CENTRE FOR RESEARCH ON GLOBALISATION AND LABOUR MARKETS

The Impact of Mergers and Acquisitions on Company Employment in the United Kingdom

by

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Abstract

This paper provides a systematic empirical analysis of the effects of take-over and merger activity on firm employment in the United Kingdom using a specially constructed database for the period 1967-1996. Our results indicate that significant rationalisations in the use of labour occur as firms reduce joint output and increase efficiency post-merger. These effects are particularly pronounced in the case of related and especially hostile mergers.

Outline

1. Introduction
2. The Impact of Mergers on Employment
3. Employment Determination
4. Database Construction and Sample Characteristics
5. Results
6. Conclusions

Non-Technical Summary

A popular view is that merger and acquisition behaviour inevitably leads to, and indeed is motivated by, the possibility of drastically downsizing the workforce. Within the economics literature this view has been given expression in the notion of 'breach of trust' which argues that an important reason for merger activity is the opportunity that it offers owners to renege on implicit and explicit labour contracts. Merger activity of this form has implications for corporate governance. Whilst shareholders may gain from such a breach of trust, other stakeholders will suffer and the net consequences are far from clear. Furthermore there may be systemic costs if the destruction of trust inhibits subsequent investment in job specific human capital by employees. Such a view has been used to argue for legislation, which would directly or indirectly restrict take-over and merger activity. It also raises issues for the development of any European Union policy towards a harmonisation of merger behaviour across member states. There is a considerable disparity between countries, such as the UK, which have an *exit* based governance system, in which the ultimate discipline over managers lies in the shareholder's ability to sell control rights to the highest bidder, and those continental countries, most notably Germany, where the *voice* of stakeholder groups determines corporate control. In the former case hostile take-overs are commonplace in the latter they are almost unknown. Any move towards harmonisation necessarily needs to be informed by empirical evidence on the actual consequences of take-over activity for the economy.

The purpose of this paper is therefore to provide a systematic empirical analysis of the effects of different types of take-over and merger activity on firm employment in the UK. To this end the paper uses a unique data set which contains information on the population of UK firms for the period 1967 to 1996, with information on in excess of 400 mergers. This is the largest UK data set on merger activity so far constructed. This sample is of particular interest as it includes the merger waves of the 1980s and early 1990s which are excluded from earlier studies. It presents the results of estimating labour demand functions which, by controlling for changes in wages or output that may occur post merger, allow an assessment to be made of the efficiency inducing impact of acquisitions. It examines not just the immediate impact of mergers on employment, but also the adjustment process through time. It therefore allows some assessment to be made of the growth inducing (or otherwise) effect of merger activity. The paper finds that mergers do indeed induce efficiency in the use of labour with this effect being particularly pronounced for related and hostile acquisitions. The results are also indicative of there being substantial efficiency effect variations across the sample, with smaller acquirers tending to show greater labour demand falls than their larger counterparts. The statistical analysis also indicated significant falls in output post-merger. This is consistent with the high levels of post-merger voluntary divestment reported for large UK firms for this period.

1   Introduction.

'General Accident and Commercial Union's £14.1bn merger will create one of Europe's biggest insurance and asset management groups.....The two UK-based groups, which began formal talks two months ago, said 5,000 jobs would be lost over two years out of a workforce of 53,000, with 60 per cent of the losses in Britain, where 21,000 are employed. ....The job cuts will fall across the entire country, but London will be more heavily hit than either Perth or York, where the GA's fast-growing life operations are headquartered. Considerable savings will be derived from switching to common information technology systems.' Financial Times, February 26th 1998.

The purpose of this paper[i] is to provide a systematic empirical analysis of the effects of take-over and merger activity on firm employment amongst a large sample of UK firms. A popular view is that such merger and acquisition behaviour inevitably leads to, and indeed is motivated by, the possibility of drastically downsizing the workforce. Within the economics literature this view has been given expression in the notion of 'breach of trust' (Shleifer and Summers, 1988) which argues that an important reason for merger activity is the opportunity that it offers owners to renege on implicit and explicit labour contracts.

Merger activity of this form has implications for corporate governance. Whilst shareholders may gain from such a breach of trust, other stakeholders will suffer and the net consequences are far from clear. Furthermore there may be systemic costs if the destruction of trust inhibits subsequent investment in job specific human capital by employees (Blair, 1995). Such a view has been used to argue for legislation, which would directly or indirectly[ii] restrict take-over and merger activity. It also raises issues for the development of any European Union policy towards a harmonisation of merger behaviour across member states. There is a considerable disparity between countries, such as the UK, which have an *exit* based governance system, in which the ultimate discipline over managers lies in the shareholder's ability to sell control rights to the highest bidder, and those continental countries, most notably Germany, where the *voice* of stakeholder groups determines corporate control[iii]. In the former case hostile take-overs are commonplace in the latter they are almost unknown. Any move towards harmonisation necessarily needs to be informed by empirical evidence on the actual consequences of take-over activity for the economy.

The empirical evidence relating to the employment impact of mergers and acquisitions is extremely limited. Brown and Medoff (1988), who conduct an econometric study for a large sample of firms in Michigan for the period 1978-1984, suggest that the impact of ownership change on employment depends on the type of acquisition being considered. Whilst asset only sales lead to a 5% decrease in employment, simple sales (where a firm changes ownership without being integrated into the acquiring firm) and true mergers (where the acquired and the acquiring firm combine to form a new entity) lead to increases in employment. The generality of their conclusions are open to question however. By concentrating on a single US state, Brown and Medoff (1988) exclude interstate acquisitions that dominate large-scale take-overs. They are also unable to distinguish between hostile and friendly acquisitions. Lichtenberg and Seigel (1992) further argue that it is important to distinguish between the type of worker considered. They find that whilst ownership change reduces employment in central offices there is little impact on production workers.

The aim of this paper is to shed additional light on the impact of mergers and acquisitions using employment data for the United Kingdom. To this end it uses a unique data set which contains information on the population of UK firms for the period 1967 to 1996, with information on in excess of 400 mergers. This is the largest UK data set on merger activity so far constructed. This sample is of particular interest as it includes the merger waves of the 1980s and early 1990s which are excluded from earlier studies. The focus on labour market consequences in this paper also contrasts with other UK studies of mergers, which have typically focused on product market and capital market issues.[iv] It presents the results of ceteris paribus derived labour demand functions which, by controlling for changes in wages or output that may occur post merger, allow an assessment to be made of the efficiency inducing impact of acquisitions. Further, by using a dynamic panel estimation procedure it is possible to examine not just the immediate impact of mergers on employment, but also the adjustment process through time. It therefore allows some assessment to be made of the growth inducing (or otherwise) effect of merger activity.

The organisation of the paper is as follows. Section two discusses rival theories relating to the motivations of mergers and their consequent impact on corporate employment. Section three details the econometric modelling strategy with section four discussing the database

construction and characteristics. Section five then presents the estimation results. Finally section six concludes and offers some implications to guide policy in this area.

2 The Impact of Mergers on Employment

It is difficult to extract strong predictions about the employment consequences of acquisition activity from the extensive literature on merger theories. Whilst it seems reasonable to assume that mergers instituted by profit-maximising managers are more likely to be followed by cost savings and employment losses than those undertaken by managers anxious to empire build or dissipate free cash flow (Jensen, 1986), the actual employment outcome would appear to depend on the complementarities between the merged entities and on the post-merger market position. Nevertheless, certain conjectures relating post-merger employment to merger type may be advanced: First, employment losses appear likely to be more substantial in horizontal mergers than in vertical or unrelated cases, particularly where the industry exhibits substantial economies of scale and/or surplus capacity (Dutz, 1989); Second, where vertical mergers are undertaken to reduce transactions costs (Williamson, 1975) the result is likely to be employment reducing unless the gains resulting from cost and price reductions are sufficient to offset job losses in the sales function of the upstream firm and the procurement function of the downstream party.

Where the transaction involves an unrelated acquisition the outcome is particularly problematic. As noted above, if an unrelated acquisition is made by managers primarily motivated by the desire for diversified firm earnings and a reluctance to disgorge free cash flow there will be no presumption of job losses. However, if the transaction is seen as a disciplinary one in which the market for corporate control operates so as to divert assets into the hands of more diligent or talented managers, in the manner suggested by Manne (1965), cost economies and labour savings may realistically follow. Finally, it has been argued, since Williamson (1963), that some managerially controlled firms depart from cost-minimisation as managers indulge their preferences for particular expenditures, especially labour. Where such management teams are able to use the takeover process to acquire control over additional assets, whether these are related to the acquirer's core activity or not, it seems not unreasonable to expect that additional opportunities will arise to indulge expense-preference behaviour (Edwards, 1977). Conversely, should such management teams be displaced during

the takeover process it is likely that a reversal to profit-maximisation will lead to lower labour intensity.

As noted in the introduction, Shleifer and Summers (1988) have argued that a change in ownership permits the new managers to renegotiate the implicit terms of employment of existing workers. This, they suggest, leads to a "breach of trust" insofar as it violates previous expectations attaching to the employees' implicit labour contracts. This behaviour is likely to follow an acquisition - particularly a hostile one - for two principal reasons: first, any managerial team that has successfully completed a hostile take-over would appear to pose a credible threat in any confrontation with labour, a credibility which is enhanced where debt used to effect the take-over raises the threat of bankruptcy; second, precisely because the managerial team is new it has not developed ties to existing activities and employees in the way that an established management would. Bhagat et al (1990) have reported that hostile mergers do tend to be followed by job losses, particularly among white-collar workers. Franks and Mayer (1996) confirm this association for the UK and argue that friendly and hostile mergers are often differentiated by the incumbent management's opposition to further divestment.

3   Employment Determination

How should we think about modelling the impact of mergers on labour usage within the firm? At its simplest, mergers and acquisitions may be represented as a change from one optimal level of employment to the other. This is illustrated in figure one. In the company, the pre-merger level of employment of the two firms is given by L_1 and L_2 respectively with merger occurring at time t. If the production technology exhibits constant returns to scale (CRTS, $g_1 + g_2 = 1$) then (assuming no change to the price of relative factor prices) the combined company should produce at a level of output and employment equal to the sum of those of the individual firms. If on the other hand the technology exhibits increasing returns to scale (IRTS, $g_1 + g_2 > 1$) then the combined firm should be able to produce the combined output of the individual firms using a smaller amount of total labour.
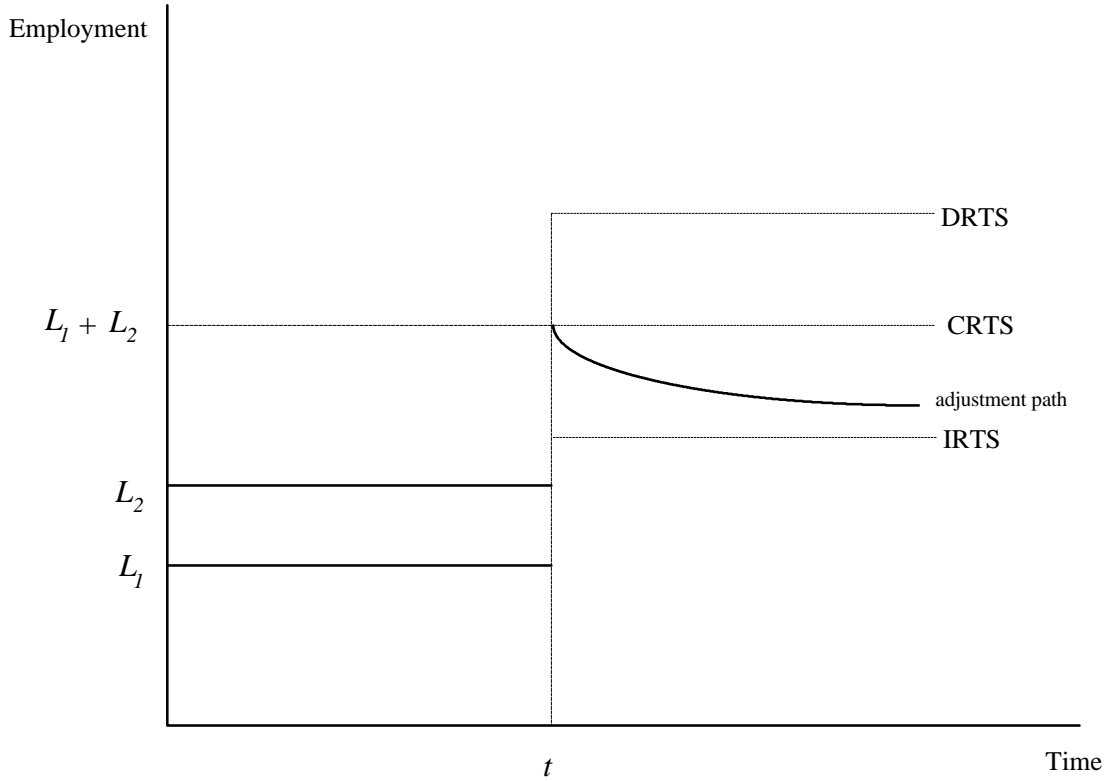
Figure One: Employment adjustment following a merger

If the optimal employment size is different to that of the two merging firms then an adjustment in the labour force must take place. However, movement to this desired level of employment is not instantaneous, and the firm will face a trade-off between the costs of more rapid adjustment to the optimal employment level and the cost of being away from the optimum. Bresson et al (1996) consider an output constrained firm[v] which faces quadratic adjustment costs and has Cobb-Douglas technology, where Q_t is production at time t, K_t is capital, and L_t is the amount of labour used in the production process.

$$\ln Q_t = a + g_1 \ln K_t + g_2 \ln L_t \tag{1}$$

The firm's problem may be characterised as minimising:

$$COST_t = E_t \sum_{t=1}^{\infty} \left(\frac{1}{1+r}\right)^t [C_{t+t} K_{t+t} + W_{t+t} L_{t+t} + \frac{d}{2}(\Delta L_{t+t})^2 + \frac{e}{2}(\Delta K_{t+t})^2] \qquad \forall t \tag{2}$$

subject to:

$$g(K_{t+t}, L_{t+t}) = Q_{t+t} \qquad \forall t \tag{3}$$

Where E_t denotes an expectation formed at time t, W_t is the wage rate, C_t is the user-cost of capital and r is the discount rate. Assuming rational expectations, an explicit solution to these equations may be derived by taking linear approximations to the Euler equations in the neighbourhood of the long run solution ($e = d = 0$). Using this procedure the optimal path for employment is given by the expression:

$$L_t = \mathsf{m}L_{t-1} + (1-\mathsf{m})(1-\mathsf{am})\sum_{\mathsf{t}=0}^{\infty}(\mathsf{am})^{\mathsf{t}} L_{t+\mathsf{t}}^* \tag{4}$$

Where L^* is the desired level of employment. If changes in employment are small enough from period to period then one can use the log approximation (where lower case denotes variable in logs):

$$l_t = \mathsf{m}l_{t-1} + (1-\mathsf{m})(1-\mathsf{am})\sum_{\mathsf{t}=0}^{\infty}(\mathsf{am})^{\mathsf{t}} l_{t+\mathsf{t}}^* \tag{5}$$

The desired level of employment $l_{t+\mathsf{t}}^*$ may be obtained by solution of the firm's optimisation problem in the absence of adjustment costs. In a static context, a profit-maximising firm will employ labour and capital at such levels that the marginal revenue product of labour equals the wage and the marginal revenue product of capital equals the user cost. This implies a derived demand for labour of the following form, where the desired level of labour demand depends on the expected production levels ($q_{t+\mathsf{t}}^*$) and on the expected labour to capital costs ratio ($(w-c)_{t+\mathsf{t}}^*$):

$$l_{t+\mathsf{t}}^* = a_1 q_{t+\mathsf{t}}^* + a_2 \left(w-c\right)_{t+\mathsf{t}}^* + a_3 + \mathsf{e}_{t+\mathsf{t}} \tag{6}$$

Hence the final equation in terms of observed variables is given by[vi]:

$$l_t = \mathsf{a}\, l_{t-1} + \mathsf{b}_0 (w-c)_t + \mathsf{b}_1 (w-c)_{t-1} + \mathsf{d}_0 q_t + \mathsf{d}_1 q_{t-1} + f + \mathsf{e}_t \tag{7}$$

Movement to the new equilibrium level may be monotonic or cyclical depending on the parameter estimates obtained. A monotonic adjustment path is illustrated in figure one.

Note that in the empirical work individual data series are observed for both firms prior to the merger and for the joint firm post merger. The series used in the data analysis apply to the combined entity. This controls for the jump in employment that would be observed in the

employment of the acquiring firm and might be used to infer a spurious impact of merger on labour usage.

Several augmentations are possible. Nickell (1984, 1986) shows that the dynamic lag structure on employment may need to be increased if the adjustment process involves altering the optimal employment mix between distinct categories of worker. Time dummies D_{t+t} may additionally be included to account for changes in technological progress.

In the empirical, work allowance is made for the fact that mergers may change the efficiency with which labour is used subsequent to the merger. The principal method used to control for the impact of mergers and acquisition on employment levels is by the introduction of dummy variables. For example, to allow for the fact that there might be differing opportunities for rationalisation if mergers occur between firms in the same 2-digit industrial sector than if they merge with firms in separate industries, the following regression was run (model one):

$$
\begin{aligned}
l_{it} = a\, l_{it-1} + b_0 w_{it} + b_1 w_{it-1} + d_0 q_{it} + d_1 q_{it-1} \quad + g_0 R_{it} + g_1 U_{it} \\
+ \sum_{d=1}^{6} p_d (IND_d \times t) + f_i \quad + e_{it}
\end{aligned}
\tag{8}
$$

Where $R_{it} = 1$ if firm i is involved in related merger activity at time t and 0 else; while $U_{it} = 1$ if firm i is involved in unrelated merger activity at time t and 0 else. ($IND_d \times t$) denotes the interaction of industrial dummies (firms are grouped into six broad categories) and time dummies that allows for differential employment growth between industries. Finally f is a firm specific effect that reflects intra-firm differences in technology, management and the user cost of capital[vii] etc. and e_{it} is an equation disturbance term.[viii]

To investigate the differential impact of hostile and friendly merger activity on employment determination the following analogous regression was run (model two):

$$
\begin{aligned}
l_{it} = a\, l_{it-1} + b_0 w_{it} + b_1 w_{it-1} + d_0 q_{it} + d_1 q_{it-1} \quad + g_0 H_{it} + g_1 F_{it} \\
+ \sum_{d=1}^{6} p_d (IND_d \times t) + f_i \quad + e_{it}
\end{aligned}
\tag{9}
$$

Where $H_{it} = 1$ if firm i is involved in hostile merger activity at time t and 0 else; while $F_{it} = 1$ if firm i is involved in friendly merger activity at time t and 0 else.

8

Following the seminal work of Anderson and Hsiao (1982), one can secure consistent estimates of the parameters of dynamic panel models with fixed effects by applying appropriate instrumental variables techniques to the first differenced equations[ix]. Since the disturbances of the first differenced models are correlated within firms by construction, a generalised instrumental variables or a generalised method of moments estimation is required.

$$
\Delta l_{it} = a\, \Delta l_{it-1} + b_0 \Delta w_{it} + b_1 \Delta w_{it-1} + d_0 \Delta q_{it} + d_1 \Delta q_{it-1} \quad + g_0 \Delta R_{it} + g_1 \Delta U_{it}
$$
$$
+ \sum_{d=1}^{6} p_d (IND_d \times t) + \Delta e_{it}. \tag{10}
$$

The γ's in models 1 and 2 measure the contemporaneous merger effects. To examine the lagged (dynamic) effects of merger activities some manipulation of the basic model is required. In order to determine the effect on employment one period after merger, we can substitute for l_{it-1} in equation (10) to give:

$$
\Delta l_{it} = a^2 \Delta l_{it-2} + b_0 \Delta w_{it} + (b_1 + ab_0)\Delta w_{it-1} + ab_1 \Delta w_{it-2} + d_0 \Delta q_{it} + (d_1 + ad_0)\Delta q_{it-1}
$$
$$
+ ad_1 \Delta q_{it-2} \quad + g_0 \Delta R_{it} + ag_0 \Delta R_{it-1} + g_1 \Delta U_{it} + ag_1 \Delta U_{it-1} + \sum_{d=1}^{6} ap_d IND_d + \Delta e_{it}. \tag{11}
$$

The coefficient on ΔR_{it-1} will then measure the employment impact of a merger that occurred in the previous period after controlling for all the other changes that have affected firm employment in the current and last period.

Continuous substitution of the basic model may be used to study the lagged effects of any dimension. In the final analysis, the following five first differenced versions of our models are considered to identify the lagged effects of mergers on employment, for $T=0....4$.

$$
\Delta l_{it} = a^{T+1} \Delta l_{it-1-L} + \sum_{r=0}^{T} a^r b_0 \Delta w_{it-r} + \sum_{r=0}^{T} a^r b_1 \Delta w_{it-1-r} + \sum_{r=0}^{T} a^r d_0 \Delta q_{it-r}
$$
$$
+ \sum_{r=0}^{T} a^r d_1 \Delta q_{it-1-r} \quad + \sum_{r=0}^{T} a^r g_0 \Delta R_{it-r} + \sum_{r=0}^{T} a^r g_1 \Delta U_{it-r} \tag{12}
$$
$$
+ \sum_{d=1}^{6} \sum_{r=0}^{T} a^r p_d IND_d \quad + \sum_{r=0}^{T} a^r \Delta e_{it-r}.
$$

4   Database Construction and Sample Characteristics

The database used in this study is constructed from a variety of sources so as to be as comprehensive as possible. The primary sources of information relating to mergers and acquisitions were developed from the London Share Price Database (1975-96) and the Cambridge/DTI Databank of Company Accounts (1967-77). These allowed the identification of more than 1400 mergers and acquisitions made by some 1000 firms for the period 1967-96.   Take-overs involving foreign or nationalised companies were not considered[x]. Economic and financial data were collected by combining the Datastream on-line service with the merger and acquisition database. Since our intention was to study the employment effects of acquisitions via a dynamic labour demand model, we have screened our sample for data availability on employment, wages and sales for at least three consecutive years[xi]. This reduced the sample size to 442 potentially useful mergers made by some 277 companies.

The mergers were then classified into related and unrelated depending on whether the acquired and acquiring companies belonged to the same 2-digit SIC code[xii]. Table 1 gives the frequency distribution of the acquisitions by year and by type, with Table Two showing the industrial composition of the sample.

For a more limited time period (1983-96) it was also possible to classify 159 acquisitions according to whether they were friendly or hostile using information obtained from *Acquisitions Monthly* and *The Financial Times*.

An industry-stratified random sample of 298 firms was drawn from the population of firms to act as a control group over the sample period. As with the sample of mergers, it was required that the relevant economic information is available for at least three consecutive years. Also, in order to guard against unrecorded acquisitions in the control group, firms with an annual growth rate of total assets exceeding 100% were excluded. The balance of the resulting panel is reported in Table Three, and a statistical comparison of acquirers and controls is detailed in Table Four.

Tables five to seven give the results of some preliminary statistical analysis of the data. Table five indicates that acquisitions tend to be undertaken by larger firms, with acquiring firms being more than three times the size of those acquired. Acquiring firms also pay their

employees significantly higher wages with both of these effects particularly true in the case of unrelated acquisitions. Finally, labour productivity also appears to be higher in firms acquiring competitors in the same sector, which is not the case for related mergers.

Tables six and seven conduct a basic univariate analysis to examine the post-merger trajectory of employment and output in the combined companies. This is achieved by estimating equations of the form:[xiii]

$$y_{it} = a_s y_{it-s-1} + \sum_{j=-\infty}^{s-1} d_j M_{it-j} + l_s M_{it-s} + e_{it} \qquad (13)$$

where *M* stands for the appropriate merger dummies , y = {ln(employment), ln(output)} and s = {0,1,2,3,4}. The λ's gives the percentage growth in the relevant variables *s* years after the mergers compared to the pre-merger values of the combined companies. The results suggest very different outcomes depending on the type of merger considered, with the employment of related acquisitions falling significantly post merger and approximately in proportion to the fall in output. This implies that post merger output per worker is approximately constant. In the case of hostile take-overs even larger employment falls are noted and some gain in output per worker seems apparent. With friendly acquisitions employment falls are both smaller and felt in the first year post acquisition.

Although these results are instructive of the changes in firm organisation that occur post merger, they are essentially based on a univariate analysis. As such they do not control for changes in wages or output which may occur post merger. They also do not allow for the impact that changes in scale may have on the use of labour and as such they do not allow for an assessment to be made of the efficiency inducing impact of acquisitions. The next section discusses the result of estimating *ceteris paribus* derived labour demand functions.

5   Results

(a) Contemporaneous results

The results of estimating models one and two are summarised in Tables 8 and 9 respectively. Column one reports the results for the full sample and subsequent columns split the sample according to the size of the firm. Since consistency of parameter estimates requires the

absence of second order serial correlation, test statistics are provided, as are J-stats of instrumental validity.

For all specifications the results yield point estimates which correspond to those predicted by the dynamic theory of labour demand. Wage increases cause statistically significant decreases in the levels of derived labour demand, both in the short run and in the long run, and increases in sales cause the level of derived labour demand to increase. The positive and significant coefficient on the lagged dependent variable additionally indicates that the employment level exhibits inertia and wages and output have persistent effects[xiv]. In all cases the equations perform well statistically and instrumental validity and lack of second order serial correlation cannot be rejected.

Turning to the impact of mergers and acquisitions on the demand for labour, Table Eight indicates that there is a significant reduction in the use of labour post merger- amounting to 19% for related firms and 8% for unrelated mergers. This presumably reflects the differing scope for rationalisations possible in the two situations. To analyse this effect further, Table Eight disaggregates the sample according to firm size. This indicates that firms in the lower half of the size distribution achieve efficiency gains at least twice those in the upper half, both for related and unrelated acquisitions.

Table Nine indicates that hostile mergers also have a dramatic impact on derived labour demand. Firms that have been involved in hostile acquisitions reduce their derived labour demand by twice the amount of firms involved in friendly acquisitions. There appears however to be a sharp distinction depending on whether or not the upper or lower half of the size distribution is considered, with the impact of hostile acquisitions being concentrated amongst larger firms and the impact of friendly acquisitions amongst smaller ones.

(b) Lagged effects

Since it is possible that the organisational impact of mergers on labour may not be felt immediately Tables Ten and Eleven allow for the possibility that rationalisations in the use of labour may continue to occur in years subsequent to the merger using the methodology discussed earlier (see equation 12). Once again the results depend on the type of merger considered. For related mergers there are persistent falls in labour usage for two years post

acquisition. Again this appears to be largely due to rationalisations in labour usage for firms in the lower half of the size distribution.

Hostile mergers also have a continuing impact on efficiency post merger, with significant falls in employment observed even in the fourth year after the merger for firms in the upper half of the size distribution.

Finally, table eleven controls for the possibility that the ability to rationalise labour may depend on the size of the merger being considered. A non-linear term is introduced into the estimating equation such that smaller firms' may adjust differentially to larger firms:

$$
\begin{aligned}
l_{it} = a\, l_{it-1} + b_0 w_{it} + b_1 w_{it-1} + d_0 q_{it} + d_1 q_{it-1} \\
+ g_0^* R_{it}^* + g_1^* U_{it}^* + \sum_{d=1}^{6} p_d (IND_d \times t) + f_i + e_{it}
\end{aligned}
\tag{14}
$$

Where, $R_{it}^* = R_{it} * l_{it}^*$, and l_{it}^* denotes the combined size of the acquired and acquiring firm. The results obtained give point estimates of similar magnitude to previously. They also serve to confirm our earlier findings that related and hostile acquisitions have the largest negative impact on labour usage.

(c) Other impacts of mergers on employment

The above discussion has been considering the impact of employment on the derived level of labour demand. That is, we have been asking if, for a given level of output and wages, do mergers induce efficiency effects in the use of labour? These results indicate that mergers do indeed induce efficiency in the use of labour with this effect being particularly pronounced for related and hostile acquisitions. The results are also indicative of there being substantial efficiency effect variations across the sample, with smaller acquirers tending to show greater labour demand falls than their larger counterparts. But, the basic statistical analysis also indicated significant falls in output post-merger. This is consistent with the high levels of post-merger voluntary divestment reported for large UK firms for this period by Haynes et al (1997).

If divestment follows acquisition, a fuller investigation of the employment effects of the latter would necessarily involve following up the second round consequences as divisions and subsidiaries are disposed of. However, it would be extremely difficult to undertake such

an investigation: First, since the disposals are parts of firms rather than entire companies the necessary information would be simply unavailable in many cases; Second, with the exception of management buyouts, one company's divestment is another company's acquisition such that tracing the employment consequences of merger becomes a problem of infinite regress. In any event following up second and subsequent round effects is beyond the scope of the present paper. This does mean, however, that overall assessments of the employment consequences need to be treated as first round approximations.

The downsizing of merged firms through divestment could also impact upon the observed efficiency of the retained parts of the business. Consider a post-merger conglomerate firm undertaking a divestment: if inefficient operations were divested then we would observe $\left|\Delta \ln l\right| > \left|\Delta \ln Q\right|$ and so the conglomerate would appear to increase in efficiency and vice versa. It is possible that this effect is being picked up in this paper's results, although at this stage we are unable to say whether firms divest themselves of their more successful businesses, to raise greater cash flow, or their less successful to permit performance improvements. Further analysis of this possibility remains for future work.

6 Conclusions

This paper has provided a systematic empirical analysis of the effects of take-over and merger activity on firm employment in the United Kingdom, using a specially constructed database for the period 1967-1996. It has distinguished between the effects of related versus unrelated mergers and hostile versus friendly mergers. The paper finds that merger activity is followed by substantial and statistically significant employment and output falls. It then models the demand for labour across a large sample of acquiring and non-acquiring UK firms using an unbalanced panel with first-differencing to remove firm-level fixed effects. The paper finds that related and hostile merger activity is followed by large falls in labour demand which, having controlled for output changes, may be interpreted as being consistent with increased efficiency of labour utilisation. There is some evidence that smaller acquirers make proportionately larger reductions in labour demand than their larger counterparts.

Whilst the results are generally consistent with the view that merger activity, particularly related and hostile merger activity, promotes efficiency, two caveats should be added: First, if the employment reductions observed constitute a reneging on the implicit terms of the

labour contract, in the sense of Shleifer and Summers (1988), there may be associated costs generated through subsequent reductions in firm-specific human capital investment by employees. This will manifest itself in lower output levels but any such changes would be very hard to calculate.

Second, it was seen that both employment and output fell subsequent to an acquisition. It was suggested that this was indicative of high levels of post-merger divestment, a phenomenon much observed among large UK firms over the period. As we are unable to observe employment and output changes in the divested units, it is not possible to be sure that the merger process as a whole is labour-saving. However, it should be noted that divestments essentially will fall into two categories, sales to existing firms and sales to new companies created by management buyouts. In the former case, the divesting firm's sale of a subsidiary or division is also an acquisition for the third party and hence, *ceteris paribus*, may be expected to produce similar results to the other take-overs evaluated here. In the latter case there exists a growing body of theoretical and empirical evidence to suggest that management buyouts are efficiency-promoting [e.g. Kaplan (1989)]. Therefore, while further research to determine the full consequences of post-merger restructuring would clearly be useful, our results remain indicative of substantial labour savings.

Table 1

Frequency of studied mergers by year

Year	Related	Unrelated
1967-69	19	46
1970-79	44	90
1980-89	69	94
1990-96	46	34
Total	178	264

Table 2

Industrial composition of sample firms

Industry	Acquirers	Controls
Mineral Extraction	7	4
General Manufacturing	141	181
Consumer Goods	34	19
Services	88	76
Utilities	3	10
Financials	4	8
Total	277	298

Table 3

Balance of the panel

Number of time series	Acquirers	Controls
3 – 6	57	54
7- 10	57	125
11-16	141	107
17-30	22	12
Total	277	298

Table 4
Summary statistics for acquirers and controls

Variables	Acquirers			Controls		
	Mean s.d	Within s.d	Between	Mean s.d	Within s.d	Between
Levels						
Employment	14229	8316	21857	3626	3125	13360
Wages/worker	10.87	3.23	4.36	10.66	1.88	4.37
Output/worker	73.31	51.9	107.6	68.18	45.6	85.0
Growth rates						
Employment	4.99%	.36	.16	3.07%	.20	.11
Wages/worker	2.25%	.17	.073	1.93%	.17	.04
Output/worker	2.35%	.21	.10	1.97%	.19	.05

Note: s.d stands for standard deviations.

Table 5

Paired t-tests for acquiring and acquired
firms a year prior to the mergers

Merger type and variable	Acquiring	Acquired	p-value |difference| >0
Related			
Employment	8984	2274	0
Wage rate	11.29	10.41	.005
Output/worker	73.12	67.02	.11
Unrelated			
Employment	16231	2844	0
Wage rate	11.14	9.73	.001
Output/worker	75.48	76.39	.54

Table 6

Post merger % change in employment and output
Related vs unrelated

Merger type and variable	t+1	t+2	t+3	t+4
Related				
Employment	-10.3*	-10.3*	-11.4*	-9.8*
Output	-10.5*	-9.4*	11.9*	-9.1*
Unrelated				
Employment	2.8	1.2	0	0
Output	0	-2.9	-2.2	-3.4*

Table 7

Post merger % change in employment and output
Friendly vs hostile

Merger type and variable	t+1	t+2	t+3	t+4
Friendly				
Employment	-6.6*	0	-1.5	1.3
Output	-5.8*	0	-2.1	1.7
Hostile				
Employment	-12.7*	-21.1*	-12.9*	-16.7*
Output	-14.7*	-15.2*	-6.1	-10.3*

Notes:

(i) The figures in the above tables refers to differences between the post-merger values of the acquiring firms and the combined (acquired and acquiring) values of the respective variables one year prior to the mergers (i.e. $t - 1$)

(ii) (*) denotes significant differences (at 10% level) from the pre-merger values, where the standard errors of the regression parameters are robust to arbitrary heteroscasticity and within-firm serial correlation.

Table 8
Base specification Model One:
Dependent variable: $employment_{it}$

Independent variables	Whole sample	Lower half	Upper half
$employment_{it-1}$	.83 (4.24)	.67 (5.39)	.95 (2.16)
$wages_{it}$	-.54 (3.82)	-.58 (4.47)	-.53 (2.19)
$wages_{it-1}$	.47 (2.79)	.46 (3.06)	.43 (1.63)
$output_{it}$	.72 (14.63)	.72 (11.17)	.71 (9.14)
$output_{it-1}$	-.57 (3.11)	-.38 (3.12)	-.64 (1.73)
$Related_{it}$	-.19 (4.20)	-.29 (3.79)	-.13 (2.21)
$Unrelated_{it}$	-.08 (2.50)	-.13 (1.37)	-.07 (1.62)
Industry-time Dummies	Jointly Significant	Jointly Significant	Jointly Significant
No. of obs.	4430	2106	2324
J-stat p-value	.94	.86	.92
R-squared	43%	49%	35%
Serial correlation	.81	.12	.43

Notes:
(i) Estimation is by generalised instrumental variables regression after first differencing.
(ii) The set of instrumental variable candidates include lag values of employment, output, wages and fixed assets.
(iii) Absolute value of asymptotic t-ratios are in parentheses.
(iv) P-values for the validity of the set of instruments is defined as Prob(J-stat > C_s^2) , where s denotes is the number of over-identifying instruments and J-stat is the IV   minimand function evaluated at the parameter estimates.
(v) R^2 is defined as the squared correlation between the dependent variable and its predicted value.
(vi) The *serial correlation* row gives p-values for the null of no serial correlation in the levels equations . The figures reinforce the results from the J-tests which confirm the global validity of the instruments.
(vii) Lower and upper halves indicates below and above median employment observations.

Table 9
Base specification
Dependent variable: $employment_{it}$

Independent Variables	Sub-sample 1	Lower half	Upper half
$employment_{it-1}$	.88 (5.43)	.79 (3.83)	.62 (2.05)
$wages_{it}$	-.78 (5.53)	-.83 (10.91)	-.71 (3.10)
$wages_{it-1}$	.52 (3.23)	.60 (3.35)	.31 (1.59)
$output_{it}$	.87 (21.00)	.85 (17.87)	.89 (14.17)
$output_{it-1}$	-.71 (4.49)	-.59 (3.09)	-.51 (1.73)
$Hostile_{it}$	-.17 (2.33)	.21 (.91)	-.16 (3.01)
$Friendly_{it}$	-.09 (2.81)	-.21 (3.36)	-.03 (1.19)
Industry-time Dummies	Jointly Insignificant	Jointly Insignificant	Jointly Significant
No. of obs.	2218	1175	1043
J-stat p-value	.96	.91	.68
R-squared	47%	48%	42%
Serial correlation	.82	.91	.51

Table 10
Dynamics of merger effects on employment:
Percentage changes (and absolute values of asymptotic t-statistics)

	Lag (0)	Lag(1)	Lag(2)	Lag(3)	Lag(4)
Sample					
Whole sample					
Related	-19.3 (4.20)	-6.8 (2.91)	-6.8 (2.15)	-5.7 (1.58)	-5.1 (1.47)
Unrelated	-8.4 (2.50)	-1.4 (.59)	1.2 (.45)	-3.3 (1.1)	-1.2 (.36)
Lower half					
Related	- 29.2 (3.79)	-20.8 (3.10)	- 13.4 (2.20)	-12.3 (1.80)	-4.9 (.70)
Unrelated	-13.2 (1.37)	4.6 (.61)	-1.4 (.10)	-12.4 (1.52)	-11.3 (1.46)
Upper half					
Related	-12.9 (2.21)	-4.79 (1.79)	- 2.4 (.64)	-1.9 (.44)	-6.6 (1.89)
Unrelated	-6.7 (1.62)	0 (0.00)	0 (.10)	-3.1 (.75)	-3.1 (.89)
Sub-sample 1					
Hostile	-16.6 (2.33)	-9.4 (2.40)	-6.2 (1.29)	-5.5 (1.21)	-5.8 (1.16)
Friendly	-8.8 (2.810	-5.3 (2.20)	0 (0.00)	-2.7 (1.11)	-4.5 (1.47)
Lower half					
Hostile	21.0 (.91)	-1.0 (.04)	21.0 (1.44)	.26 (2.13)	22 (1.75)
Friendly	-21.4 (3.36)	-13.5 (2.20)	-9.4 (1.39)	-4.7 (.74)	-10.6 (1.34)
Upper half					
Hostile	-15.7 (3.01)	-7.4 (2.33)	-9.9 (2.36)	-12.9 (3.08)	-11.7 (2.84)
Friendly	-3.1 (1.19)	-1.5 (.69)	3.8 (1.27)	-2.2 (.85)	-1.9 (.77)

Table 11
Dynamics of merger effects on employment allowing for the size of the acquiring firm.
Percentage changes (and absolute values of asymptotic t-statistics)

	Lag (0)	Lag(1)	Lag(2)	Lag(3)	Lag(4)
Sample					
Lower half					
Related	- 28.7 (3.90)	-21.4 (3.22)	-13.1 (2.29)	-7.5 (1.78)	-4.2 (.65)
Unrelated	-14.9 (1.61)	-7.2 (.94)	-1.4 (.20)	-11.6 (1.52)	-10.2 (1.45)
Upper half					
Related	-11.5 (2.15)	-4.7 (1.82)	-2.8 (.85)	-1.9 (.46)	-6.5 (1.94)
Unrelated	-4.8 (1.73)	-.7 (.37)	-1.0 (.37)	-2.9 (.75)	-2.9 (.79)
Sub-sample 1					
Lower half					
Hostile	-19.1 (.84)	-2.1 (.13)	-21.3 (1.37)	-25.2 (2.05)	-23.7 (1.72)
Friendly	-22.3 (3.50)	-14.0 (2.40)	-9.1 (1.41)	-4.2 (.71)	-9.4 (1.29)
Upper half					
Hostile	-15.6 (2.96)	-6.8 (2.36)	-9.7 (2.33)	-9.7 (2.78)	-10.7 (2.89)
Friendly	-2.7 (1.01)	-1.8 (1.10)	.3 (1.27)	-3.6 (1.60)	-1.8 (.69)

Note :
(i)   The above coefficients are obtained by evaluating the estimates from Model 2 at the mean values of
the relevant merger sizes.

22

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Data Appendix

Table A1: Variables definitions and sources

Variable	Description	Source
l	Total employment	Datastream item 219
		DTI item t134
w	Total employment cost	Datastream item 215
		DTI item t135
q	Total sales	Datastream item 104
		DTI item t127
	Merger year indicator	LBS/DTI

Endnotes

[i] The authors would like to acknowledge the financial support of the Economic and Social Research Council under grant number R000221779.

[ii] It is useful to distinguish between calls for the adoption of a more restrictive merger policy per se - for example, one which shifts the burden of proof away from competition policy authorities having to show that a merger is against the public interest to one which requires the merging parties to demonstrate beneficial consequences - from proposals to alter corporate governance to empower other "stakeholders" in such a way as to restrict the take-over mechanism: for example, the reforms proposed by Kay and Silberston (1995) would make hostile take-overs: "virtually impossible in practice". (p. 95)

[iii] The different functions of merger activity across EU states are contrasted in Davis et al. (1993) For a comparison of the role of *exit* and *voice* see Thompson and Wright (1995).

[iv] For example, industrial organisation economists have generally found little improvement in firm profitability post-merger (e.g. Meeks, 1977, and Cowling et al, 1980).

[v] Note that other forms of labour demand function may be obtained depending on assumptions made concerning the predetermination of output and the capital stock, and assumptions made about the production and adjustment cost function. See Bresson et al (1996) p664.

[vi] Longer lags may be necessary for the exogenous variables depending on the precise assumptions made regarding their evolution.

[vii] The formulation adopted implicitly assumes that the difference between firms in the user cost of capital is constant over time. Their influence may therefore be removed by first differencing.

[viii] Sales replace real output/value added, as accounts data do not directly report the former. See Nickell et al (1992) for a discussion of the use of this variable.

[ix] Recently the fundamental assumption of pooling individual times series data has been questioned by Pesaran and Smith (1995). Their basic argument is that since valid instruments are hard to come by for heterogeneous dynamic panels, one is better off averaging parameters from individual time series regressions. This is not feasible in our context on two counts. Firstly the individual time series lengths are not adequate (95% of them have less than 15 observations) and secondly comparison of acquiring and non acquiring firms necessitate some sort of pooling. We have, however, performed our calculation for different sub-samples and size groups, thereby minimising the potential hazard of heterogeneity. Besides, we take comfort from a recent comparative study by Baltagi and Griffin [Journal of Econometrics 77 (1997) 303-327)] which concluded that efficiency gain from pooling is likely to more than offset the biases due to individual heterogeneity even with a moderately large T.

[x] Further details are available from the authors on request.

[xi] We also excluded companies making multiple acquisitions in one year.

[xii] For the DTI database we use the 1969 SIC code, whereas for the LBS database we employed, depending on availability, both the 1980 and 1992 SIC codes obtained from Datastream and the Office of National Statistics. For some acquisitions we also use the LBS 3-digit industrial grouping to determine the relatedness of the mergers.

[xiii] Time and industrial dummies are included in these estimations.

[xiv] The industry dummies indicate that general manufacturing and services have experienced lower ceteris paribus employment growth than the mineral, consumer manufacturing, utilities and finance sectors.