. *Decline in labour demand is greater in the ‘layoff’ acquisitions than in the ‘non-layoff’ acquisitions.*

² In the literature labour productivity is defined as the ratio of output to the number of employees, output being measured as either value-added in the production process or value of shipments (sales value). As the value-added measure is not always available, usually in practice sales value is used to proxy for output. However, price differentials among different firms and inflation over time do not allow reliable comparison of labour productivity among different firms. Therefore some studies use the Relative Labour Productivity (RLP) measure, defined as the ratio of an individual firm’s labour productivity to average industry labour productivity.

1.2.3 The effect of ownership change on wage growth

A related issue is whether this improvement in shareholders' wealth (high profitability) is at the expense of other stakeholders, for example, employees. In their seminal paper Shleifer and Summers (1988) argue that mergers may reduce wage growth by eliminating extra-marginal wage payments through layoffs of older workers. Several empirical studies provide evidence supporting this argument. Lichtenberg and Siegel (1990) find that wage growth in ownership-changing auxiliary establishments is 9.2% lower, while in production establishments wage growth is 2.1% lower than in non-ownership-changing production establishments. Thus, these authors conclude that ownership change diminishes wage growth, although the relative wage decline in production establishments is only about one third of that in auxiliary establishments. In contrast to this, McGuckin et al. (1998) find that a typical acquired plant increases its workers' wages 12% faster than a non-acquired plant in the US food industry. McGuckin and Nguyen (2001) report that for the entire US manufacturing sector ownership change causes a 4.2% faster increase in wages for workers at a plant of average size. But there is an inverse relationship in the case of larger plants: wages increase faster in large plants that undergo ownership change. Ownership change in bigger plants negatively affects wage growth: a typical worker in bigger acquired plants has lower wage growth in comparison to other workers in non-acquired plants. Thus, even if the wage effect of takeovers is positive for a worker of an average size typical plant, its effect may not be positive for a typical worker, as most people work in large plants. More recently, Gugler and Yurtoglu (2004) have provided evidence showing that tender-based takeovers reduce employment by about 8% in the US, while mergers do not change employment. These authors interpret this as being consistent with the 'breach of trust' hypothesis.

However, in contrast to this, it can be argued that improvements in firm-level efficiency should also benefit employees, among other stakeholders. As a result of elimination of

duplicative activities and better labour management, mergers may cause efficiency gains, which should be manifested in firm performance improvement. Both synergy and management disciplining theories postulate that mergers should improve firm performance. Both decline in labour demand and increase in labour productivity may lead to a higher level of profitability per employee. For example, Conyon et al. (2004) suggest that post-merger labour efficiency causes change in firm profitability (measured as the profit per worker). In the UK Conyon et al. (2004) report that the *ceteris paribus* impact of acquisitions on wages is positive: mergers increase wages by 11% within two years after mergers. Thus, these authors argue that merger-related restructurings boost employees' share in the business rent as well.

On the basis of this discussion, we predict that, along with the owners, the employees of merged firms will also be able to benefit from the overall performance improvement in the form of better wage and work conditions. Firms with an increasing market share and improving labour productivity may achieve higher levels of profitability. Strong unions may be able to increase the employees' share of the rent through higher levels of wages. As Conyon et al. (2004) suggested, wages may increase due to increased profits, even if the wage formation process does not change. Thus there may be two possible sources of wage change in merged firms. Mergers may change firm profitability, which in turn leads to the change in wages. Alternatively, mergers may simply cause a change in the wage formation process. Thus, we test the following hypotheses regarding the wage effect of mergers:

Q4-H5. *Wage growth is higher in merged firms than in non-merging firms.*

Q4-H6. *Wage growth is higher in related acquisitions than in unrelated acquisitions.*

Q4-H7. *Wage growth is higher in hostile acquisitions than in friendly mergers.*

Q4-H8. *Wage growth is higher in 'layoff' acquisitions than in 'non-layoff' acquisitions.*

1.3 Data and methods

1.3.1 Econometric modelling

In modelling the labour demand effect of takeovers, we follow the strategy adopted by previous research (Canyon et al., 2002, 2004; Gugler and Yurtoglu, 2004), which uses a model developed on the basis of the Cobb-Douglas production function. Specifically, to test hypotheses Q4-H1, Q4-H2, Q4-H3 and Q4-H4, the following model will be estimated:

$$l_{it} = \beta_1 l_{it-1} + \beta_2 w_{it} + \beta_3 w_{it-1} + \beta_4 q_{it} + \beta_5 q_{it-1} + \beta_6 D_{it} + \eta_i + v_{it} \quad (6.1)$$

where l_{it} is the logarithm of employment, w_{it} is the logarithm of real wage relative to user cost of capital³, q_{it} is the logarithm of real output of firm i in time t , D_{it} is a dummy variable, taking one of the following four dummies: merger, relatedness, hostility and employee layoffs. The merger dummy takes 1 if firm i is involved in a merger at time t and 0 otherwise, the relatedness dummy takes 1 if both target and acquiring firms are in the same industry and 0 otherwise, the hostility dummy takes 1 if the management of the target company rejects the initial offer made by an acquirer and 0 otherwise, and finally the layoff dummy takes 1 if acquisitions involve employee layoffs and 0 otherwise; η_i indicates time constant firm-specific unobservable variables, that will be removed after first differentiation using panel data⁴; v_{it} is the usual error term.

The above equation only indicates the contemporaneous impact of mergers on labour demand. To investigate the long-run effect of mergers on labour demand we include lagged levels

³ User cost of capital is assumed to be equal to one to provide comparability across firms.

⁴ In econometrics the above model is called an autoregressive-distributed lag model, the estimation methods of which are discussed in the methodology chapter of this thesis.

of the dummy variable. For example, D_{it-1} takes 1 if firm i was involved in a merger at time $t-1$ and 0 otherwise and D_{it-2} takes 1 if firm i was involved in a merger at time $t-2$ and 0 otherwise.

To test the above hypotheses we use four types of dummy variable in different estimations. First, we use a *Merger* dummy that differentiates merged firms from control firms. Second, we use *Related* and *Unrelated* merger dummies that differentiate post-takeover changes in the performance of these types of merger from the changes in the non-merging control firms. Related mergers are classified as those mergers where both acquired and acquiring firms are in the same industry, while unrelated mergers indicate those transactions that involve firms in different industries. Third, we use *Hostile* and *Friendly* merger dummies. Hostile takeovers indicate those takeovers where the initial bid was rejected by the incumbent managers. Finally, we use *Layoff* and *Non-layoff* dummy variables, where the Layoff dummy indicates those acquisitions involving layoffs of more than 1% of the combined workforce within two years after completion of transactions, as reported by the newspapers⁵.

⁵ To be considered as a layoff acquirer, a firm should layoff at least 1% of the combined workforce during a two-year period. If no information is found on layoffs, then we assume that none have occurred. Out of 235 sample acquirers 101 (43%) acquirers made merger-related layoffs, on average laying off about 7.5% of the combined workforce. The mean number may be biased downwards, because companies may not disclose all layoffs or reported data in the newspapers may be incomplete. Alternatively, acquiring firms can be classified into ‘layoff’ and ‘non-layoff’ firms, on the basis of merger-related layoff information, collected from newspapers, as in Krishnan et al. (2007) and Hillier et al. (2007). In this regard, we collect data from newspapers on merger-related layoffs undertaken during the two-year period after takeovers, by screening all major national and regional newspapers, downloaded through Nexis®. We find a

The basic issue underlying equation (1) is whether changes in takeovers have a significant effect on employment, controlling for changes in wages and output. Bresson et al. (1996) derive the optimal level of employment conditional on the changes in expected output and the wage to capital ratio. In this regard, to isolate mergers' effect on labour demand the model includes both one period lagged level and contemporaneous sales and wage variables, as the labour demand changes could occur due to the changes in these variables. Wages should be relative to user cost of capital and it is common in the relevant literature to assume that the cost of capital remains constant over time and therefore to be equal to one for all companies. As discussed above, labour demand adjustment may not be instantaneous, but may occur gradually, meaning that there may be a time lag between the merger event and labour demand adjustment. Labour demand may also

strong positive correlation between newspaper-reported layoffs and year-to-year workforce change, reported by *Datastream* (34%). However, the size of workforce reductions reported in the press is smaller than the *Datastream* reported size. One explanation could be the fact that managers are reluctant to publicise the true scale of workforce reductions, as this may affect the market value of their company. Both Krishnan et al. (2007) and Hillier et al. (2007) suggest that the measure of layoffs reported by the press is more precise than year-to-year changes in employment levels reported by databases as the latter may include the effect of divestments or asset disposals. However, although layoffs reported in the newspapers are more relevant, they do not give the full picture of workforce changes. All workforce reductions may not be reported in the newspapers or all announced layoffs may not actually materialize, providing a measurement bias, as suggested by Shah (2007).

depend on lagged output and wages. Therefore it is customary to include lagged variables, also called initial variables: last year's variables are the most important predictors of current year variables. By including the lagged variables we control for the full history of the right-hand size variables, so any new shock in the dependent variable comes from the takeover event.

In equation (1) the main interest is the coefficient of the dummy variable β_6 , which indicates the contemporaneous effect of mergers on labour demand. Where lagged dummies are used, the merger dummies indicate the effect of mergers on employment after one and two years respectively. To support the above hypothesis, we expect negative coefficients for these merger dummies.

This estimation directly tests whether the changes in profitability are caused by the increased labour productivity and reduced labour demand. This can be linked to the basic discussion of the economic role of mergers in improving efficiency.

To test hypotheses Q4-H4, Q4-H5, Q4-H6 and Q4-H7, the following model will be estimated:

$$w_{it} = \beta_1 w_{it-1} + \beta_2 iw_{it} + \beta_3 l_{it-1} + \beta_4 k_{it-1} + \beta_5 p_{it} + \beta_6 D_{it} + \eta_i + v_{it} \quad (6.2)$$

where w_{it} is the logarithm of wage rate per worker in firm i in time t , iw_{it} is the logarithm of firm i average industry wage in time t , l_{it} is the logarithm of employment, k_{it} is the logarithm of capital per employee in firm i at time t , p_{it} is the logarithm of profit per employee, M_{it} is the post-merger dummy variable that takes 1 in all three post-merger years, D_{it} is a dummy variable (as explained above). To investigate the long-run effect of mergers on labour demand up to three period lagged dummy variables will be included in the above equation.

As a result of post-takeover operating performance rationalisation, elimination of duplicative activities and cost savings, mergers may cause efficiency improvement, which should be manifested in a performance improvement. As discussed above, *the value creation* theory of

takeovers (synergy and management disciplining) postulates that mergers improve firm performance. Both the decline in labour demand and increase in labour productivity may lead to a higher level of profitability per employee. For example, Conyon et al. (2004) suggest that post-merger labour usage efficiency causes change in firm profitability (measured as the profit per worker). In the models we include profitability per employee a measure of firm performance.

As the change in wages may be conditional on the alternative wages, we include an industry average wage to the model. Wages may change due to changes in employee profitability. Therefore we include employee profitability as well as interaction of this variable with the merger dummy. Conyon et al. (2004) show that wage changes in merging firms are strongly associated with profitability changes. Vietorisz and Harrison (1973) discuss the positive feedback theory of the labour market, which postulates that high wages cause adoption of labour-saving innovations, that lead to high productivity and a further increase in wages. On the other hand, low wages cause the persistence of more labour-intensive techniques that lead to low labour productivity and wage stagnation. This contrasts with the negative feedback theory of labour markets, which predicts that high wages will lead to the adoption of capital intensive techniques, reducing labour demand and wages. Arai (2003) reports that wages are positively correlated with both profits and capital intensity after controlling for a number of other variables. Therefore we also control for capital intensity. Finally, the dummy variables indicate the contemporaneous effect of mergers (also classified as relatedness, hostility and employee layoffs) on wages. To analyse the long-term effect of mergers we also include lagged levels of the dummy variables.

The above models are autoregressive lag models, which include the lagged level of the dependent variable (employment and wage) and therefore the error term may be correlated with the explanatory variables. The model includes the lagged dependent variable, because the employment and wage effect of mergers may not be instantaneous, but may follow a dynamic

adjustment process. One of the main characteristics of the above autoregressive distributed lag models is that some or all explanatory variables may be correlated with the error term due to the presence of the lagged dependent variable and unobservable variables, which may affect both the dependent variable and the explanatory variables. Examples of unobserved firm-specific heterogeneity in this research context could be such variables as firm *i* management performance, its overall workforce quality or unique customer relations. Such unobservable variables are usually time-invariant and allow for heterogeneity in the dependent variables across observations. For example, the management quality unobserved variable is negatively correlated with other inputs in the above models and positively correlated with the output variable, since a high quality management will probably result in more efficient use of inputs and achieve a higher level of output. Another reason for the correlation of explanatory variables with the error term is that the relationship between dependent variable and independent variable could be simultaneous: the output may explain the employment level but, at the same time, employment levels may explain output. The third reason is that there may be some measurement error in the variables⁶ used.

⁶ In addition to the above, there may be simultaneity in the model: the merger dummy may be correlated with the error term: prior performance of merging firms may determine the occurrence of a takeover event. McGuckin and Nguyen (2001) argue that plant productivity and ownership change positively correlated, whereas Lichtenberg and Siegel (1990) argue that plant productivity and ownership change are negatively correlated. In addition to this, the merger event may itself negatively affect the employee work attitude and this may start to negatively affect performance. The pre-merger productivity measure and wage levels may also influence the probability of the merger event itself, and it is possible that the merger indicator itself may be endogenous. For example, the McGuckin and Nguyen (1995b) results indicate that plants with high productivity

When explanatory variables are correlated with the disturbance term OLS estimates are inconsistent. In this case pooled OLS is subject to the same omitted variable bias as OLS in the single cross-section. First differencing eliminates unobservable firm-specific fixed effects, but it introduces another problem: the first-differenced lagged dependent variable may be correlated with the differenced disturbance term. Therefore, following Anderson and Hsiao (1981) and Arellano and Bond (1991), we use Instrumental Variables estimation, using lagged levels and lagged differences of all explanatory variables as instruments. As our dataset includes more than three time periods, the efficiency of the estimates could be improved by using two or more periods lagged variables as instrumental variables. Thus, we use a systems generalized method of moments (GMM) technique to estimate the above models, using both two and more periods lagged levels and lagged first differences of all available periods as instruments, as suggested by Arellano and Bover (1995) and Blundell and Bond (2000). Harris et al. (2005) use the systems GMM approach to analyse the effect of management buyouts on economic efficiency.

All three variables in the model - employment, wage and output - are considered as endogenous variables, as they are determined in the system. Efficient firms with good labour

were the most likely to experience ownership change, Therefore previous research also uses estimated probabilities of merger events as an instrumental variable to proxy the merger dummy variable, estimated on the basis of a panel probit model. However, the results of using both merger dummy and probability of merger event are qualitatively the same. Because of data limitations, we use only the merger dummy variable.

organisation use lower levels of employment and achieve higher levels of sales. The previous literature indicates that wages are different even within industries: wages may be historically high in some firms. For example, Krueger and Summers (1988) report that unexplained wage differences exist among firms even within the same industries with similar financial indicators. Therefore we use lagged levels and lagged differences of these variables as instrumental variables, as suggested by the Arellano and Bover (1995) and Blundell and Bond (2000) systems GMM estimation methodology⁷. The one-step systems GMM estimation method uses two-year and earlier lagged levels as well as lagged differences as instruments for the endogenous variables. This estimation method corrects for simultaneity and allows us to control for firm-specific fixed effects by first differencing, and then it instruments the differenced variables with their own two or more period lagged levels and lagged differences. One of the main assumptions of using the instrumental variables estimation method is that there should be first order serial correlation between the error terms, but not second order serial correlation. These assumptions are tested using Arellano–Bond tests for the first AR(1) and second AR(2) order serial correlations in first differences. In addition, the validity of instrumental variables is tested using the Hansen test of over-identification restrictions⁸. We also control for changes in macro-

⁷ In addition to the one-step systems GMM, we also experiment with the two-step systems GMM estimation methods, because this method corrects for small sample bias. In this case the coefficients are smaller. However, Windmeijer (2005) argues that two-step systems GMM estimates can be invalid due to small sample biases. Therefore we base our discussions on the one-step systems GMM estimation results. In the latter case, the coefficients are smaller.

⁸ The Sargan test usually over-rejects, when it is used with the heteroscedasticity robust option. Therefore we use the Hansen test.

economic factors by including time-dummies and for industry wide differences by including industry dummies⁹.

1.3.2 Data

This chapter uses the same sample and data as that described in Chapter 5. In addition to this we collected data from national newspapers on merger-related employee layoffs in order to more precisely measure the employment effect of mergers, following the methodology adopted by prior research (Hillier et al., 2007; Krishnan et al., 2007). In particular, we collected data on takeover related workforce layoffs undertaken during the two-year period after takeovers, as reported in the public media. To collect this data we screened all major national and regional newspapers, downloaded through *Nexis*[®]. To be considered as a layoff acquirer, an acquiring firm should lay off at least 1% of the combined workforce during the 2- year period after the takeover completion date. If no layoffs are reported in the press, then we assume that none has occurred. Out of 235 sample acquirers 101 (43%) acquirers made merger-related employee layoffs, on average dismissing about 7.5% of the combined workforce. Using this data we classify acquiring firms into ‘layoff’ and ‘non-layoff’ sub-samples.

1.3.3 Description of the variables

This chapter uses two employment-related variables. The first variable is the number of employees, which represents the average number of both full- and part-time employees during

⁹ McGuckin, R. H. & Nguyen, S. V. (2001) suggest considering the merger dummy as an endogenous variable, as the profitability of firms may affect the occurrence of a merger. Therefore they estimate the probability of a merger event by a probit regression methodology using several explanatory variables. However, as we do not have enough data to calculate this probability, we treat the merger as an exogenous dummy.

the accounting year, taking into consideration seasonal workers. The second variable is staff cost, which represents wages paid to the employees and directors of the firms¹⁰. It includes wages and salaries, social security costs and other pension costs.

For *output* we use total sales. Following Conyon et al. (2004), *employee profitability* is computed by dividing annual profits by the annual average number of employees¹¹. As the measure of profit we use Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA). *Capital intensity* is computed as the ratio of net book value fixed assets to the average annual number of employees. Similarly, *average industry wage* and *average employee profitability* for each industry is computed on the basis of *Datastream* information. For this purpose, for each industry we compute the median performance, including all contemporaneously

¹⁰ The most direct test of ‘the wealth transfer’ hypotheses should be on the basis of the analysis of individual workers’ wages in both target and acquiring firms, using employee – employer linked data. However, we do not have such a dataset and therefore we concentrate on aggregate wages at the firm level.

¹¹ Ideally productivity should be measured by Total Factor Productivity, which is defined as the ratio of total output to total input. However, we do not have data on total input, such as materials and cost of capital. Alternatively, productivity can be measured for each individual input: for example, labour productivity can be defined as the ratio of output to the number of employees. Thus, labour productivity could be measured using the ratio of value-added to number of employees, where value added could be measured as the difference between sales and material inputs. However, it is not always possible to collect an accurate measure of output and therefore sales are used instead.

listed UK firms in the same industry, defined on the basis of Datastream Industrial Classification Level Four.

For the control group we selected 470 matched firms (one for each acquired and acquiring firm). These firms were selected on the basis of the methodology proposed by Barber and Lyon (1996), matching on the basis of the same industry, size and pre-takeover performance measures. For each sample firm we selected a matching firm at the end of year $t-1$ on the basis of the following criteria: first, we filtered all firms in the same industry with the sample firm; second, we selected all firms within the 25% to 200% size interval of the sample firm's size, size being measured with total assets; third, we selected the non-acquiring firm with the closest EBITA scaled total assets to those of the matching firm.

To distinguish the difference in performance between acquiring and non-acquiring firms, the matched firms should not have undertaken any significant acquisition around the sample takeover event which is being investigated¹². Therefore we selected only those matching firms which had neither been acquired nor had made any significant acquisitions during the two years before takeovers or the three years after takeovers. To construct the non-merging firms' sample, we selected as matching firms only non-acquiring firms that had not been involved in any acquisitions during the five-year period from $t-2$ to $t+3$.

Table 1 provides descriptive statistics for a number of variables, including mean and median, for merging and matching firms at the end of the last pre-takeover financial year. The descriptive statistics show that variables come from a non-normal distribution and are highly positively skewed. Therefore in the regression analysis we use log transformations of these

¹² However, it is unclear whether the previous studies select non-acquiring firms as matching firms (Ghosh, 2001, Powell and Stark, 2005).

variables. As the employment variable shows, acquiring firms are nearly 4 times larger than acquired firms¹³.

Table 1. Workforce, wage, sales, profit and fixed assets for merging and control firms at the end of t-1

| | | Acquiring firms | Matched acquiring firms | Acquired firms | Matched acquired firms |
|--------------------------------|--------|------------------------|--------------------------------|-----------------------|-------------------------------|
| Number of employees | Mean | 13,088 | 9,214 | 3,313 | 2,088 |
| | Median | 2,975 | 2,661 | 770 | 706 |
| Annual wage per worker | Mean | 23.04 | 23.12 | 23.33 | 25.30 |
| | Median | 22.11 | 22.60 | 21.58 | 22.80 |
| Sales per worker | Mean | 133.85 | 145.82 | 147.05 | 153.30 |
| | Median | 97.86 | 94.00 | 94.89 | 94.00 |
| Profit per worker | Mean | 26.17 | 23.60 | 22.41 | 20.85 |
| | Median | 12.29 | 11.84 | 9.30 | 10.17 |
| Fixed assets per worker | Mean | 126.04 | 87.55 | 97.02 | 99.26 |
| | Median | 23.57 | 24.88 | 21.26 | 21.86 |

Not e: All financial figures are in real terms (2003 currency) and in £'000. Number of employees represents the number of both full- and part-time employees of the company. Profit is defined as earnings before interest, taxes and depreciation and amortization (EBITDA). Annual wage per worker is computed by dividing the employment cost by the number of employees. Employment cost represents wages paid to employees and officers of the company.

1.3.4 Measuring changes in the variables

To measure the changes in the above variables, we compute a pro-forma pre-takeover variable by combining the target and buyer firms. For example, pro-forma combined values of employment and sales are calculated by combining respective values for acquired and acquiring firms.

The average pre-takeover wage is calculated by dividing the combined staff costs of acquired and acquiring firms by their combined number of employees as follows:

$$W_{ii}^{pre} = \frac{W_{Tii} + W_{Bii}}{N_{Tii} + N_{Bii}} \quad (6.3)$$

¹³ Other variables - sales, fixed assets and profits - also show that the acquired firms are 3-4 times smaller than the acquiring firms.

where W_{it}^{pre} is pre-takeover pro-forma wage rate per employee, W_{Tti} is i^{th} acquired firm's staff cost in year t ; W_{Bti} is i^{th} acquiring firm's staff cost in year t ; N_{Tti} is total number of workers employed by i^{th} acquired firm at the end of year t , N_{Bti} is total number of workers employed by i^{th} acquiring firm at the end of year t .

Similarly, pro-forma pre-takeover values of other variables, such as profitability per employee and capital per employee are calculated in the same manner. Table 2 provides percentage changes in the employment, wages, output and employee profitability variables during the post-takeover years relative to the pre-takeover year ($t-1$). These percentage changes have been computed on the basis of the Brown and Medoff (1988) regression methodology, that includes both time and industry dummies. These results show that mergers reduce employment levels significantly during the merger year, but not during the post-takeover years. However, when the sample is split into layoff and non-layoff sub-samples, then the results show that layoff-making acquirers significantly reduce employment levels during all three post-takeover years, while non-layoff-making acquirers increase their employment levels relative to the pre-takeover period.

These preliminary univariate results also show that mergers cause faster wage growth relative to non-merging firms: wages grow 7% faster in merging firms in comparison to non-merging firms during the three post-takeover years. Unrelated, friendly and layoff-involving mergers cause higher levels of wage growth in comparison to non-merging firms, whereas related, hostile and non-layoff mergers do not cause different wage growth.

The results also show that in the full sample, output levels do not change during post-takeover years. However, after acquisitions that involve layoffs, output levels significantly decline every year during the three post-takeover years, while after acquisitions that do not

involve layoffs, output levels increase every year during the three post-takeover years. These preliminary results indicate that employment levels decline due to the decline in output levels, while employment growth is a function of the output growth.

Table 2 Change in the main variables during the post-takeover years relative to pre-takeover level

| | Post-takeover years | t=0 | t+1 | t+2 | t+3 |
|---|---------------------|------------|------------|------------|------------|
| Panel A: Change in employment relative to the pre-takeover level (t-1) | | | | | |
| All takeovers | | - 0.123*** | - 0.032* | - 0.013 | - 0.009 |
| Related takeovers | | - 0.122*** | - 0.041* | - 0.007 | 0.027 |
| Unrelated takeovers | | - 0.124*** | - 0.025 | - 0.05 | - 0.078 |
| Hostile takeovers | | - 0.153*** | - 0.062* | - 0.06 | 0.036 |
| Friendly takeovers | | - 0.119*** | - 0.026 | - 0.006 | - 0.013 |
| Cash financed takeovers | | - 0.124*** | - 0.056 | - 0.027 | 0.024 |
| Non-cash financed takeovers | | - 0.122*** | - 0.026 | - 0.012 | - 0.026 |
| Layoff involving takeovers | | - 0.181*** | - 0.164*** | - 0.176*** | - 0.192*** |
| Non-layoff involving takeovers | | - 0.069*** | - 0.064*** | - 0.099*** | 0.135*** |
| Panel B: Change in wage rate relative to the pre-takeover level (t-1) | | | | | |
| All takeovers | | - 0.006 | - 0.012 | 0.019* | 0.033** |
| Related takeovers | | - 0.01 | 0.002 | 0.014 | 0.032* |
| Unrelated takeovers | | - 0.005 | 0.033*** | 0.031** | 0.039** |
| Hostile takeovers | | - 0.027* | 0.044** | 0.029 | 0.047* |
| Friendly takeovers | | - 0.001 | 0.005 | 0.018 | 0.031** |
| Cash financed takeovers | | 0.031*** | 0.001 | 0.008 | 0.028 |
| Non-cash financed takeovers | | - 0.018** | 0.019* | 0.025* | 0.035** |
| Layoff involving takeovers | | 0.008 | 0.037*** | 0.030* | 0.052*** |
| Non-layoff involving takeovers | | - 0.015* | - 0.006 | 0.011 | 0.016 |
| Panel C: Change in output (sales) relative to the pre-takeover level (t-1) | | | | | |
| All takeovers | | - 0.098*** | - 0.001 | 0.03 | 0.008 |
| Related takeovers | | - 0.089*** | 0.011 | 0.026 | 0.036 |
| Unrelated takeovers | | - 0.128*** | - 0.026 | 0.011 | - 0.066 |
| Hostile takeovers | | - 0.141*** | 0.018 | 0.009 | 0.071 |
| Friendly takeovers | | - 0.102*** | 0.006 | 0.032 | - 0.009 |
| Layoff involving takeovers | | - 0.188*** | - 0.115*** | - 0.144*** | - 0.133*** |
| Non-layoff involving takeovers | | - 0.051*** | 0.083*** | 0.131*** | 0.067* |
| Panel D: Change in employee profitability relative to the pre-takeover level (t-1) | | | | | |
| All takeovers | | 0.064*** | 0.080** | 0.084** | 0.065 |
| Related takeovers | | 0.096*** | 0.114*** | 0.161*** | 0.068 |
| Unrelated takeovers | | - 0.015 | 0.009 | - 0.017 | 0.067 |
| Hostile takeovers | | 0.061* | 0.039 | 0.073 | 0.137* |
| Friendly takeovers | | 0.062** | 0.083** | 0.084* | 0.058 |
| Layoff involving takeovers | | 0.092*** | 0.128*** | 0.124** | 0.161*** |
| Non-layoff involving takeovers | | 0.048* | 0.036 | 0.067 | 0.012 |

Notes: The percentage mean change in the employment, wages, output and employee profitability variables have been computed using the Brown and Medoff (1988) regression methodology. The estimates are obtained using OLS regression. The omitted group is the control group of non-merging firms. The regressions include year and industry dummies. The table reports only the coefficients of the relevant dummy variables.

Finally, analysis of employee profitability indicates that mergers cause 13% faster growth in comparison to non-merging firms, which is significant at the 10% significance level. In this process, related mergers cause a 21% improvement in employee profitability relative to the pre-

takeover levels, controlling for changes in the non-merging control firms. The employee profitability change after hostile takeovers is also 21%, which is significant at the 10% significance level only. In contrast to this, employee profitability changes in layoff and non-layoff sub-samples are not different from those in the non-merging firms.

1.4 Results

1.4.1 Short-run impact of mergers on labour demand

As the descriptive statistics given in Table 2 show, mergers do not cause significant changes in employment levels during the post-takeover years. However, as a result of materialising synergies or instituting better labour management during the post-merger period, labour productivity may change in a positive direction. For example, after some mergers output may increase much faster than employment growth or, alternatively, job cuts may happen much faster than output decline. This disproportionate change in output and labour input may subsequently cause change in labour productivity during the post-takeover years.

To empirically investigate this relationship, we estimate equation 6.1. Table 3 reports the results of the estimation using all four dummy variables. The estimates of control variables – lagged employment, wages and sales – are consistent with the predictions of the dynamic labour theory. The current year employment levels should be positively related to the previous year employment levels, as confirmed by positive and significant coefficients of the lagged level employment, which indicates the existence of inertia in the employment levels. Next, according to the dynamic theory of labour, the direction of the change in the employment levels should be inversely related to the employment cost, meaning that the higher the required compensation for labour, the lower the use of labour. Consistent with this, the wage variable coefficient is negative

and significant. The next control variable - output - is positively related to the employment levels: increasing output levels require higher levels of labour input.

Turning to the estimates of the main variables of interest, dummy variables, the negative coefficients of merger dummies indicate that acquiring firms reduce their labour demand in comparison to non-acquiring firms, depending on output and wages. The merger dummy variable indicates that the immediate effect of mergers on employment is to reduce the demand for labour by about 8.5% during the event year in merging firms in comparison to other non-merging firms. Although these results are consistent with the previous research findings, the size of the derived decline in labour demand is smaller: both Conyon et al. (2002) and Gugler and Yurtoglu (2004) report that UK public takeovers reduce labour demand by about 12% during the merger year.

Table 3 Short-run labour demand effect of mergers

| Dependent variable: Employment | | | | |
|--|-----------|-----------|-----------|-----------|
| Independent variables | model1 | model2 | model3 | model4 |
| Employment (t-1) | 0.677*** | 0.677*** | 0.843*** | 0.678*** |
| Wages (t) | -0.273** | -0.270** | -0.071 | -0.273** |
| Wages (t-1) | 0.166* | 0.164* | -0.002 | 0.167* |
| Output (t) | 0.774*** | 0.774*** | 0.517*** | 0.772*** |
| Output (t-1) | -0.417*** | -0.418*** | -0.371*** | -0.416*** |
| Merger (t) | -0.085*** | | | |
| Related (t) | | -0.098*** | | |
| Unrelated (t) | | -0.068* | | |
| Hostile (t) | | | -0.081* | |
| Friendly (t) | | | -0.082*** | |
| Layoff (t) | | | | -0.113** |
| Non-layoff (t) | | | | -0.065** |
| Interaction of Year and Industry dummies | Yes | Yes | Yes | Yes |
| Constant | -1.483*** | -1.483*** | -0.288 | -1.480*** |
| AR(1) | 0.00 | 0.00 | 0.00 | 0.00 |
| AR(2) | 0.86 | 0.88 | 0.98 | 0.87 |
| Sargan test p-value | 0.00 | 0.00 | 0.00 | 0.00 |
| Hansen test p-value | 0.33 | 0.21 | 0.65 | 0.40 |
| No. of observations | 4127 | 4127 | 4127 | 4127 |
| No. of firms | 705 | 705 | 705 | 705 |

es: The dependent variable is employment. The estimation method is the one step SYSTEM GMM, using heteroscedasticity-robust standard errors. Significance levels: *p<0.1, **p<0.05; ***p<0.01. Appendix 9.2 provides the definitions of the variables.

Due to the existence of synergy and cost savings opportunities arising as a result of related mergers, these mergers should reduce labour demand more than unrelated mergers. Consistent with this prediction, the results indicate that the decline in labour demand is higher in related acquisitions (9.8%) than in unrelated acquisitions (6.8%). Conyon et al. (2002) and Gugler and Yurtoglu (2004) show that related mergers reduce employment by more than unrelated mergers. However, Amess et al. (2008) report that the magnitude of the labour demand reduction is the same for both related and unrelated mergers: related mergers reduce employment by 15.8% and unrelated merger reduce employment by 15.5%.

Hostile takeovers may also result in a larger decrease in labour demand, because management disciplining may lead to efficiency improvement in labour usage. However, the results indicate that the magnitude of the labour demand reduction in hostile and friendly acquisitions is almost the same: hostile takeovers cause an 8.2% drop in labour usage in comparison to non-merging control firms, while friendly mergers cause an 8.1% drop in labour demand. This could be due to the small number of hostile takeovers in the sample.

Finally, we investigate whether there is a differential effect on labour demand of the acquisitions that involve employee layoffs and acquisitions that do not involve employee layoffs. Empirical evidence on this issue is important in understanding the reasons for employee layoffs: whether managers cut employment costs to cover takeover premiums or to eliminate duplicative activities that arise due to business combinations. As the results show, the employee layoff-involving acquisitions reduce labour demand by nearly twice (11.3%) as much as those acquisitions that do not involve employee layoffs (6.5%).

1.4.2 The long-run labour demand impact of mergers

Consistent with the dynamic labour demand theory, labour demand adjustments may take up to several years to materialise. As reported in Table 4, the results show that mergers reduce labour demand by 8.7% two years after mergers. However, the long-run coefficients of related versus unrelated and hostile versus friendly dummy variables are insignificant, although in some cases they are negative and very large. In contrast to this, layoff-involving acquisitions continue to adjust their employment levels in the long run by reducing labour demand by another 17.8% after two years following acquisitions, while the non-layoff sub-sample mergers' long-run employment effect is insignificant.

These results are consistent with prior research. For example, the results of Conyon et al. (2004) show that mergers reduce labour demand by about 2% during the second year after mergers. Conyon et al. (2002) report that related mergers reduce derived labour demand every year by 6.8% for two years after mergers, while the effect of unrelated mergers is insignificant.

1.4.3 Labour demand effect of mergers by firm size

Previous research shows that there is significant variation in the firm performance effect of mergers depending on firm size: the effect of mergers is less pronounced in large firms than in small firms (McGuckin and Nguyen, 2001; Conyon et al., 2002).

Table 4 Long-run labour demand effect of mergers

| Dependent variable: Employment | | | | |
|--|-----------|-----------|-----------|-----------|
| Independent variables | model1 | model2 | model3 | model4 |
| Employment (t-1) | 0.854*** | 0.861*** | 0.854*** | 0.855*** |
| Wages (t) | -0.06 | -0.053 | -0.066 | -0.04 |
| Wages (t-1) | 0.01 | -0.009 | 0.01 | -0.009 |
| Output (t) | 0.467*** | 0.463*** | 0.455*** | 0.463*** |
| Output (t-1) | -0.325*** | -0.330*** | -0.312*** | -0.328*** |
| Merger (t) | -0.099*** | | | |
| Merger (t-1) | 0.008 | | | |
| Merger (t-2) | -0.087*** | | | |
| Related (t) | | -0.116*** | | |
| Related (t-1) | | 0.006 | | |
| Related (t-2) | | -0.02 | | |
| Unrelated (t) | | -0.072* | | |
| Unrelated (t-1) | | 0.015 | | |
| Unrelated (t-2) | | -0.174 | | |
| Hostile (t) | | | -0.106** | |
| Hostile (t-1) | | | 0.145 | |
| Hostile (t-2) | | | -0.017 | |
| Friendly (t) | | | -0.100*** | |
| Friendly (t-1) | | | -0.035 | |
| Friendly (t-2) | | | -0.11 | |
| Layoff (t) | | | | -0.134*** |
| Layoff (t-1) | | | | -0.057 |
| Layoff (t-2) | | | | -0.178* |
| Non-layoff (t) | | | | -0.061** |
| Non-layoff (t-1) | | | | 0.07 |
| Non-layoff (t-2) | | | | 0.005 |
| Interaction of Year and Industry dummies | Yes | Yes | Yes | Yes |
| Constant | -0.373 | -0.315 | -0.398 | -0.322 |
| AR(1) | 0.00 | 0.00 | 0.00 | 0.00 |
| AR(2) | 0.44 | 0.43 | 0.43 | 0.39 |
| Sargan test p-value | 0.00 | 0.00 | 0.00 | 0.00 |
| Hansen test p-value | 0.87 | 0.88 | 0.81 | 0.89 |
| No. of observations | 3469 | 3469 | 3469 | 3469 |
| No. of firms | 705 | 705 | 705 | 705 |

es: The dependent variable is employment. The estimation method is the one step SYSTEM GMM, using heteroscedasticity-robust standard errors. Significance levels: *p<0.1, **p<0.05; ***p<0.01. Appendix 9.2 provides the definitions of the variables.

To analyse the role of the size factor in the labour demand effect of mergers, we divide the overall sample into two sub-groups according to the firm size distribution: large firm and small firm sub-groups. We use median employment to divide the sample into two sub-samples¹⁴. Table 5 reports the results of estimating the equation 6.1 separately for the two firm size sub-samples to investigate the short-run employment effect of mergers. Consistent with the Conyon et al. (2002) findings, the results show that smaller firms derive higher levels of efficiency improvement in labour usage than large firms. In the large firms sub-sample the merger dummy coefficient is not significant, while in the small firms sub-sample the results indicate that mergers reduce labour demand by 12.6%. Thus mergers lead to a higher level of efficiency improvement in small firms than in larger firms.

Table 5 Short-run labour demand effect by firm size distribution

| Dependent variable: Employment | | | | | | | | | |
|---------------------------------------|--------------------------|-----------|-----------|-----------|--------------------------|-----------|-----------|----------|------------|
| Independent variables | Large firms (upper half) | | | | Small firms (lower half) | | | | |
| | model1 | model2 | model3 | model4 | model5 | model6 | model7 | model8 | |
| Employment (t-1) | 0.971*** | 0.971*** | 0.974*** | 0.982*** | 0.820*** | 0.823*** | 0.821*** | 0.821*** | |
| Wages (t) | -0.703*** | -0.702*** | -0.699*** | -0.680*** | -0.063 | -0.067 | -0.061 | -0.063 | |
| Wages (t-1) | 0.662*** | 0.662*** | 0.660*** | 0.652*** | 0.06 | 0.063 | 0.059 | 0.061 | |
| Output (t) | 0.911*** | 0.912*** | 0.903*** | 0.886*** | 0.421*** | 0.421*** | 0.419*** | 0.410*** | |
| Output (t-1) | -0.882*** | -0.883*** | -0.877*** | -0.867*** | -0.283** | -0.286** | -0.283** | -0.273** | |
| Merger (t) | -0.017 | | | | -0.126*** | | | | |
| Related (t) | | -0.017 | | | | -0.174*** | | | |
| Unrelated (t) | | -0.017 | | | | -0.038 | | | |
| Hostile (t) | | | -0.019 | | | | -0.108 | | |
| Friendly (t) | | | -0.018 | | | | -0.129*** | | |
| Layoff (t) | | | | -0.025 | | | | | -0.183** |
| Non-layoff (t) | | | | -0.015 | | | | | -0.103** |
| Year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | |
| Constant | -0.009 | -0.01 | -0.007 | -0.01 | -0.465 | -0.447 | -0.458 | -0.469 | |
| AR(1) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| AR(2) | 0.76 | 0.75 | 0.76 | 0.76 | 0.87 | 0.83 | 0.84 | 0.87 | |
| Sargan test p-value | 0.03 | 0.03 | 0.03 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Hansen test p-value | 0.38 | 0.38 | 0.37 | 0.36 | 0.36 | 0.34 | 0.35 | 0.35 | |
| No. of observations | 2065 | 2065 | 2065 | 2065 | 2062 | 2062 | 2062 | 2062 | |
| No. of firms | 353 | 353 | 353 | 353 | 352 | 352 | 352 | 352 | <i>Not</i> |

es: The dependent variable is employment. The estimation method is the one step SYSTEM GMM, using heteroscedasticity-robust standard errors. Significance levels: *p<0.1, **p<0.05; ***p<0.01. Appendix 9.2 provides the definitions of the variables.

¹⁴ Here we report the results for the short-run effect

The same picture emerges with related and unrelated acquisitions – the effect of mergers on labour demand is stronger in small firms than in large firms. In this case only related acquisitions cause lower labour demand. The size distribution effect is insignificant in the case of hostile takeovers, possibly due to the small number of hostile takeovers in the sample. The size distribution of friendly takeovers also indicates a differential effect of mergers, which is consistent with the general picture described above.

When mergers are classified into layoff and non-layoff acquisitions, both the layoff and non-layoff dummies indicate that small firms reduce labour demand during the merger year, but not in the long run. Small acquisitions involving employee layoffs reduce labour demand three times more than large acquisitions involving employee layoffs. In comparison to this the effect of non-layoff acquisitions is approximately the same for the two size distributions and neither small nor large acquirers adjust labour usage in the long run.

In sum, the reported results of mergers' effect on labour demand are similar to those presented by Conyon et al. (2002), Gugler and Yurtoglu (2004) and Amess et al. (2008), although the size of the employment decline is different. This could be due to the difference in sample or the use of different estimation methods in different samples. For example, Conyon et al. (2002) use Generalized Instrumental Variable Estimation after first differencing (GIVE), while Gugler and Yurtoglu (2004) use the one step difference GMM. The contemporaneous effect of mergers indicates that there is synergy between the operations of merging firms. The long-run labour demand reductions indicate that it takes some time to materialize merger-related synergy.

1.4.4 Wage effects of mergers

We analysed two possible sources of wage change after mergers: mergers' *ceteris paribus* effect on wages due to changes in the wage formation process and the possibility of wage increase due

to improvement in employee profitability, as suggested by Conyon et al. (2004). First, mergers may immediately alter the wage formation process by introducing structural changes in rent sharing among different stakeholders. The underlying source of this immediate impact of mergers could also be the fact that mergers may induce immediate efficiency in labour usage, resulting from elimination of duplicative activities. This effect of mergers is confirmed by the labour demand analysis (discussed above): in the short run mergers significantly reduce labour demand.

The second source of wage change depends on the long-term profitability change in merging firms, resulting from long-run organisational restructuring and operating performance rationalisations. The Conyon et al. (2004) results show that mergers improve employee profitability. As a result of improved profitability, employees should be able to increase their share in the enhanced profit. If mergers cause profit enhancement that only benefit shareholders, leaving the employee share unchanged, then this supports one form of Shleifer and Summers' (1988) 'breach of trust' argument: employees work harder after mergers, but receive the same wages as before mergers. We test the contemporaneous effect of mergers and improved employee profitability on wages by estimating equation 6.2, which includes both employee profitability and merger dummies. The results are given in Table 6.

Table 6 Wage effect of mergers

| Deapendent variable: Wage | | | | | | | | |
|--|----------|-----------|----------|-----------|----------|----------|----------|----------|
| Independent variables | model1 | model2 | model3 | model4 | model5 | model6 | model7 | model8 |
| Wage (t-1) | 0.490** | 0.832*** | 0.793*** | 0.796*** | 0.481** | 0.824*** | 0.780*** | 0.785*** |
| Industry average wage (t) | 0.380* | 0.145* | 0.150** | 0.157** | 0.525** | 0.214** | 0.229*** | 0.246*** |
| Employment (t-1) | -0.021** | -0.009* | 0.008 | 0.005 | -0.018** | -0.007 | 0.035 | 0.033 |
| Capital per employee (t-1) | -0.020** | -0.017*** | -0.022** | -0.020*** | -0.003 | -0.012 | -0.020* | -0.015 |
| Profit per employee (t) | 0.094*** | 0.052*** | 0.066*** | 0.061*** | 0.095*** | 0.055*** | 0.078*** | 0.073*** |
| Merger (t-1) | 0.036 | | | | 0.023 | | | |
| Merger (t-2) | 0.049* | | | | 0.023 | | | |
| Merger (t-3) | 0.098** | | | | 0.083 | | | |
| Related (t-1) | | -0.224 | | | | -0.253 | | |
| Related (t-2) | | 0.001 | | | | -0.026 | | |
| Related (t-3) | | -0.003 | | | | -0.026 | | |
| Unrelated (t-1) | | 0.368 | | | | 0.379 | | |
| Unrelated (t-2) | | 0.06 | | | | 0.026 | | |
| Unrelated (t-3) | | 0.128 | | | | 0.079 | | |
| Merger (t-1) | | | 0.047 | | | | 0.006 | |
| Merger (t-2) | | | 0.194 | | | | 0.311 | |
| Merger (t-3) | | | -0.028 | | | | -0.072 | |
| Friendly (t-1) | | | 0.018 | | | | 0.008 | |
| Friendly (t-2) | | | -0.019 | | | | -0.081 | |
| Friendly (t-3) | | | 0.086 | | | | 0.076 | |
| Layoff (t-1) | | | | -0.082 | | | | -0.11 |
| Layoff (t-2) | | | | 0.024 | | | | -0.015 |
| Layoff (t-3) | | | | -0.043 | | | | -0.07 |
| Non-layoff (t-1) | | | | 0.129* | | | | 0.115* |
| Non-layoff (t-2) | | | | 0.059 | | | | 0.046 |
| Non-layoff (t-3) | | | | 0.138** | | | | 0.112* |
| Interaction of Year and Industry dummies | No | No | No | No | Yes | Yes | Yes | Yes |
| Constant | 0.396 | 0.083 | 0.036 | 0.031 | -0.029 | 0.015 | -0.448 | -0.451 |
| AR(1) | 0.000 | 0.037 | 0.008 | 0.008 | 0.000 | 0.030 | 0.006 | 0.006 |
| AR(2) | 0.685 | 0.994 | 0.292 | 0.895 | 0.641 | 0.953 | 0.423 | 0.939 |
| Sargan test p-value | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Hansen test p-value | 0.092 | 0.212 | 0.300 | 0.271 | 0.074 | 0.451 | 0.539 | 0.631 |
| No. of observations | 2485 | 2485 | 2485 | 2485 | 2485 | 2485 | 2485 | 2485 |
| No. of firms | 695 | 695 | 695 | 695 | 695 | 695 | 695 | 695 |

es: The dependent variable is wage. The estimation method is the one step SYSTEM GMM, using heteroscedasticity-robust standard errors. Significance levels: *p<0.1, **p<0.05; ***p<0.01. Appendix 9.2 provides the definitions of the variables.

The lagged dependent variable – wage is positive and highly significant. As expected, wage growth is strongly positively associated with average industry wage growth. Similarly, employee profitability is positively associated with the wage change: the higher the employee profitability, the higher the increase in wages. However, the effect of the second source of mergers is not clear: there is no evidence indicating that wages grow faster in merging firms due to increased profit per employee, as indicated by the insignificant interaction of the profitability variable with the

post-merger dummy. Although the interaction term between profitability and merger dummy is positive, it is not significant.

The results indicate the clear impact of mergers on wage formation through structural changes: mergers on average increase wages by 4.9% two years after mergers and 9.8% three years after mergers, when they are considered as homogenous. However, when year and merger dummies are included these coefficients become insignificant. Both relatedness and hostility dummy variables indicate that there is no significant difference in wage growth. Wage growth is higher in ‘non-layoff’ sub-sample acquisitions than in ‘layoff’ sub-sample acquisitions. This could be explained by the fact that layoff sub-sample firms are underperforming firms and therefore wage growth is lower than the wage growth in ‘non-layoff’ sub-sample firms, which are assumed to be highly profitable both before and after acquisitions.

1.5 Conclusions

The value-creation theory suggests that most takeovers are motivated by the desire to gain synergies resulting from the combination of two businesses, or to discipline underperforming management. According to this theory, mergers should reduce the derived labour demand, controlling for wages and output. Also employee profitability should be improved, enabling employees to earn higher salaries after mergers. Decline in labour demand should be greater in acquisitions that involve layoffs than in acquisitions that do not.

The results of this analysis show that mergers significantly reduce the derived labour demand during the merger year. In the merger year merging firms experience 10% decline in labour demand. Furthermore, the results reveal that mergers cause long-run adjustment in the use of labour input: mergers reduce labour demand by another 9% two years after completion of such transactions.

The difference between the performance of related versus unrelated mergers indicates the existence of a wider scope for synergy in the former: during the merger year decrease in labour demand is larger in related acquisitions than in unrelated acquisitions, while in the long run neither related nor unrelated acquisitions change labour demand. However, both hostile and friendly mergers lead to approximately the same size of labour demand reduction in both the short and the long run. Thus we conclude that merger-related synergy is one of the main sources of decline in labour demand.

One of the main contributions of this chapter is that it provides further evidence showing that employee layoffs are motivated by merger-related efficiency improvements in labour usage. The results show that the derived decline in labour demand is greater in ‘layoff’ acquisitions than in ‘non-layoff’ acquisitions: short-run decline in labour demand is greater in the former case than in the latter case, while in the long run only ‘layoff’ acquisitions cause lower labour demand, while ‘non-layoff’ acquisitions do not change labour demand. The preliminary analysis also indicates that the layoff-making acquirers’ output significantly declines during the post-merger years, whereas non-layoff-making acquirers’ output volume increases significantly during the post-merger years. This indicates that layoffs were undertaken at least to arrest further deterioration in firm performance.

Furthermore, the results show that mergers accelerate wage growth: wage growth in merging firms is higher by 5% two years after the merger completion year and 10% three years after the merger completion year. Neither the relatedness nor the hostility classification reveals any difference in wage growth, but classification of mergers into ‘layoff’ and ‘non-layoff’ sub-samples reveals a significant difference between the wage growths in these two sub-samples. ‘Non-layoff’ acquirers’ wage growth is significantly higher than the wage growth in non-merging firms, while ‘layoff’ acquirers’ wage growth is not different from the wage growth in non-

merging firms. This confirms the view that employee layoffs are undertaken in firms with financial and operational difficulties.

Overall, the results of this chapter do not show a significant adverse effect of mergers on employees, taking into consideration both long-run employment and wage growth after mergers. The absolute number of employees does not fall, but acquiring firms achieve efficiency in labour usage. At the same time, mergers benefit employees by accelerating their wage growth.

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