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Intra-Sectoral Labour Mobility and Adjustment Costs

By R.J.R.Elliott and J. Lindley

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Abstract

The ability of workers to change job, industry or occupation and the costs associated with a reallocation of labour in reaction to changes in economic circumstances is the subject of lively debate among academics and policy makers. This paper examines recent sectoral and industrial adjustment in the UK between 1995 and 2000 using data from the *Quarterly Labour Force Survey*. We explore the nature of adjustment within the manufacturing sector and examine the consequences of `within' and `between' industry adjustment on individual wages and the transition into and out of unemployment. Skill specificity, mobility costs and higher ex-ante returns are shown to significantly affect `within' and `between' industry adjustment in different ways. Industry skill specificity is thought to be an important determinant of earnings since there are wage losses to `between' industry movers and wage gains to `within' industry movers. In addition intra-industry trade contributes to 'within' industry mobility although there is little evidence that openness to trade makes any significant contribution to the displacement of workers.

Outline

1. Introduction
2. The data
3. Results
4. Conclusion

Non-Technical Summary

The ability of workers to change job, industry or occupation and the costs associated with a reallocation of labour in reaction to changes in economic circumstances is the subject of lively debate among academics and policy makers. Ever-closer global economic integration has resulted in significant changes in the flows and composition of trade and final demand as well as changes in technology and government regulations. These factors have contributed to shifts in global production patterns both temporary and permanent.

The effects of globalisation on the developed world's labour markets is therefore, coming under ever closer scrutiny not least because trade and technological changes are seen as being responsible for two major developments in the labour market. The first effect is on the status of the low skilled and least qualified who are seen as more likely to experience longer periods of unemployment or a relative decline in their long-term wages. The second is because trade and technology changes are seen as a possible cause of reduced job stability as the number of job changes and moves at the sector, industry, occupation or regional level increase.

In this paper we examine the relation between different types of labour mobility, earnings, skill specificity and employment status. The mobility of factors of production, specifically labour, are a crucial determinant of the flexibility and competitiveness of an economy which is in turn related to the magnitude of adjustment costs associated with the reallocation of labour where adjustment costs manifest themselves in terms of lost production, unemployment and retraining costs.

Therefore, the extent to which skills are specific to a sector, occupation, industry or firm (similarity of inputs) is crucial to the level of aggregate adjustment cost since it is associated with how easy workers can move. This is because differences in labour requirements such as sector specific human capital, worker endowments, the cost of relocating resources and the retraining of labour, job related natural abilities and spatial aspects of labour reallocation are likely to be smaller the more similar the firms that define any given grouping.

Using micro data for males and females taken from the Spring quarters of the *Quarterly Labour Force Survey* for 1995-2000, this paper addresses three related issues from the globalisation and labour market debate by examining micro-patterns of labour mobility. Firstly, we investigate the complexity of labour mobility at the relatively aggregated sectoral level and then a relatively disaggregated level for the manufacturing sector. Secondly, we consider earnings where we investigate whether inter-industry movers receive a lower wage that they would have received if they had been intra-industry movers or not moved at all. In addition, we investigate the role of skill specificity (related to the earnings issue) where human capital is assumed to accumulate sector specific skills during a period of firm or industry specific tenure. Thirdly, we assess the impact of trade indicators such as trade openness and the share of intra-industry trade on labour mobility and unemployment.

This paper shows that industrial reallocation in the manufacturing sector is costly in terms of industry specificity of occupational skills amongst non-manual workers, wage losses to between industry movers, and higher unemployment for manual ex-workers with lower re-employment for the less qualified. One would therefore prescribe policies that increase the inter-industrial labour mobility of non-manual workers and reduce unemployment duration for manual workers. One suggestion is vocational training that should be generalised with a curriculum of transferable skills. However retraining programmes have been widely criticised in the literature.

1. Introduction

The ability of workers to change job, industry or occupation and the costs associated with a reallocation labour in reaction to changes in economic circumstances is the subject of lively debate among academics and policy makers. Ever-closer global economic integration has resulted in significant changes in the flows and composition of trade and final demand as well as changes in technology and government regulations. These factors have contributed to shifts in global production patterns both temporary and permanent.

The effects of globalisation on the developed world's labour markets is therefore, coming under ever closer scrutiny not least because trade and technological changes are seen as being responsible for two major developments in the labour market. The first effect is on the status of the low skilled and least qualified who are seen as more likely to experience longer periods of unemployment or a relative decline in their long-term wages (see Lawrence and Slaughter 1993 and Addison *et al*. 1995). The second is because trade and technology changes are seen as a possible cause of reduced job stability that can lead to an increase in the number of job changes and moves at the sector, industry, occupation or regional level (see Greenaway *et al.* 2000 and Greenaway and Nelson 2000 for a survey).

In this paper we examine the relation between different types of labour mobility, earnings, skill specificity and employment status. The mobility of factors of production, specifically labour, are a crucial determinant of the flexibility and competitiveness of an economy (Grossman and Shapiro 1982) which is in turn related to the magnitude of adjustment costs associated with the reallocation of labour where adjustment costs manifest themselves in terms of lost production, unemployment and retraining costs (Davidson and Matusz 2001).

Although interest in the international mobility of labour (migration) has increased recently due to greater European integration (Ludema and Wooton, 1999 and Nickell 1997) and the creation of the North American Free Trade Agreement (Martin 1993), the study of intra-sectoral or industrial mobility of labour, with a few notable exceptions such as Neal (1999) and Greenaway *et al*. (2000), remains a relatively under researched area of the globalisation and labour market debate. The main exception follows Lilien (1982) and examines whether a positive relationship exists between sectoral mobility and aggregate unemployment fluctuations as suggested by the

sectoral shift hypothesis of mandatory search unemployment (see e.g. Abraham and Katz 1986 and Brainard and Cutler 1993). The other exception is the regional mobility of labour literature that concerns the movement of workers between geographical locations (see for example Jackman and Savouri 1992, McCormick 1997 and Henley 1998) and the related work on geographic concentration and trade sensitive employment (Shelburn and Bednarzik 1993).

Economic theory tells us that within a country, labour should be free to relocate until the wage differential exactly compensates for the utility change experienced by the marginal locating worker. If the tastes, costs of living and labour endowments of individuals are identical and labour is perfectly mobile across the economy, then wage differentials would be fully compensating and welfare equalised. However, labour mobility between sectors and industries is imperfect. One of the results of imperfections in the labour market is the limited degree of worker moves across sectors relative to the significant number of worker moves within sectors. This effect is compounded by the evidence that between sector moves also tend to be relatively small compared to gross labour flows (Jovanovic and Moffit 1990 and Greenaway *et al.* 1999).

The extent to which skills are specific to a sector, occupation, industry or firm (similarity of inputs) therefore, is crucial to the level of aggregate adjustment cost since it is associated with how easy workers can move. This is because differences in labour requirements such as sector specific human capital, worker endowments, the cost of relocating resources and the retraining of labour, job related natural abilities and spatial aspects of labour reallocation are likely to be smaller the more similar the firms that define any given grouping or classification.[1] Indeed, in the asymmetric shocks literature, Shin (1997) demonstrates that intra-sectoral shocks that require within sector resource reallocation have smoother adjustment processes and lower costs than inter-sectoral shocks that require a reallocation between sectors.

Similarly, Neal (1995) in a study of industry specific human capital demonstrates that workers receive compensation for some skills that are neither general nor firm specific but rather are

specific to their industry. For example, one product line may require a set of skills that are vital to its production but are not valued by the manufacture of other product lines. The greater the skill specificity the more significant the adjustment cost associated with an inter-sectoral or inter-industry move is likely to be. Shaw (1984) also demonstrates that occupational skills are an important determinant of earnings.

Parnes (1954) and Neal (1999) examine skill and occupation specificity within a discussion of the "complexity" of labour mobility where complex moves are assumed to encompass an occupation and/or industry move (defined as an inter-industry move) whereas a simple shift means workers change employer but continue to do the same type of work (defined as an intra-industry move). Few studies have investigated this aspect of the complexity of labour mobility and the actual type of job changes workers make.

In the literature, the treatment of labour mobility and adjustment tends to be approached differently by trade and labour economists.[2] The main difference concerns the derivation of the relative labour-demand function where labour economists assume there is a single aggregate output sector (partial equilibrium framework) while trade economists assume there are many sectors and that the national labour demand schedule reflects changes in the output mix and wages. Labour economists have tended to employ two main approaches to the examination of the effects of trade on wages and the demand for skilled labour. The first is factor-content analysis (for example Katz and Murphy 1992, Berman *et al.* 1994 and Wood 1994) and the second is product price studies that state that the proportional change in product price is equal to a weighted average of the proportional change in factor prices.[3]

In terms of the literature on trade changes and labour market adjustment, labour economists

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[1] The specificity of human capital led Jacoby (1983) to argue that job overall job mobility has been declining in the twentieth century and for Thomas (1996) to suggest that the manifestation of human capital specificity is longer periods of unemployment.

[2] The general methodological differences between the trade and labour approaches are summarised in Slaughter (1999) in his study of wage inequality.

[3] The labour literature also provides us with models of job creation and job destruction that can explain labour mobility within and between sectors (for example Davis and Haltiwanger 1992 and Mortensen and Pissarides

have tended to be more active (see e.g. Kruse 1988 and Addison *et al*. 1995), possibly because of trade economists belief that the long-term gains from trade will always outweigh any short-term adjustment costs. Consequently, there have been relatively few attempts to integrate labour market adjustment into a fully specified theoretical framework of trade as traditional Hechscher-Ohlin models assume the free intersectoral movement of labour and costless adjustment. Placing adjustment within the context of traditional models of intra-industry trade (IIT) such as Krugman (1981), Falvey (1981) and Brander and Krugman (1983) has been considered but the two-country, two-sector, two-factor models of small open economies within a Jones-Samuelson specific factors framework (Neary 1985) has been the focus of the majority of attempts.[4] The specific-factors model suggests two sources of adjustment costs, factor-price rigidity and factor specificity with the empirical manifestations being unemployment and factor-price disparities respectively where in practice we are likely to find both phenomena.

This leads us to the proposition from the trade literature of the smooth adjustment hypothesis (SAH), first mentioned by Balassa (1966) that is closely related to our explanation of labour market imperfection. Defining intra-industry trade as the simultaneous import and export of goods from the same industrial classification, the SAH states that if trade expansion as a result of a trade liberalisation and/or further integration is intra-industry in nature then the subsequent adjustment will be easier to achieve. The standard assumption is that adjustment costs will be less forbidding because when increases in trade are sectorally matched (imports and exports rise by a similar amount), resource transfers can be contained within individual industries or possibly firms. In contrast, an increase in inter-industry or net trade (where changes in imports and exports are unmatched) means that there is likely to be pressure for resources to be transferred between industries, most commonly from those contracting to those expanding. The adjustment implications will be more severe the greater the differences in the geographical location and factor requirements of an industry. [5] However, models of trade theory are of

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1994) where demand shocks at the firm level can result in the creation and destruction of jobs within narrowly defined industry definitions.

[4] Leger and Gaisford (2001) present a multi-period perfect-foresight model based on a two-sector, two factor (land and imperfectly mobile labour) model that has imperfect labour mobility and a Heckscher-Ohlin or specific factors structure depending on the treatment of the mobility of land. In addition, a recent study by Loverly and Nelson (2000) adapts an Either (1982) trade model to examine the relationship between changes in IIT and adjustment.

[5] Many authors including Krugman (1981), OCED (1994), Cadot *et al* (1995) have alluded directly and indirectly to the smooth-adjustment hypothesis. Brulhart (2000), Haynes *et al.* (2000) and Brülhart and Elliott (2001) are just three of the studies that attempt to find evidence for SAH. Estimates of adjustment costs associated with the

limited use as Loverly and Nelson (2000) point out, it is not possible to establish clear priors from trade models about the relative degree of inter to intra-labour adjustment and the relative changes in net intra-industry trade.

An approach that sheds some light on this issue is derived from a strand of the labour literature that concerns the costs of worker dislocation (surveyed by Hamermesh 1989 and more recently by Fallick 1996 and Kletzer 1998) and emphasises that adjustment costs are dependent in part on an individuals characteristics. The strand of the labour literature that studies displaced workers (Devons 1986, Carrington 1992, Podgursky 1992, Fallick 1993, Carrington and Zaman 1994 and others) employ a strict definition of a displaced worker that requires the satisfaction of three main criteria. First, there must be a structural cause for displacement such as trade or technology changes rather than those discharged due to cyclical downturns or the idiosyncratic fortunes of individual firms.[6] Second, workers must be able to return within a reasonable time frame to a comparable job in terms of industry, occupation or region (although with some difficulty) and third, that they retain some attachment to the sector in which they were previously employed.[7]

In a related literature, Podgursky and Swaim (1987), Addison and Portugal (1989), Haynes *et al*. (1999) and Jacobson *et al.* (1993) examine the relationship between earnings and mobility and in general demonstrate that industry movers suffer greater earning losses than stayers where the latter provide an estimate of the costs of displacement and provide a link between the trade and labour and literatures. Jacobson *et al.* (1993) estimate that for an individual the average lifetime loss of displacement is around $80,000. Pro protectionists highlight these losses and those associated with the reduced wages of those remaining in import competing sectors as an argument against free trade. Standard free trade theory assumes that compensation from the gainers should more than out weigh these individual losses although in reality the compensation

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removal of trade restrictions include Baldwin *et al*. (1980), Winters and Takacs (1991) and Davidson and Matusz (2001).

[6] One argument is that job flows (or job quits) defined as voluntary moves increase during "boom" periods of the business cycle whereas moves from employment into unemployment are likely to be counter-cyclical. See Blanchard and Diamond (1990) and Burda and Wyplosz (1994), Solon, Whatley and Huff Stevens (1997) and Hipple (1997).

[7] The Bureau of Labour Studies defines a displaced worker as someone of at least 20 years old with three years of work experience who has lost their job due to slack work, abolition of position or plant relocation or closure.

is never actually paid. These results have led to significant interest from policy makers looking to ease the perceived adjustment burden.[8]

This paper addresses three related issues from the globalisation and labour market debate by examining micro-patterns of labour mobility. Firstly, following Neal (1999) we investigate the complexity of labour mobility. Initially, we consider the movement of workers at the relatively aggregated sectoral level. The next stage is to examine labour mobility at a relatively disaggregated level for the manufacturing sector. As well as examining the flow of workers that have moved into or out of manufacturing we measure worker flows intra-sectorally (within manufacturing). Here we distinguish between industries and sub-industries where a complex move between two industries is defined as an inter-industry move and a simple move between two sub-industries (within a given industry) is defined as a intra-industry move. The profiles of the two different groups are shown to be an important determinant of the decision to move and hence provide an indication of the likely costs of demand shocks to different parts of the economy.

Secondly, we consider earnings where we investigate whether inter-industry movers receive a lower wage that they would have received if they had been intra-industry movers or not moved at all. Any difference may be because of; (i) a loss of human capital specific to that job or sector; (ii) a loss of a quality match between job and worker and (iii) a loss of union wage premium and loss of seniority.[9] In addition, following Neal (1995) we investigate the role of skill specificity (related to the earnings issue) where human capital is assumed to accumulate sector specific skills during a period of firm or industry specific tenure.

Thirdly, we assess the impact of trade indicators such as trade openness and the share of intra-industry trade on labour mobility and unemployment. A positive relationship between industry IIT and intra-industry mobility (that is over and above all other socio-economic and industry

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Howland and Peterson (1988) extend this definition to include only those workers whose "old" job was in a declining sector.

[8] Policies include wage subsidies to displaced workers, bonus payments to the unemployed who quickly find new employment, job search assistance and government sponsored training schemes. See Decker and Corson (1995) for an evaluation the U.S. trade adjustment assistance program. There are additional wider political economy issues that this paper does not address such as the costs that wide scale industrial adjustment can have on local communities over and above the losses to individuals.

[9] See Kletzer (1998) for an overview.

effects) would provide a direct link between IIT and the extent of intra-industry labour market adjustment. Furthermore, a negative relationship between industry IIT and unemployment duration would provide evidence of lower costs through smoother adjustment. We therefore estimate parametric models to assess the impact of trade on both intra-sectoral mobility and on transitions into and out of unemployment. If unemployed respondents previously employed in an industry with high IIT have a higher incidence of employment, this would provide some evidence of lower costs via a smooth adjustment hypothesis effect. Using data that covers a period of economic expansion we might also expect any relationship between trade indicators and unemployment transitions (that is over and above all other socio-economic and industry effects) to signify trade as a structural cause of labour displacement. One aim therefore is to identify industry characteristics that might cause worker displacement.

This paper is organised as follows. Section 2 describes the data, provides a descriptive analysis of sectoral and industrial adjustment, and introduces the definitions that will be used throughout the paper. Section 2 also includes the sample means for the individual characteristics and average hourly wages for individual intra-sectoral movers and stayers, as well as sample means for the individual characteristics of unemployment adjusters. Section 3 presents the results. Probit estimates for within and between industry mobility are presented, as well as wage equations and Probit estimates for unemployment adjustment. The final section concludes.

2 The Data

2.1 Definitions and methodology

We use micro data for males and females taken from the Spring quarters of the *Quarterly Labour Force Survey* for 1995-2000. The *LFS* began in 1973 as a biennial continuous survey as part of Britain's obligations on joining the European Union. The survey became annual in 1983 and has been quarterly since 1992. The *QLFS* is a pseudo panel that follows the same individuals for 5 consecutive quarters. It currently includes a representative sample of approximately 60,000 households.

The main advantage of the *QLFS* is that it contains a wealth of information on the employment, earnings (since 1992) and socio-economic characteristics of individuals over a number of years.

Furthermore, it uses the *International Labour Office* (*ILO*) definition of unemployment that is not subject to the frequent revisions of the claimant count that refers only to those actually in receipt of benefit.[10]

In the Spring quarter of the *QLFS* all individuals are asked questions about their circumstances 12 months prior to the survey. Included are questions on economic activity such as employment status, industry of employment and occupational status. This information enables us to construct two dichotomous transition variables; the first to measure labour mobility; the second to measure transitions into and out of unemployment.

One of the central concerns of this paper is how we handle the definition of an industry and the associated aggregation and sensitivity implications for the measurement of micro-patterns of labour mobility. Our choices apply to the level of regional, occupational and most importantly industrial aggregation. Throughout this paper we employ sector/industry definitions based on the Standard Industrial Classification 1992 (SIC92) nomenclature.[11]

Firstly, a "sector" is defined as the one-digit level of the SIC92 and includes eighteen sectors one of which is manufacturing. Secondly, we define an "industry" at the two-digit SIC92 level (twenty-three industries within the one-digit manufacturing sector). Thirdly, a "sub-industry" is defined at the three-digit level of the SIC92 (103 sub-industries within the manufacturing sector).[12] We use data from 1995 to 2000 since the SIC92 are not provided for the *QLFS* prior to 1995. To obtain sufficiently large sample sizes by industry and sub-industry the QLFS are pooled over the six years.

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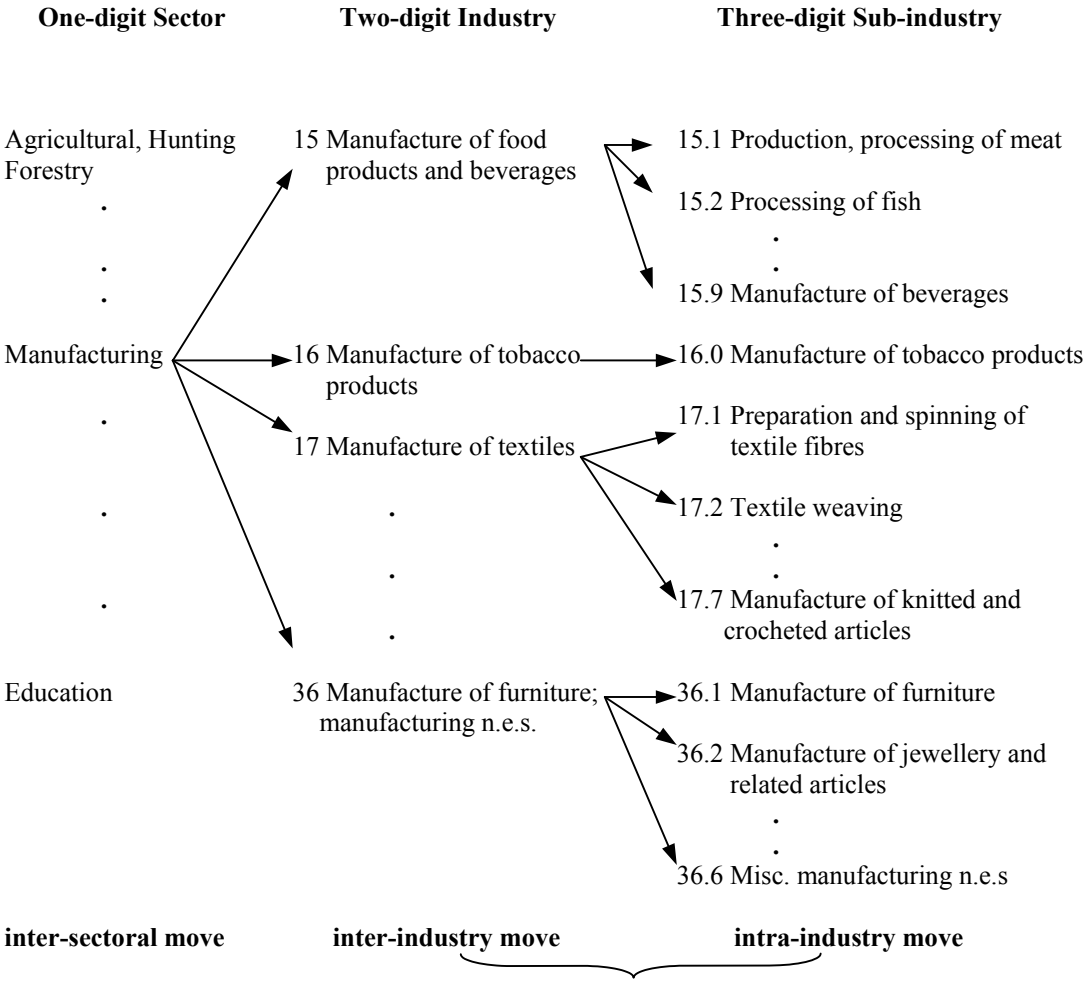
[10] See the Department of Employment Gazette (July 1992, pp. 349). Garside (1980) documents the changes in the Department of Employment claimant count series up to 1979. There have been at least eight changes since this date. The *ILO* measure is comparable with unemployment measures of other countries such as the United States and is used by the *Monetary Policy Committee* for its monthly assessment of the economy. To be classified as unemployed in *ILO* terms, it is necessary to have looked for work at some point in the previous four weeks.

[11] See Appendices 1 and 2 for descriptions of the two and three-digit levels of the SIC92 system. Our selection is based partially on accepted definitions of what constitutes an industry and a sector from the trade literature (see Finger 1975, Rayment 1976, Greenaway and Milner 1986 and Elliott *et al*. (2000) for a detailed discussion of the categorical aggregation issue).

[12] We only include industries and sub-industries that produce tradable products. The result is the removal of one industry, SIC 37 (Recycling) and eight sub-industries, SIC 17.3 (Finishing of textiles), SIC 22.3 (Reproduction of recorded media), SIC 27.5 (Casting of metals), SIC 28.4 (Forging, pressing and roll forming of metal), SIC 28.5

One of the innovations of this paper relates to the complexity of labour mobility and our definition of within (intra) and between (inter) industry mobility where both are encompassed within the term intra-sectoral mobility. An individual is assumed to have moved within an industry (intra-industry mobility to be known as an intra-industry mover) if they have moved firm or sub-industry (at the three-digit level) but remained employed within any given industry (at the two-digit level). Analogously, an individual is assumed to have moved between industries (inter-industry mobility to be known as an inter-industry mover) if they have moved to a different industry (at the two-digit level) but remained employed within a given one-digit sector. This gives us a simple hierarchical system that is summarised in figure 1.

Figure 1. A hierarchical system of labour mobility based on SIC92



(Treatment of metals), SIC 33.3 (Manufacture of industrial control equipment) and SIC 37.1 and 37.2 (Recycling of metal waste and non-metal waste respectively).

intra-sectoral move

The justification for our precise definitions of intra- and inter-industry mobility is twofold; firstly, a higher level of aggregation (for example, looking only at the two-digit industry level) would mask all intra-industry moves; secondly, a level of disaggregation higher than the three-digit would not provide sensible estimates of human capital transfers and would imply smaller sample sizes and hence require more observations than are available the *QLFS* (even accounting for the pooling of data).

In the *QLFS* an employed respondent who has moved firm, sub-industry, industry or sector during the 12 months prior to the survey is coded as a 'mover'. An individual who remained within the same firm, sub-industry, industry or sector or remained unemployed over the previous 12 months is coded as a 'stayer'. To measure moves into or out of unemployment (or unemployment adjustment), employed respondents who were unemployed 12 months ago and unemployed respondents who were employed 12 months ago are also coded as 'movers'. In the broadest sense we consider all moves to be a form of labour market mobility that incurs by definition some degree of adjustment cost.[13]

2.2 Descriptive statistics

Table 1 provides a summary of the sectoral employment shares at the one-digit level for 1995-2000. This period reveals a relatively stable employment pattern across sectors with no individual sector exhibiting a large-scale expansion or contraction relative to the rest of the economy. The process of de-industrialisation (Rowthorn 2000) where employment systematically moves from manufacturing to the service sector seems to have slowed by 1995 for the UK.[14] Given that we concerned with the effects of trade on labour mobility this paper

[13] Although our approach is one of the most disaggregated available we acknowledge that we are not picking up more subtle forms of labour mobility that effect true adjustment costs such as intra-firm changes in responsibility or a move onto a different production line within a given firm.

[14] See Greenaway *et al.* (2000) for an overview of UK sectoral employment shares from 1950-2000.

concentrates on the manufacturing sector that is also the largest with 22% share of the workforce in 2000 (showing a two percent decline since 1995).

Table 2 provides information on the number employed in manufacturing and two unemployment rates, one for all sectors and the other specifically calculated for the manufacturing sector.[15] Table 2 indicates that for the UK, unemployment decreased from over seven to below six percent for both measures between 1995 and 2000. Given the growth of the UK and world economy during this time this is not surprising.

At the sectoral level, Table 3 examines inter-sectoral moves and provides transition ratios for all individuals. The second column refers to one-digit sectoral adjustment; here this is the proportion of economically active individuals that have moved sectors within a given year. The third column refers to unemployment adjustment; this is the proportion of economically active individuals that have changed employment status and encountered a spell of unemployment during the 12 months prior to the survey. The first column is the sum of columns two and three while the fourth column refers to one-digit adjustment into and out of the manufacturing sector only at the one-digit level.

Over the six-year period the second column shows that yearly inter-sectoral adjustment has remained relatively stable at approximately eleven percent while unemployment adjustment has fallen to below five percent. These results only partially support the findings of Blanchard and Diamond (1990) and Burda and Wyplosz (1994) who observe that more workers voluntarily move during "boom" periods while involuntary moves into unemployment fall. This may be because Table 3 just looks at inter-sectoral moves that mask all the voluntary intra-sectoral job changes. The final row of Table 3 indicates that a relatively high 30.5 percent of total adjustment was through unemployment.

This does not tell us much however, about the real magnitude of labour mobility since it only applies to moves at a very broad classification level. A comparison of the total adjustment levels for all sectors and manufacturing only (fourth column) reveals that there has been relatively little labour mobility between manufacturing and other sectors (1.8 percent of the

[15] This measures the number of unemployed whose last job was in the manufacturing sector.

sample or 16.3 percent of total inter-sectoral adjustment). The relatively low value for moves into and out of the manufacturing sector suggests that labour may be more mobile between service sectors for example where skills are more generic and transferable. Compared with the relative stability of employment levels in Table 1 a total average inter-sector adjustment value of 0.1125 (second column) suggests that gross flows are far greater than net flows and supports the results of Greenaway *et al.* (2000). In fact over the six-year period and across all sectors, 61 percent of all two-digit inter-industry moves (within a one-digit sector) occurred within the manufacturing.[16]

To assess the impact of industry labour demand variables (such as trade) on labour mobility within a sector, we study manufacturing in isolation. Table 4 provides transition ratios for employees and ex-employees from the manufacturing sector. The first column refers to total adjustment, whilst the second and third columns refer to intra-sectoral and unemployment adjustment respectively where intra-sectoral adjustment refers to any individual who has changed firm and/or sub-industry and/or industry within the previous year but remained within the manufacturing sector. Observe again, that both intra-sectoral and unemployment adjustment have remained fairly stable at approximately 6.5 percent and 5 percent respectively over the 6 years. Note that comparing column 2 of Table 4 and column 4 of Table 3 shows that intra-sectoral adjustment (within manufacturing) is more than three times higher (6.5 percent) than moves between manufacturing and other one-digit sectors (1.8 percent). [17]

Table 5 splits the intra-sectoral adjustment for the manufacturing sector from Table 4 into adjustment within and between two-digit industries. The second column shows that intra-industry adjustment (average of nearly 4 percent) is everywhere greater than inter-industry adjustment (average of just over 2.5 percent). Hence, there are more 'within' industry than 'between' industry moves across the whole period as expected. The final row shows that 61 percent of total adjustments are intra- and 39 percent are inter-industry adjustments and is preliminary evidence that moves are easier to facilitate within narrowly defined (two-digit)

[16] For example in 1999 there were 467 two-digit industry movers who moved within a one-digit sector. Of these, 284 moved within manufacturing showing that this sector is where most of the variability occurs. Elliott and Lindley (2002) investigate the issue of skill specificity and occupational transfers at the sector level. A matrix of worker moves show the job flows into and out of each sector (where the leading diagonal represents sectoral stayers).

[17] A number of authors including Booth (1997) and Topel and Ward (1992) note that intra-sectoral moves may also occur as a part of a natural career development.

industries than between them. This is a natural extension of the results from Tables 3 and 4 that demonstrate that there were more moves within manufacturing than between manufacturing and other one-digit sectors and is an indication that the intuitive appeal of our hierarchical ease of adjustment system has some empirical grounding.

Thus far our results suggest that it is important to not only consider the movement of labour between sectors (which is limited) but to also examine moves within sectors and subsequently to understand what determines whether an individual is more likely to move within or between industries. The next two sub-sections examine intra-sectoral, industrial and unemployment adjustment within the manufacturing sector and investigates the role of human captial (skills and qualifications etc.), socio-economic and industry characteristics (trade, growth and relative wages etc.).

2.3 Intra-sectoral adjustment, mobility and wages

Table 6 provides some descriptive statistics for movers, stayers and the breakdown between intra- and inter-industry movers in our sample. Table 6 shows the unweighted sample means for human capital and socio-economic characteristics affecting labour mobility. All time varying variables are those 12 months previous to the time of the survey.[18] The sample consists of all employed men and women aged between 16 and 65 employed in the manufacturing sector. The first column in Table 6 refers to the full sample of 55368 employed movers and stayers, whilst the second and third columns refer to intra-sectoral stayers (51383) and movers (3985) respectively. The final two columns refer to intra-industry and inter-industry movers as defined in Section 2.1.

The first cell in Table 6 shows the average age of the sample is just over 39 years old. Comparing column one with columns three, four and five shows that age is slightly lower for movers and lower still for inter-industry movers. This suggests that younger people are more likely to move and even more likely to move across industries. The second row of Table 6 shows that 65 percent of the sample are married, yet only 59 percent of movers and even fewer (53 percent) of inter-industry movers are married. Being single, therefore, seems to imply

[18] Unfortunately we are restricted from including employment tenure since information is only provided at the time of the survey and would imply that all movers would have employment tenure of less than 12 months.

greater mobility and is especially the case for inter-industry mobility. Although 28 percent of the sample are female, only 25 percent of movers are female and over 28 percent of inter-industry movers are female. These results seem to suggest that females are less likely to move than men, but that they are relatively more likely to move between industries. This may be a consequence of gender specific skills and occupations, for example, it is likely that there would be more females employed in occupations with a greater transferability of skills such as clerical or secretarial jobs that are not necessarily firm or sub-industry specific.

Interestingly, there are a high percentage of foreign-born respondents amongst the intra-industry movers suggesting that immigrants tend to move within narrowly defined industries. The data show that foreign born, intra-movers are over-represented in particular industries, textiles (7.31 percent) and clothing (17.78 percent).

One area of the labour mobility literature that has received particular attention concerns the movement of workers between geographical regions (see e.g. Jackman and Savouri 1992, McCormick 1997 and Henley 1998). However, in the context of this paper we investigate whether or not the region of residence has any effect on the degree of intra-sectoral mobility. The first column shows the residential dispersion of the sample. The majority (39 percent) live in the North of the UK, where this consists of the North and the North West of England, Yorkshire, Scotland and Northern Ireland. The second largest regional grouping is in the South East of the UK (26 percent of the sample). This consists of East Anglia, London and the South East. The rest of live in the Midlands (East and West Midlands) or the South West of England (which includes Wales). Amongst the movers more than the national average live in the Midlands and less live in the South East. Looking separately at inter- and intra-industry movers however, reveals only small differences. Given that the industrial structure of UK manufacturing is relatively evenly dispersed across regions (see Barrios *et al.* 2001) this is not too surprising.

According to Oswald (1996, 1997) the housing market affects geographical mobility via higher moving costs. Table 6 supports this view since 84 percent of the sample own a home compared with 80 percent of movers and only 77 percent amongst the inter-industry movers and provides some evidence of industrial immobility amongst those with mortgages. However, although Table 6 indicates that home ownership negatively affects inter-industry mobility it does not seem to have any effect on intra-industry mobility. This indicates that sectors may be evenly

distributed across regions, whilst narrowly defined sub-industries are geographically clustered and therefore unevenly distributed so individuals can easily switch between firms or sub-industries without moving region and therefore at little cost. This provides one example where intra-industry adjustment costs may be lower than inter-industry adjustment costs through relocation expenses impacting the former rather than the latter.

We now turn to the distribution of qualifications and occupational skills. Only 14 percent of respondents have a `higher' qualification as their highest qualification attained, where `higher' consists of degrees, higher degrees or their equivalent. A further 16 percent have `further' qualifications ('A' levels or equivalent) while 70 percent have other qualifications (generally 'O' levels or GCSE's) as their highest qualification. The third column shows movers to be generally better qualified than stayers (16 percent with 'higher', 19 percent with 'further' and 65 percent with 'other'). However, looking at the intra- and inter-industry adjustments, there are more respondents with `higher' qualifications amongst the intra-industry movers. This suggests that higher qualifications improve the likelihood of within industry adjustment, whilst further and other qualifications improve the likelihood of adjustment between industries. This is our first indication that qualifications and therefore, skill specificity have an important role to play in the flexibility of an economy and also indicates that it is not necessarily always those with the highest qualifications that are the most mobile.

The obvious link between qualifications and mobility is occupation, where occupational skills are measured by using one digit Standard Occupational Classifications (SOC80). Managers and professionals are disaggregated into skilled and semi-skilled categories, whilst sales occupations are disaggregated into semi-skilled and manual categories.[19]

This sample of manufacturing employees mainly consists of plant operators (27 percent), craftsman or tradesmen (24 percent), skilled managers (14 percent), skilled professionals (11 percent) and secretarial or clerical staff (11 percent). The third column of movers suggests that plant operators, salesman and skilled professionals are more mobile, whilst managers, semi-skilled professionals, tradesman, secretarial and other manual occupations less so with no

[19] See Appendix 1 for a detailed description of the SOC80 categories and Appendix 2 for a description of the occupation groupings we employ in this paper. Since the sample is for the manufacturing sector only it is considered unnecessary to disaggregate these occupational categories further.

discernible pattern in the data. However, distinguishing between intra- and inter-industry adjustment does indicate some important differences. Comparing the first and fourth column shows above average numbers of skilled managers (17 percent) and skilled professionals (13 percent) amongst the intra- movers. Comparing the first and final column shows above average plant operators (31 percent) and craftsmen (25 percent) amongst the inter- movers. The raw data therefore, suggests a distinct dichotomy between intra- and inter-industry movers. Those with skills appear to be more likely to move within industries and those with lower skills are more likely to move between industries. This suggests that higher skilled individuals (such as professionals and managers) have higher levels of industry-specific human capital and provides evidence that skills in the manufacturing sector are industry specific. It should be noted however that these skilled individuals are only 30 percent of the sample.

Also included in Table 6 are the sample means for various sub-industry characteristics that are thought to characterise sub-industry demand for labour. These apply to the respondent's sub-industry of employment (three-digit) 12 months previous to the survey. The first of these refers to the sub-industry union share. The average share of union members in a three-digit sub-industry were calculated for each sub-industry and individually for each of the 6 years 1994 to 1999. Each of the respondents was then coded with this average union membership share according to their sub-industry of employment 12 months previous to the survey. For example, those individuals who were part of the Spring 1995 *QLFS* were coded with the average union density calculated from the Autumn 1994 *QLFS* since the union membership question is only asked in the Autumn quarter of each annual survey.[20] A detailed description for the construction of the industrial data is provided in Appendix 2.

Across all individuals the average union density of employment 12 months previous to the survey (and hence prior to any adjustment) was 28 percent. This is slightly higher amongst the movers, and suggests that there is slightly more activity emanating from highly unionised sub-industries. Comparing the last two columns demonstrates that individuals from highly unionised sub-industries are more likely to move within their industry than move to another. This is intuitive since those in highly unionised sub-industries may not want to move to an

[20] Since the union membership question is only asked in the Autumn quarter of the *QLFS*, actual union membership is not used. Including a variable to measure whether an individual is a member of a union or not

industry with lower union representation while being in a union may aid the ease of movement within that industry especially if an industry operates any sort of closed shop agreement.

One might expect lower wages prior to any transition to be associated with higher labour mobility, as relative wages capture 'price' opportunities and incentives to change jobs. There are two competing effects for wages. First, individuals with high wages may be less likely to move from sub-industries with relatively high wages. Second however is that firms with high relative wages are more likely to lay people off in bad times and increase labour movements in general. This is investigated in Section 3. The average sub-industry hourly pay for each individual was calculated in a similar way to union density. Each respondent was given an average sub-industry pay value that was calculated from the previous annual survey in accordance with employment 12 months prior to the survey.[21] This allowed the construction of a relative measure where this average sub-industry pay is relative to the average across all sub-industries. Table 6 shows little variation between movers and stayers. However, the inter-industry movers have a below average value for relative industry pay prior to any move (0.9813). This suggests that people moving to other industries are from the relatively low paid industries. The impact of adjustment on ex-post earnings is considered later in this section.

We might also anticipate that individuals employed in sub-industries with higher than average unemployment rates are more likely to move to a different industry. Indeed the relative unemployment rate variable in Table 6 is higher amongst the inter-industry movers suggesting that this is the case. High annual growth within a sub-industry as well as the size of industry might be expected to negatively impact mobility across sub-industries.[22] A growing industry may however attract more inter-industry movers, as workers are attracted (pulled) into the

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would imply measurement error since it would not be clear whether the individual was a union member prior to any transition.

[21] The hourly wage data is deflated using the RPI from the Economic Trends Annual Supplement (2000). It is provided in the first and the fifth quarter of the each individual's panel for those in the 1997-2000 *QLFS,* and the fifth quarter of the individual's panel for those in the 1995 and 1996 *QLFS*. Wage data is therefore taken from the last quarter before the respondent leaves the survey. As a consequence actual earnings data is not used since it is unclear what the hourly wage for each respondent would have been prior to any adjustment.

[22] The relative average growth of a sub-industry is deflated using the RPI from ETAS (2000).

industry.[23] However, high growth and size seem to be associated more with intra- than inter-industry mobility.

Finally, we investigate the extent to which industry trade openness and the nature of that trade (synonymous with the smooth adjustment hypothesis) may impact the mobility of an industry's inhabitants.[24] The nature of trade is measured in two ways. First, we use the traditional Grubel and Lloyd (GL) index to measure the share of trade that is intra-industry in nature and secondly we test a dynamic measure of trade changes, UMCIT (Menon and Dixon 1997) that measures the change in net trade over the period 1995-2000.[25] All the trade data are deflated into 1995 prices using the RPI from the ETAS (2000). The results suggest that a high level IIT in an industry is associated with more intra-industry movements (and is one of the first indications that IIT leads to relatively more intra-industry moves and potentially lower adjustment costs if the smooth adjustment hypothesis holds). The UMCIT value for intra-industry movers (162.80) is significantly below the inter-industry value (239.32) and again demonstrates that large net trade changes result in more inter-industry moves and therefore, potentially higher adjustment costs. For example, if exports remained constant and imports increased for a specific industry, we would expect more inter-industry moves and the industry experiences increased competitive pressure.

Table 7 provides sample means of gross hourly wages for those who have moved and those who have stayed in the same industry during the 12 months prior to the survey.[26] This individual hourly wage data is in 1995 prices and is taken from the last quarter before the respondent leaves the survey so the wage data for movers are ex-post. The average hourly wage of the sample is £7.79. There is a slight variation between those who have moved in the previous 12 months and those who have stayed. The most important distinction is between

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[23] Where the scale of an industry refers to employment (12 months prior to the survey) in a sub-industry that is scale intensive. Growth is measured as the growth in value added of the sub-industry the individual is employed in. Details of both measures are in Appendix 2.

[24] Trade openness is measured as imports plus exports divided by gross value added.

[25] The GL index was first presented in Grubel and Lloyd (1975). Other measures of dynamic or marginal IIT were examined with varying success (such as measures by Brülhart 1994 and Greenaway *et al.* 1994).). Due to the large variation in GDP and trade values an unweighted measure is more appropriate that an index in this paper.

[26] Sample sizes are smaller than in Table 6 because of non-response in the earnings data. All figures refer to gross hourly wages and are deflated using the Retail Price Index from Economic Trends Annual Supplement (2000) so that they appear in 1995 prices.

inter- and intra-industry movers. Workers who have moved between industries suffer wage losses with a below average mean hourly wage of £6.44, whilst workers who have moved within industries actually receive wage gains (£8.22 per hour, on average). This suggests that the skills of workers who change industry become redundant and they suffer wage losses as a consequence.

Although moves within and between industries provides useful information, adjustment costs are likely to be felt most severely amongst those individuals who experienced significant periods of unemployment which is where we turn in section 2.4.

2.4 Unemployment Adjustment

Table 8 provides some descriptive statistics concerning the characteristics of unemployment adjustment in the manufacturing sector. Again data have been pooled over the period 1995-2000 to obtain sufficiently large sample sizes. The sample consists of those employed (who have not changed firm, sub-industry or industry during the previous 12 months) and unemployed men and women aged between 16 and 65, employed or previously employed in the manufacturing sector. All means are unweighted.

There are two possibilities for the investigation of unemployment adjustment. First we consider those employed 12 months prior to the survey and compare those who are still employed (but have not moved firm, sub-industry or industry) to those who were unemployed at the time of the survey. This measures the transition into unemployment. The second examines those who were unemployed 12 months prior to the survey and compares those unemployed at the time of the survey to those who had gained employment during the year. This measures the transition from unemployment into employment.

One feature of Table 8 is that it contains employment characteristics (occupation and industry) for both the employed and unemployed. For the former, they refer to the actual occupation and industry of employment 12 months prior to the survey and for the latter they refer to the respondents last occupation and industry prior to the time of the survey. Since we are comparing the transitions into unemployment and employment that have occurred during a 12-month period we feel that it is legitimate to include these industry and occupation characteristics.

The first column contains the sample means for the full sample. The second and third columns compare the mean characteristics of the employed to those of the respondents who have become unemployed during the 12 months prior to the survey. The recently unemployed tend to be younger, male, unmarried, living in the North of England and non-home owners. There are also a higher than average number of immigrants amongst this unemployed category. Comparing columns three and five indicates that foreign-born workers have a higher probability of becoming unemployed but also a higher probability of staying unemployed.[27] In contrast, females are less likely to be made unemployed and are also less likely to remain unemployed suggesting female participation increases the flexibility of the economy.

Columns two and three also highlight a distinct dichotomy between the average qualifications and skills of the employed and those recently made unemployed with a higher percentage of respondents with higher qualifications as their highest qualification attained amongst the employed. Conversely there are a higher percentage of respondents with further or other qualifications amongst the unemployed and suggests that the employed are generally better qualified. The raw data for the occupational skills variables suggests that non-manual workers (professionals, mangers and secretarial workers) are less likely to be made unemployed compared to the manual workers (plant operatives, tradesman and other manual workers). The implication is that most manual workers in the manufacturing sector demonstrate higher transition rates into unemployment that suggests that they are being coerced to move.

The industry characteristics in Table 8 were constructed analogously to those in Table 6. The raw data suggests that employed respondents tend to be associated with highly unionised sub-industries, whilst those recently made unemployed are surprisingly associated with growing and large scale sub-industries. This suggests that employees of both growing and large-scale sub-industries are subject to greater unemployment volatility. Respondents who have recently become unemployed can be associated with sub-industries that pay relatively less than other sub-industries and are also associated with sub-industries that are less open to trade. Therefore, trade seems to be beneficial to employment as it has a negative impact on job displacement. The IIT and UMCIT measures have little effect.

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[27] Fairlie and Kletzer (1996) find the opposite result for the U.S. between 1982-1993. The difference between British and foreign-born unemployment rates is explored in Lesley and Lindley (2002).

The fourth and fifth columns in Table 8 compare the long-term unemployed (at least one year) to those that have gained employment during the 12 months prior to the survey. Those who have recently gained employment tend to be younger, male, married, living in the South of England and own a home. The raw data suggest that once unemployed, it is those with higher and further qualifications that find it easier to enter employment. Also mangers, skilled professionals, clerical, personal and sales occupations find it easier to gain employment once unemployed. Conversely, unemployed tradesman, plant operators, semi-skilled professionals and other manual workers find it more difficult. Therefore, most of the manual workers have higher transition rates into unemployment and lower transition rates back into employment which may help to explain the observed increasing inequality between manual and non-manual workers.

3 Results

According to Section 2 the probability of a movement between industries will be greater if the costs of moving are low, the more employable is the individual (better skills and qualifications), the less industry specific are their skills and the higher are the returns to efficiency in the alternative industry. The industrial mobility results are discussed first, followed by earnings and unemployment adjustment. Since industry specific variables are merged with micro data, all standard errors are corrected for sub-industry clustering.[28]

3.1 Intra-sectoral mobility

Since the comparison of interest is within and between industry mobility, only the intra-industry and inter-industry mobility models are discussed here. The intra-sectoral mobility estimates are provided in Appendix 3 (Table A). Table 9 provides Probit estimates for inter-industry mobility. The default category are married males, with no children, a non-home owner, living in the North, born in the UK, has other qualifications, employed as a skilled professional and who appeared in the 1995 Spring quarter of the *QLFS*.

[28] See Moulton (1990) for a discussion.

The inter-industry mobility/age locus displays a `U' shape, where both the young and the old are significantly more likely to move industry. Relative to living in the North, those who live in the Midlands are 1 percent more likely to move between industries, whilst those who live in the South East and the South West are 0.4 percent and 0.9 percent more likely to move respectively. As expected there is also a significant housing tenure effect where non-home owners are 0.8 percent more likely to move between industries. Interestingly this is also the case for within industry mobility that is discussed later.

The raw data in Table 6 suggests that those with higher qualifications and non-manual occupations are more mobile within rather than between industries. Table 9 shows that above all other characteristics, those with further qualifications are 0.4 percent more mobile between industries than those with other qualifications. So over and above qualifications, skilled managers, semi-skilled professionals and personal employees are less likely to move between industries, whilst semi-skilled managers, semi-skilled salespersons and manual salespersons are more likely to move between industries, relative to skilled professionals. This further demonstrates the relative industry specificity of occupational skills amongst these non-manual workers in the manufacturing sector and highlights the importance of occupational skills on labour mobility.

The industry characteristics show individuals from relatively highly unionised sub-industries to be 1.5 percent less likely to move between industries. This is expected if employment in highly unionised industries is preferable to employment in less unionised industries. Also average industry hourly pay has a negative and significant impact on inter-industry mobility. Those employed in relatively low paid sub-industries are 1.5 percent more likely to move between industries. Trade openness makes a small but significant positive contribution to inter-industrial mobility. Finally there is little evidence of variability in mobility over time since the year dummies are statistically insignificant.

Table 10 provides Probit estimates for intra-industry labour adjustment. Once more the default category are married males, with no children, a non-home owner, living in the North, born in the UK, has other qualifications, employed as a professional and who appeared in the 1995 Spring quarter of the *QLFS*. The age variable shows the young to be significantly more likely to move within an industry. Also being single implies 0.6 percent less intra-industry mobility

compared to those who are married. Immigrants are 0.9 percent more likely to move within an industry (although not between industries) compared to natives.

Again housing market rigidities are apparent. The raw data in Table 6 suggest housing tenure effects 'between' rather than 'within' industries. However, Table 10 shows a significant housing tenure effect for intra-industrial mobility. Non-home owners are 0.9 percent more likely to move within an industry than owner-occupiers. Hence non-homeowners are more mobile both between and within industries although housing tenure could well contain elements of risk adversity as well as geographical immobility. If there is an element of risk adversity homeowners should also be less likely to move at all (this is confirmed by Table A in Appendix 3). One obvious reason is job security and firm tenure effects. The latter are unfortunately not measurable from this data since employment tenure information is only provided at the time of the survey.

The qualification variables demonstrate that those with 'higher qualifications' as highest qualification attained are 0.9 percent more mobile within an industry than those with other qualifications. Also there are no significant effects for further qualifications. Table 9 showed those with further qualifications to be more mobile between industries. Therefore, it seems that those with higher qualifications as their highest qualification have industry specific skills that are less transferable between industries.

Most of the sub-industry variables are both economically negligible and statistically insignificant in explaining intra-industry mobility.[29] The only significant variables are those that measure the nature of IIT. These show that individuals employed in industries characterised by a high share of total trade that is intra-industry are 2.1 percent more likely to move within an industry than those employed in low IIT industries. Also net trade changes result in less intra-industry moves and therefore, potentially lower adjustment costs if the smooth adjustment hypothesis holds.

3.2 Earnings

[29] One might expect firm level data to better explain mobility within any two-digit industry classification but is beyond the scope of this paper.

To give a more complete picture of industrial mobility effects, gross hourly wage functions were estimated for the employed and are shown in Table 11.[30] The specification is similar to Tables 9 and 10 except that time dependent variables are those at the time of survey rather than 12 months prior to the survey.[31] We exclude average industry pay and include firm tenure variables as well as inter-industry and intra-industry mover variables. Smaller sample sizes through non-response required the aggregation of skilled and semi-skilled mangers into one composite group. All estimates have been corrected for employment selection and sub-industrial clustering.[32]

The first column in Table 11 refers to the full sample, whilst the second and third columns split the sample into manual and non-manual employees. Non-manual employees consist of professionals, managers, semi-skilled sales workers and clerical/secretarial. Manual employees are craft/trade, personal/security, manual sales, plant operators and other manual employees. A χ^2 likelihood ratio test for the joint hypothesis of coefficient equality across the two equations suggests that the null hypothesis of common slope coefficients is rejected.[33]

For all employees, the earnings/age locus displays an inverted U shape and higher educational qualifications imply greater earnings. Also females earn significantly less than males. Relative to those who are married, being single reduces earnings, although being divorced increases earnings for manual but not non-manual employees. Hourly earnings are significantly higher for those living in the South East of England, although they are only significantly higher for non-manual employees in the South West, relative to the North of the UK. Owner-occupiers also appear to earn significantly higher wages than non-home owners.

The first column shows that returns to firm tenure are small compared to returns to qualifications and occupation. Relative to those employed less than one year, firm tenure implies a negative return for the previous five years of employment. Only tenure above 15

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[30] All hourly wages data are in 1995 prices and are deflated using the RPI from ETAS (2000).

[31] The individual hourly wage data is taken from the last quarter before the respondent leaves the survey so earnings for movers are post move earnings.

[32] The identification restrictions for the earnings equation are poor health status and whether the respondent lives in a household with children.

[33] See the notes to Table 10.

years implies an earnings premium. Relative to professionals, those individuals employed as managers or as semi-skilled salespersons enjoy an earnings premium, whereas clerical/secretarial, craft/trade, personal/security, manual sales, plant operators and other manual employees earn relatively less. Also individuals employed in highly unionised industries earn significantly more.[34]

Those who have moved between industries earn 5.1 percentage log points (5.2 percent) less than those who have not moved industry at the two-digit SIC92 level.[35] This is not the case for those who have moved firm or moved industry at the three-digit SIC92 level. This provides evidence that workers who change industry suffer wage losses as a consequence of the redundancy of their skills.[36]

Comparing non-manual and manual workers provides further interesting results. Only manual workers enjoy higher earnings as a consequence of working in a highly unionised industry. The union share variable is statistically insignificant for non-manual workers. Also industry unemployment positively impacts the earnings of non-manual workers, but not manual workers. This suggests that industries with relatively high unemployment rates pay more to non-manual workers than industries with relatively low unemployment rates. Industries that are relatively more open to trade also imply slightly higher wages to non-manual workers, but not for manual workers. Conversely, higher inter-industry trade implies 0.8 percentage log points (0.8 percent) lower hourly wages for non-manual workers.

Non-manual workers that have moved between industries (at the two-digit level) do not suffer a significant wage loss as a result. However, manual workers that have moved industry earn 5.7

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[34] Appendix 3 (Table B) contains a χ^2 likelihood ratio test for the joint significance of the industry variables. This rejects the null hypothesis where the industry coefficients are restricted to zero.

[35] Here the semi-log specification of the earnings function is used. In practice, for low values (of around 0.10) log points method and the level method give the same result. The semi-log specification is given by

$\ln Y = \alpha + \beta X$, where $\ln Y$ is the log of earnings and X is the inter-mover binary variable. Since X is binary, the effect of X on Y is $\frac{Y_{|X=1} - Y_{|X=0}}{Y_{|X=0}} = e^{\beta} - 1$, whereas the log point difference is simply β.

[36] The authors are aware of the potential endogeneity between mobility and wages. Most workers would like to return to their original industry. Given the distribution of displacement, industry wage differentials and union wage premiums will intensify this tendency. However, simultaneous equation estimates have as yet been unsuccessful. The problem lies with finding suitable instruments with which to identify the mobility and wage equations. This can only demonstrate the problems associated with modelling such endogenous relationships.

percentage log points (5.8 percent) less than those who have not so it is manual workers rather then non-manual workers that suffer wage losses through the redundancy of their skills when they move between two-digit industries. This helps to explain the observed increasing wage inequality between manual and non-manual workers.

The correlation coefficients between the error terms of the employment selection equation and those of the earnings equation are significantly negative for manual workers and statistically insignificant for non-manual workers. Thus for manual workers, earnings would be higher for those who are unemployed, should they gain employment, relative to those who are already have jobs. One would expect this if the unemployed have higher reservation wages than the employed as they would in turn require a greater reward to enter into employment.

3.3 Unemployment transition

We now address unemployment transition. We fit two Probit equations. The first estimates the likelihood of becoming unemployed. The dependant variable refers to a transition into unemployment from employment, as opposed to staying employed. The second Probit equation estimates the likelihood of remaining unemployed. The dependant variable is remaining unemployed from a state of unemployment, as oppose to a transition into employment. The specifications are identical to those in Tables 9 and 10 although time dependent variables are those at the time of survey rather than 12 months prior to the survey. Also the sub-industrial and occupational characteristics refer to current sub-industry or occupation of employment for the employed and previous sub-industry or occupation of employment for the unemployed.

Table 12 provides the unemployment Probit estimations for respondents who were employed in manufacturing 12 months prior to the time of the survey, but who have not moved intra-sectorally (firm, sub-industry or industry). The unemployment/age locus displays its usual inverted 'U' shape and both females, married and British born individuals are less likely to be made unemployed. Living in the South of England generally implies less likelihood of unemployment from manufacturing relative to living in the North.

Home owner-occupiers are 3.6 percent less likely to become unemployed. Hence homeowners are less mobile between and within industries, and less likely to become unemployed. This supports Nickell (1979) where home ownership restricts employment mobility and reduces

unemployment propensities because housing association tenants receive a subsidy and hence are more likely to move. An alternative view is that council housing is endogenous to unemployment probabilities. Unemployed people are less likely to have the resources to purchase their own house and therefore it is employment status that determines housing choice. McCormick (1983) provides a discussion of this view. A third view is that housing tenure picks up a number of unmeasured characteristics such as `ambition', `motivation' and so on, not captured elsewhere.

Interestingly, a lack of educational qualifications is not significant in determining unemployment probabilities. However, occupational skills are significant, and these are over and above all other characteristics. Relative to skilled professionals, all occupations except managers and semi-skilled professionals have a higher propensity to become unemployed. Manual sales (29 percent), other manual employees (27 percent), and personal/Security employees (26 percent) display the highest unemployment propensities, whilst clerical/secretarial workers (1.2 percent) display the lowest. This provides some evidence of occupational restructuring in the manufacturing sector. Since manual workers are forced into unemployment and non-manual workers (especially managers and professionals) are relatively secure.

The insignificance of the trade openness variable suggests that previous employment within a sub-industry open to trade has no significant immediate effect on the probability of unemployment so there is little evidence of trade as a structural cause of labour displacement. Not surprisingly, higher relative sub-industry unemployment rates do have a positive impact on the likelihood of becoming unemployed. More importantly, relative average industry pay is also positive and significant. Employees in industries characterised by higher than average pay are 1.4 percent more likely to become unemployed than those employed in relatively low paying sub-industries. This suggests that sub-industries with high relative wages appear more likely to lay people off during this time period. One could conjecture that such industries might be characterised with a high percentage of high skilled and highly paid workers with high mobility amongst their skilled workers and also high unemployment rates amongst their lower skilled manual workers. Again this could further indicate occupational skill restructuring in the manufacturing sector.

Table 12 showed the determinants of unemployment likelihood amongst those who were

employed 12 months prior to the survey. If manual unemployment were hypercyclical to non-manual unemployment, manual workers would exhibit higher transitions into employment from unemployment. Therefore, we would expect a higher propensity of employment amongst manual unemployed workers than for non-manual unemployed workers. Table 13 addresses this issue by estimating the likelihood of remaining unemployed, from the sample of those who were unemployed 12 months prior to the survey. Tables 12 and 13 are therefore comparable since they are both estimating the likelihood of unemployment, albeit from two different employment states.

In Table 13 qualifications are important rather than occupational skills. This is intuitive if one considers the role of qualifications in terms of job market signalling. According to Spence (1973) education levels act as signals to employers on unknown levels of productivity of prospective employees, as well as impacting individually on productivity. Table 13 therefore suggests that unemployed individuals with higher or further qualifications (and who are therefore skilled) are less likely to remain unemployed and more likely to become employed. Thus, Table 12 indicates that manual workers are more likely to become unemployed, whilst Table 13 indicates that manual ex-workers are no more likely to become employed than non-manual ex-workers. This suggests a divergence between the unemployment rates of manual and non-manual ex-employees that further indicates the redundancy of manual occupational skills in the manufacturing sector. Moreover, since the unemployed obviously need to invest in qualifications and new occupational skills in order to gain employment, there are re-training costs to be associated with this divergence.

A second observation from Table 13 refers to the sub-industry characteristics. Those unemployed individuals who were previously employed in highly unionised sub-industries and scale intensive sub-industries are more likely to remain unemployed, so the less employable individuals would have previously been employed in scale-intensive and highly unionised sub-industries such as steel manufacture, associated metal manufacture and shipbuilding.[37]

[37] See data Appendix 2 for a list of these scale intensive industries.

4. Conclusion

This paper attempts to analyse the effects of globalisation on labour market adjustment within the UK manufacturing sector over the period 1995 to 2000. We show that there are relatively few worker moves between manufacturing and the other sectors but that there is significant labour mobility within the manufacturing sector. Focussing on industrial adjustment within manufacturing, we show that there is more `within' industry adjustment than `between' industry adjustment. As a consequence of industry specificity in the skills of manufacturing workers, it suggests that labour adjustment within industries is smoother and therefore less costly than between industry adjustment.

We also identify which workers are more mobile between and within these manufacturing industries. Lower qualified workers with manual occupational skills are more mobile between industries than higher qualified non-manual workers suggesting that higher qualified non-manual employees possess industry specific skills that are less transferable between industries. Home owner-occupiers are less mobile between and within industries suggesting that there are housing tenure costs associated with industrial mobility. However data limitations prevent isolating employment tenure effects that could be contained within this effect. Higher returns in the destination industry also significantly increase inter-industry mobility where these returns are based on lower relative industry wages in the ex-ante industry of origin.

This paper also shows that between industry movers receive a lower wage ex-post than both within industry movers and those who have not moved at all. This suggests that workers who change industry suffer a wage loss as a consequence of a loss in human capital specific to that industry. Moreover, distinguishing between non-manual and manual workers shows that the cost in terms of wage losses applies only to the latter. This indicates a decline in the earnings of manual workers, relative to the earnings of non-manual workers, and supports the observation of a growing occupational earnings gap between manual and non-manual employees in the manufacturing sector.

Lower qualified workers with manual occupational skills are more likely to become unemployed than non-manual workers with higher qualifications. Moreover, these lower skilled workers are more likely to remain unemployed once they find themselves out of work. This suggests the existence of occupational restructuring in the manufacturing sector over the

1995 to 2000 period that implies further costs in terms of re-training.

Further important results that emerge from this study concern the relationship between the sub-industry characteristics and labour mobility. Respondents who were employed in relatively higher paying sub-industries 12 months previous to the survey, are less mobile between industries and have a higher probability of becoming unemployed. Sub-industries with higher relative wages appear more likely therefore, to lay people off during the period. Also respondents who are employed in highly unionised sub-industries are less mobile between industries, receive significantly higher wages and have a higher probability of remaining unemployed, should they become unemployed.

Finally, there is little evidence of a displaced worker effect in terms of higher unemployment for workers emanating from sub-industries that are open to trade. However, employees from open sub-industries are more mobile between industries, whilst employees from sub-industries with a high share of trade that is intra-industry and a low absolute change in net trade, are more mobile within industries as the trade and smooth adjustment literature predicts. This provides a direct link between IIT and intra-industry labour adjustment, and provides some support for the cause of the smooth adjustment hypothesis in that it seems that IIT causes intra-industry labour market adjustment. Interestingly, high intra-industry trade share industries are also associated with higher earnings for manual workers.

In short, industrial reallocation in the manufacturing sector is costly in terms of industry specificity of occupational skills amongst non-manual workers, wage losses to between industry movers, and higher unemployment for manual ex-workers with lower re-employment for the less qualified. One would therefore prescribe policies that increase the inter-industrial labour mobility of non-manual workers and reduce unemployment duration for manual workers. One suggestion is vocational training that should be generalised with a curriculum of transferable skills. However evidence on the success of retraining programmes is mixed (see e.g. Dolton and O'Neill 1996, Kletzer 1998, Heckman *et al.* 1999 and). Future research will attempt to define job categories that directly capture skill specificities, since occupational skills may not be truly specific to an industry but rather specific to an intersection of certain industries and occupations.

Table 1. QLFS employment shares between 1995-2000

One-digit 1992 SIC	1995	1996	1997	1998	1999	2000
Agriculture, Hunting & Forestry	625 (1.32)	515 (1.09)	479 (1.03)	475 (1.03)	444 (0.97)	438 (1.00)
Fishing	10 (0.02)	7 (0.01)	15 (0.03)	14 (0.03)	9 (0.02)	14 (0.03)
Mining & Quarrying	273 (0.58)	257 (0.54)	241 (0.52)	217 (0.47)	296 (0.65)	220 (0.50)
Manufacturing	**11478** **(24.27)**	**11781** **(24.86)**	**11283** **(24.34)**	**10811** **(23.52)**	**10443** **(22.49)**	**9661** **(22.01)**
Electricity, Gas & Water	575 (1.22)	457 (0.96)	419 (0.90)	386 (0.84)	429 (0.94)	407 (0.93)
Construction	2480 (5.24)	2452 (5.17)	2254 (5.44)	2766 (6.02)	2739 (5.98)	2872 (6.54)
Wholesale, Retail Trade & Motor Vehicles	7590 (16.05)	7756 (16.37)	7487 (16.15)	7442 (16.19)	7446 (16.25)	7189 (16.38)
Hotels & Restaurants	2396 (5.07)	2466 (5.20)	2411 (5.20)	2492 (5.42)	2313 (5.05)	2173 (4.95)
Transport, Storage & Communication	3593 (7.60)	3356 (7.08)	3373 (7.28)	3385 (7.36)	3588 (7.83)	3454 (7.87)
Financial Intermediation	2774 (5.87)	2781 (5.87)	2951 (5.59)	2638 (5.74)	2504 (5.46)	2395 (5.46)
Real Estate, Renting & Business	1253 (2.65)	1328 (2.80)	1330 (2.87)	1275 (2.77)	1387 (3.03)	1385 (3.15)
Public Admin & Defence	293 (0.62)	318 (0.67)	327 (0.71)	272 (0.59)	331 (0.72)	359 (0.82)
Education	4855 (10.27)	4956 (10.46)	4812 (10.38)	4819 (10.48)	4973 (10.85)	4805 (10.95)
Health & Social Work	6636 (14.03)	6626 (13.98)	6798 (14.66)	6596 (14.35)	6686 (14.59)	6284 (14.31)
Other Community, Social and Personal Services	2171 (4.59)	2075 (4.38)	2006 (4.33)	2144 (4.66)	2023 (4.41)	2028 (4.62)
Private Households	209 (0.44)	193 (0.41)	189 (0.41)	172 (0.37)	163 (0.36)	157 (0.36)
Extra Territorial	45 (0.10)	43 (0.09)	46 (0.10)	41 (0.09)	35 (0.08)	45 (0.10)
Outside UK	38 (0.08)	22 (0.05)	32 (0.07)	19 (0.04)	18 (0.04)	15 (0.03)
Total	47294	47389	46363	45964	45827	43901

Source: Spring quarters of the QLFS. Annual employment shares are in parentheses.

Table 2. Sample of employed and unemployed within the manufacturing sector

	Employed*	ILO Unemployed**	Unemployment Rate	Overall Unemployment Rate***
1995	10610	819	7.17	7.66 (56565)
1996	10847	802	6.88	7.31 (51843)
1997	10143	554	5.18	6.13 (54067)
1998	10007	518	4.92	4.98 (53399)
1999	10055	523	5.20	4.91 (52716)
2000	8630	458	5.04	4.39 (50272)
Total	**60292**	**3674**	**5.87**	**5.90 (318862)**

Notes: Source: Spring quarters of the QLFS.

* This employed category includes those employed in manufacturing in the given year, and economically active 12 months ago.

** Unemployed here consists of those who were ILO unemployed in the given year, previously employed in the manufacturing sector and economically active 12 months ago.

*** This is overall unemployment rate for all the industrial sectors. The sample consists of those who are economically active and were economically active 12 months ago. Sample sizes are in parentheses.

Table 3. Inter-sectoral and unemployment adjustment for all one-digit sectors

	Adjustment*	Inter-Sectoral Adjustment**	Unemployment Adjustment***	Manufacturing Adjustment****
1995	0.1681	0.1112	0.0569	0.0164
1996	0.1689	0.1132	0.0557	0.0170
1997	0.1618	0.1101	0.0517	0.0185
1998	0.1602	0.1131	0.0471	0.0198
1999	0.1602	0.1158	0.0444	0.0188
2000	0.1541	0.1118	0.0423	0.0200
Total	**0.1621**	**0.1125**	**0.0496**	**0.0184**

Notes: Source: Spring quarters of the QLFS.

* Adjustment here refers to the proportion of the total sample that has moved firm and sector (at the SIC one digit level) or into or out of unemployment in any given year.

** Inter-sectoral adjustment is the proportion of the total sample that have moved firm and sector and remained employed in any given year.

*** Unemployment adjustment is the proportion of the total sample that have moved into or out of unemployment during the last 12 months.

**** Adjustment here refers to the proportion of economically active that have moved 'from' or `to' the manufacturing sector (at the SIC one-digit level) in any given year.

Table 4. Intra-sectoral mobility and unemployment adjustment at the three-digit level, for the manufacturing sector.

	Adjustment*	Intra-Sectoral Adjustment**	Unemployment Adjustment***
1995	0.1212	0.0628	0.0583
1996	0.1188	0.0618	0.0571
1997	0.1129	0.0662	0.0467
1998	0.1148	0.0684	0.0464
1999	0.1142	0.0676	0.0466
2000	0.1166	0.0683	0.0483
Total	**0.1162**	**0.0657**	**0.0505**

Notes: Source: Spring quarters of the QLFS.

* Adjustment here refers to the proportion of the total sample that has moved firm and/or sub-industry (at the SIC three-digit level) or into or out of unemployment in any given year.

** Intra-sectoral adjustment is the proportion of the total sample that have moved firm and/or sub-industry and/or industry and remained employed in any given year.

*** Unemployment adjustment is the proportion of the total sample that have moved into or out of unemployment during the last 12 months.

Table 5. Intra-industry and inter-industry adjustment within the manufacturing sector

	Intra-sectoral Adjustment	Intra-industry Adjustment*	Inter-industry Adjustment**
1995	0.0628	0.0395	0.0234
1996	0.0618	0.0366	0.0252
1997	0.0662	0.0401	0.0261
1998	0.0684	0.0387	0.0296
1999	0.0676	0.0402	0.0274
2000	0.0683	0.0410	0.0272
Total	**0.0657**	**0.0393**	**0.0264**

Notes: Source: Spring quarters of the QLFS.

* Intra-industry adjustment includes those who have moved firm or sub-industry (at the SIC 3-digit level), but stayed within an industry (at the SIC 2-digit level) in any given year.

** Inter-industry adjustment consist of those who have moved industry (at the SIC 2-digit level) but remained within the manufacturing sector (at the SIC one-digit level) in any given year.

Table 6. Sample means for intra-sectoral adjustment

	Total	Stayers	Movers	Intra-industry Movers*	Inter-industry Movers**
Individual Characteristics:					
Age	39.88	40.16	36.32	37.61	34.36
Female	0.2769	0.2793	0.2466	0.2222	0.2838
Child	0.3532	0.3534	0.3511	0.3481	0.3556
Foreign Born	0.0561	0.0560	0.0577	0.0609	0.0528
Married	0.6484	0.6528	0.5914	0.6297	0.5336
Single	0.2564	0.2251	0.3266	0.2884	0.3832
Divorced	0.0952	0.0962	0.0823	0.0818	0.0831
Midlands	0.2256	0.2234	0.2547	0.2462	0.2674
South East	0.2585	0.2602	0.2366	0.2349	0.2391
South West	0.1267	0.1267	0.1269	0.1131	0.1478
North	0.3891	0.3897	0.3816	0.4057	0.3455
Home Owner	0.8428	0.8462	0.7985	0.8516	0.7715
Highest Qual: Higher	0.1429	0.1414	0.1626	0.1819	0.1334
Highest Qual: Further	0.1610	0.1588	0.1892	0.1816	0.2007
Highest Qual: Other	0.6959	0.6997	0.6481	0.6365	0.6658
Skilled Manager	0.1489	0.1496	0.1390	0.1669	0.0969
Semi-Skilled Manager	0.0122	0.0123	0.0120	0.0096	0.0157
Skilled Professional	0.1147	0.1147	0.1157	0.1269	0.0988
Semi-Skilled Professional	0.0205	0.0207	0.0173	0.0217	0.0106
Clerical/Secretarial	0.1110	0.1124	0.0939	0.0813	0.1126
Craft/Trade	0.2423	0.2429	0.2341	0.2253	0.2492
Personal/Security	0.0070	0.0075	0.0047	0.0062	0.0025
Semi-Skilled Sales	0.0259	0.0247	0.0416	0.0459	0.0352
Manual Sales	0.0082	0.0079	0.0123	0.0100	0.0157
Plant Operator	0.2715	0.2704	0.2855	0.2667	0.3140
Other Manual	0.0333	0.0332	0.0339	0.0329	0.0352
Industry Characteristics:					
Union Share	0.2828	0.2822	0.2905	0.3027	0.2720
Relative Av Ind Pay	1.0045	1.0037	1.0144	1.0363	0.9813
Relative Unemp Rate	0.8632	0.8638	0.8553	0.8196	0.9093
Annual Growth in GVA	1.4712	1.4313	1.9861	2.6571	0.9741
Scale industry	0.3189	0.3119	0.4090	0.4787	0.3039
Trade Openness	288.98	287.99	301.78	294.60	312.60
IIT	0.8239	0.8217	0.8512	0.8696	0.8233
UMCIT	224.124	226.51	193.32	162.80	239.32
1 N	55368	51383	3985	2396	1589

Notes: Source: QLFS 1995-2000.

* Intra-industry movers are those who have moved firm or sub-industry (at the SIC three-digit level), but stayed within an industry (at the SIC two-digit level).

** Inter-industry movers consist of those who have moved industry (at the SIC two-digit level) but remained within the manufacturing sector (at the SIC one-digit level).

Table 7. Sample means for hourly wages of intra-sectoral 'movers' and 'stayers'

	Total	Stayers	Movers	Intra-industry Movers	Inter-industry Movers
Hourly Wage	7.687 (4.756)	7.700 (4.767)	7.506 (4.607)	8.218 (4.953)	6.439 (3.791)
N	42255	39297	2958	1691	1267

Notes: Source: QLFS 1995-2000.
Figures have been deflated using the RPI from ETAS (2000).
Standard errors in parentheses

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Table 8. Sample means for unemployment adjustment

	Total[a]	Employed 12 months prior to the Survey		Unemployed 12 months prior to the Survey	
		Employed stayer[b]	Unemployed mover[c]	Employed mover[d]	Unemployed stayer[e]
Individual Characteristics:					
Age	39.81	40.15	37.33	33.46	38.04
Female	0.2759	0.2810	0.2664	0.2437	0.1811
Child	0.3527	0.3532	0.3604	0.3402	0.3455
Foreign Born	0.0599	0.0567	0.0830	0.0703	0.1142
Married	0.6307	0.6521	0.4710	0.4185	0.3782
Single	0.2691	0.2516	0.4015	0.4757	0.4455
Divorced	0.1002	0.0962	0.1274	0.1057	0.1761
Midlands	0.2221	0.2223	0.2187	0.2108	0.2269
South East	0.2620	0.2634	0.2394	0.2580	0.2469
South West	0.1251	0.1263	0.1081	0.1162	0.1117
North	0.3909	0.3879	0.4337	0.4148	0.4143
Home Owner	0.8145	0.8461	0.6010	0.5429	0.3909
Highest Qual: Higher	0.1360	0.1425	0.0926	0.0784	0.0493
Highest Qual: Further	0.1593	0.1597	0.1608	0.1834	0.1279
Highest Qual: Other	0.7047	0.6977	0.7465	0.7381	0.8228
Skilled and Semi-Skilled					
Manager	0.1469	0.1554	0.0959	0.0565	0.0405
Skilled Professional	0.1086	0.1147	0.0566	0.0473	0.0409
Semi-Skilled Professional	0.0219	0.0227	0.0129	0.0131	0.0151
Clerical/Secretarial	0.1115	0.1139	0.0965	0.1014	0.0693
Craft/Trade	0.2438	0.2424	0.2689	0.2357	0.2665
Personal/Security	0.0071	0.0067	0.0109	0.0131	0.0102
Semi-Skilled Sales	0.0245	0.0253	0.0283	0.0124	0.0097
Manual Sales	0.0078	0.0073	0.0128	0.0155	0.0107
Plant Operator	0.2847	0.2736	0.3507	0.3905	0.4324
Other Manual	0.0390	0.0337	0.0643	0.1026	0.1035
Industry Characteristics:					
Union Share	0.2732	0.2744	0.2647	0.2542	0.2649
Relative Av Industry Pay	0.9973	1.0021	0.9563	0.9529	0.9411
Relative Unemploy Rate	0.8556	0.8422	0.9894	0.0645	0.0693
Annual Growth in GVA	1.9599	1.9274	2.0001	2.7311	2.1433
Scale industry	0.2861	0.2829	0.2967	0.3401	0.3161
Trade Openness	281.52	283.72	269.22	258.93	252.81
IIT	0.8137	0.8184	0.7925	0.7618	0.7536
UMCIT	244.68	246.09	239.08	226.51	227.60
N	56945	51383	1554	1959	2049

Notes: Source: QLFS 1995-2000.

a This consists of 55368 employed who were employed 12 months prior to the survey less the 3985 movers from Table 6 plus the 1959 employed workers who were unemployed 12 months ago and 3603 unemployed. The means are all unweighted.

b Where respondents are employed 12 months previous to the survey and employed at the time of the survey, but who have not moved industry.

c Where respondents are employed 12 months previous to the survey and unemployed at the time of the survey.

d Where respondents are unemployed 12 months previous to the survey and employed at the time of the survey.

e Where respondents are unemployed 12 months previous to the survey and unemployed at the time of survey.

Table 9. Inter-industry mobility Probit, QLFS 1995-2000. Dependant variable=1 if the individual has changed industry (2-digit level) in the 12 months prior to the survey, and zero otherwise

Variable	Coefficient (Standard Error)	Marginal Effect
Age	-0.037 (0.008)*	-0.002
Age Squared	0.0002 (0.000)*	0.00001
Female	-0.031 (0.028)	-0.002
Child	-0.013 (0.022)	-0.008
Single	-0.056 (0.034)**	-0.003
Divorced	0.016 (0.036)	0.001
Midlands	0.155 (0.037)*	0.010
South East	0.067 (0.030)*	0.004
South West	0.139 (0.038)*	0.009
Home Owner	-0.124 (0.025)*	-0.008
Foreign Born	-0.028 (0.046)	-0.002
Highest Qualification: Higher	-0.047 (0.043)	0.003
Highest Qualification: Further	0.061 (0.032)**	0.004
Skilled Manager	-0.098 (0.054)**	-0.005
Semi-Skilled Manager	0.198 (0.107)**	0.014
Semi-Skilled Professional	-0.217 (0.105)*	-0.010
Clerical/Secretarial	0.040 (0.056)	0.002
Craft/Trade	0.029 (0.055)	0.017
Personal/Security	-0.384 (0.178)*	-0.015
Semi-Skilled Sales	0.187 (0.066)*	0.129
Manual Sales	0.278 (0.106)*	0.021
Plant Operator	0.081 (0.056)	0.005
Other Manual	0.049 (0.068)	0.003
Union Share	-0.185 (0.174)*	-0.011
Relative Average Industry Pay	-0.256 (0.122)*	-0.015
Relative Unemployment Rate	0.052 (0.047)	0.003
Annual Growth in GVA	0.001 (0.001)	5.85e-07
Scale industry	0.001 (0.046)	0.00004
Trade Openness	0.0002 (0.0001)*	0.00001
High IIT	0.045 (0.039)	0.003
UMCIT	0.0001 (0.0001)	1.97e-6
Year 1996	0.045 (0.039)	0.002
Year 1997	0.025 (0.045)	0.001
Year 1998	0.086 (0.044)	0.005
Year 1999	0.057 (0.038)	0.003
Year 2000	0.065 (0.047)	0.004
Constant	-0.710 (0.223)*	
2 N	55368	
3 Pseudo R Squared	0.0394	

Notes: Source: QLFS 1995-2000
Standard errors in parentheses.
* Denotes statistical significance at the 5% level
** Denotes statistical significance at the 10% level.

Table 10. Intra-industry mobility Probit, QLFS 1995-2000.
Dependent variable=1 if the individual has changed firm or sub-industry (at the 3-digit level but remained within the 2-digit industry) in the 12 months prior to the survey, and zero otherwise

Variable	Coefficient (Standard Error)	Marginal Effect
Age	-0.019 (0.008)*	-0.002
Age Squared	0.0001 (0.00001)	8.11e-06
Female	-0.051 (0.066)	-0.004
Child	-0.025 (0.031)	-0.002
Single	-0.079 (0.032)*	-0.006
Divorced	-0.033 (0.038)	-0.002
Midlands	0.013 (0.062)	0.001
South East	-0.088 (0.057)	-0.007
South West	0.104 (0.058)	-0.008
Home Owner	-0.111 (0.047)*	-0.009
Foreign Born	0.105 (0.046)*	0.009
Highest Qualification: Higher	0.108 (0.037)*	0.009
Highest Qualification: Further	0.032 (0.056)	0.003
Skilled Manager	0.049 (0.041)	0.004
Semi-Skilled Manager	-0.110 (0.073)	-0.007
Semi-Skilled Professional	-0.022 (0.079)	-0.002
Clerical/Secretarial	-0.148 (0.437)*	-0.010
Craft/Trade	-0.024 (0.086)	-0.019
Personal/Security	-0.035 (0.121)	0.002
Semi-Skilled Sales	0.301 (0.072)*	0.031
Manual Sales	0.091 (0.098)	0.007
Plant Operator	0.027 (0.060)	-0.002
Other Manual	0.006 (0.059)	0.0005
Union Share	0.406 (0.642)	0.032
Relative Average Industry Pay	0.452 (0.394)	0.036
Relative Unemployment Rate	0.114 (0.218)	0.009
Annual Growth in GVA	0.003 (0.006)	0.0003
Scale industry	0.349 (0.225)	0.028
Trade Openness	0.0003 (0.001)	0.00003
High IIT	0.271 (0.149)**	0.0206
UMCIT	-0.0004 (0.0002)*	-0.00004
Year 1996	0.004 (0.073)	-0.0004
Year 1997	0.011 (0.111)	0.0009
Year 1998	0.008 (0.136)	0.0007
Year 1999	0.019 (0.130)	0.0016
Year 2000	0.063 (0.147)	0.0053
Constant	-2.024 (0.490)*	
N	55368	
Pseudo R Squared	0.0520	

Notes: Source: QLFS 1995-2000
Standard errors in parentheses.
* Denotes statistical significance at the 5% level
** Denotes statistical significance at the 10% level.

Table 11. Earnings functions for manual and non-manual workers QLFS 1995-2000. (Dependent variable log of hourly gross earnings)

Variable	Full Sample	Non-Manual only	Manual only
Age	0.039 (0.003)*	0.065 (0.005)*	0.035 (0.002)*
Age Squared	-.0004(0.00003)*	-.00007(0.0006)*	-.0004(0.00002)*
Female	-0.230 (0.011)*	-0.172 (0.017)*	-0.230 (0.012)*
Single	-0.049 (0.007)*	-0.078 (0.012)*	-0.048 (0.008)*
Divorced	0.020 (0.008)*	0.025 (0.016)	0.033 (0.009)*
Midlands	0.009 (0.010)	0.018 (0.017)	0.007 (0.009)
South East	0.123 (0.013)*	0.153 (0.021)*	0.109 (0.011)*
South West	0.019 (0.011)**	0.009 (0.018)*	0.020 (0.012)
Home Owner	0.072 (0.008)*	0.114 (0.017)*	0.083 (0.009)*
Foreign Born	-0.018 (0.023)	0.079 (0.030)*	-0.065 (0.019)*
Highest Qualification: Higher	0.311 (0.013)*	0.378 (0.017)*	0.266 (0.017)*
Highest Qualification: Further	0.114 (0.008)*	0.173 (0.012)*	0.087 (0.009)*
Firm Tenure 1-2 years	-0.072 (0.012)*	-0.029 (0.023)	-0.082 (0.013)*
Firm Tenure 2-3 years	-0.085 (0.012)*	-0.089 (0.024)*	-0.075 (0.014)*
Firm Tenure 3-4 years	-0.073 (0.014)*	-0.058 (0.028)**	-0.073 (0.014)*
Firm Tenure 4-5 years	-0.059 (0.016)*	-0.014 (0.031)	-0.069 (0.015)*
Firm Tenure 5-10 years	-0.009 (0.011)	0.006 (0.018)	-0.010 (0.013)
Firm Tenure 10-15 years	0.018 (0.011)	0.022 (0.019)	0.022 (0.015)
Firm Tenure >15 years	0.085 (0.010)*	0.066 (0.015)*	0.095 (0.013)*
Manager* **	0.175 (0.013)*		
Semi-Skilled Professional	0.009 (0.041)		
Clerical/Secretarial	-0.201 (0.012)*		
Craft/Trade	-0.230 (0.014)*		
Personal/Security	-0.337 (0.028)*		
Semi-Skilled Sales	0.043 (0.018)*		
Manual Sales	-0.295 (0.032)*		
Plant Operator	-0.271 (0.013)*		
Other Manual	-0.378 (0.017)*		
Union Share	0.253 (0.070)*	0.061 (0.086)	0.330 (0.062)*
Relative Unemployment Rate	-0.120 (0.024)*	0.090 (0.031)*	-0.133 (0.021)
Annual Growth in GVA	-0.008 (0.0005)	-0.0003 (0.0006)	0.001 (0.0004)*
Scale industry	-0.0002 (0.015)	0.009 (0.020)	0.006 (0.015)
Trade Openness	-0.00002 (0.00001)	-0.00006 (0.00005)	-2.76e-06 (0.00002)
High IIT	-0.010 (0.015)	-0.0242 (0.017)	0.026 (0.014)**
UMCIT	0.00003 (0.00002)	0.00004 (0.00001)	-0.00002 (0.00001)
Move inter-Industry	-0.053 (0.013)*	-0.031 (0.023)	-0.057 (0.016)*
Move intra-Industry	0.022 (0.010)*	0.027 (0.020)	0.015 (0.013)
Year 1996	0.059 (0.008)*	0.142 (0.017)*	0.026 (0.008)*
Year 1997	0.007 (0.009)	0.026 (0.019)	-0.003 (0.008)
Year 1998	0.067 (0.012)*	-0.057 (0.019)*	-0.069 (0.013)*
Year 1999	0.097 (0.010)*	0.104 (0.019)*	-0.094 (0.010)*
Year 2000	0.100 (0.012)*	0.099 (0.024)*	0.102 (0.126)*
Constant	1.111 (0.054)*	0.511 (0.096)*	0.972 (0.056)*
Correlation Coefficient ρ	-0.675 (0.049)*	-0.018 (0.032)	-0.723 (0.058)*
4 N			
Censored	45858	13858	32000
Uncensored	3603	518	3085
	42255	13364	28915
5			
6 R Squared	0.3946	0.2483	0.2147

Notes: Source: QLFS 1995-2000 Standard errors are in parentheses.

* Denotes statistical significance at the 5% level

** Denotes statistical significance at the 10% level.

a Skilled and semi-skilled managers are grouped together.

The Likelihood Ratio value for coefficient equality across the two manual/non-manual equations is 411.97, with χ^2 (18 d.o.f. Critical value 28.87)

Table 12. Unemployment Probit for those employed 12 months prior to the survey, QLFS 1995-2000.
Dependant Variable=1 if the individual is unemployed at the time of the survey, and zero if the individual is employed

Variable	Coefficient (Standard Error)	Marginal Effect
Age	-0.073 (0.009)*	-0.004
Age Squared	0.0008 (0.0001)*	0.00005
Female	-0.081 (0.029)*	-0.004
Child	0.033 (0.256)	0.002
Single	0.123 (0.032)*	0.007
Divorced	0.200 (0.034)*	0.013
Midlands	-0.030 (0.033)	-0.002
South East	-0.056 (0.028)*	-0.003
South West	-0.088 (0.043)*	-0.004
Home Owner	-0.453 (0.304)*	-0.036
Foreign Born	0.209 (0.066)*	0.014
Highest Qualification: Higher	0.033 (0.063)	0.018
Highest Qualification: Further	0.023 (0.039)	0.001
Skilled Manager	0.120 (0.076)	0.007
Semi-Skilled Professional	0.029 (0.099)	0.002
Clerical/Secretarial	0.188 (0.056)*	0.012
Craft/Trade	0.234 (0.055)*	0.014
Personal/Security	0.345 (0.108)*	0.026
Semi-Skilled Sales	0.318 (0.084)*	0.023
Manual Sales	0.380 (0.103)*	0.029
Plant Operator	0.253 (0.051)*	0.015
Other Manual	0.363 (0.073)*	0.027
Union Share	-0.111 (0.124)	-0.006
Relative Average Industry Pay	0.257 (0.111)*	0.014
Relative Unemployment Rate	0.432 (0.353)*	0.023
Annual Growth in GVA	-0.0002 (0.001)	-0.00001
Scale industry	0.048 (0.032)	0.003
Trade Openness	-0.00002 (0.0005)	-1.01e-06
High IIT	0.081 (0.083)	0.004
UMCIT	-6.39e-06(0.00005)	-3.45e-07
Year 1996	0.036 (0.043)	0.002
Year 1997	-0.100 (0.048)*	-0.005
Year 1998	-0.053 (0.046)	-0.003
Year 1999	0.029 (0.051)	0.001
Year 2000	0.046 (0.045)	0.002
Constant	-1.087 (0.215)*	
7 N	52937	
8 Pseudo R Squared	0.0723	

Notes: Source: QLFS 1995-2000
Standard errors in parentheses.
* Denotes statistical significance at the 5% level.

Table 13. Unemployment Probit for those unemployed 12 months prior to the survey, QLFS 1995-2000.
Dependant Variable=1 if the individual is unemployed at the time of the survey, and zero if the individual is employed

Variable	Coefficient (Standard Error)	Marginal Effect
Age	-0.045 (0.139)*	0.0178
Age Squared	0.0001 (0.0001)	-0.00008
Female	-0.246 (0.060)*	-0.098
Child	0.048 (0.043)	0.019
Single	0.492 (0.078)*	0.191
Divorced	0.340 (0.093)*	0.129
Midlands	-0.029 (0.058)	0.012
South East	-0.089 (0.082)	-0.035
South West	-0.0001(0.077)	0.00006
Home Owner	-0.433 (0.439)*	-0.169
Foreign Born	0.365 (0.086)*	0.138
Highest Qualification: Higher	-0.264 (0.107)*	-0.105
Highest Qualification: Further	-0.234 (0.071)*	-0.092
Skilled Manager	0.051 (0.138)	-0.021
Semi-Skilled Professional	0.291 (0.247)	0.011
Clerical/Secretarial	0.036 (0.112)	0.014
Craft/Trade	0.138 (0.111)	0.054
Personal/Security	-0.134 (0.239)	-0.053
Semi-Skilled Sales	0.091 (0.092)	0.035
Manual Sales	0.011 (0.231)	-0.020
Plant Operator	0.138 (0.114)	0.054
Other Manual	0.139 (0.139)	0.016
Union Share	0.592 (0.207)*	0.233
Relative Average Industry Pay	0.129 (0.199)	0.051
Relative Unemployment Rate	0.317 (0.952)*	0.125
Annual Growth in GVA	-0.003 (0.002)	-0.001
Scale industry	0.149 (0.046)*	-0.058
Trade Openness	-0.00001 (0.0001)	0.00002
High IIT	0.012 (0.150)	0.047
UMCIT	-0.00006 (0.00006)	-0.00002
Year 1996	-0.086 (0.076)	-0.034
Year 1997	-0.175 (0.078)*	-0.069
Year 1998	-0.206 (0.081)*	-0.082
Year 1999	-0.161 (0.081)*	-0.064
Year 2000	-0.214 (0.109)*	-00085
Constant	-1.809 (0.403)*	
N	4008	
Pseudo R Squared	0.0869	

Notes: Source: QLFS 1995-2000
Standard errors in parentheses.
* Denotes statistical significance at the 5% level.

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Appendix 1 *Two-digit 1992 Standard Industrial Classifications for the manufacturing sector and one-digit 1980 Standard Occupational Classification.*

SIC92	*Two-digit Industry Codes*
15	Manufacture of food products and beverages
16	Manufacture of tobacco products
17	Manufacture of textiles
18	Manufacture of wearing apparel; dressing and dying of fur
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
21	Manufacture of pulp, paper and paper products
22	Publishing, printing and reproduction of recorded media
23	Manufacture of coke, refined petroleum products and nuclear fuel
24	Manufacture of chemicals and chemical products
25	Manufacture of rubber and plastic products
26	Manufacture of other non-metallic mineral products
27	Manufacture of basic metals
28	Manufacture of fabricated metal products, except machinery and equipment
29	Manufacture of machinery and equipment not elsewhere classified
30	Manufacture of office machinery and computers
32	Manufacture of radio, television and communication equipment and apparatus
33	Manufacture of medical, precision and optical instruments, watches and clocks

34	Manufacture of motor vehicles, trailers and semi-trailers
35	Manufacture of other transport equipment
36	Manufacture of furniture; manufacturing not elsewhere classified
37	Recycling

SOC80	*Occupation Codes*
1	Managers & administrators
2	Professional occupations
3	Associate professional & technical occupations
4	Clerical & secretarial occupations
5	Craft & related occupations
6	Personal & protective service occupations
7	Sales occupations
8	Plant & machine operatives
9	Other occupations

Appendix 2 *Construction of the data*

The survey data are the Spring quarters of the QLFS 1995-2000 for the UK provided by the Data Archive at the University of Essex. The sample consists of working age men and women that are economically active at the time of they survey (employed and ILO unemployed). The definition of the variables is presented in a series of 6 tables.

1. Mobility variables

Variable	*Definition*
Intra-sectoral mover	Change in firm status or SIC92 3-digit sub-industry or SIC 2-digit industry of employment
Intra-sectoral stayer	No change in firm status or SIC92 3-digit sub-industry or SIC 2-digit industry of employment
Unemployment mover	Change in employment status: Either employed to unemployed or to unemployed to employed
Unemployment stayer	No change in employment status
Inter-industry mover	Change in SIC92 2-digit industry of employment
Inter-industry stayer	No change in SIC92 2-digit industry of employment
Intra-industry mover	Change in firm or SIC92 3-digit sub-industry of employment, no change in SIC92 2-digit industry of employment
Intra-industry stayer	No change in firm or SIC92 3-digit sub-industry of employment

2. Personal characteristic variables

Variable	*Definition*
Age	year of birth, continuous measure
Female	(0,1): dummy for female

Child	(0,1): dummy for living in a household with children
Foreign born	(0,1): dummy for foreign born (born outside the UK)
Married	(0,1): dummy for marriage
Single	(0,1): dummy for single or unmarried (not married or divorced)
Divorced	(0,1): dummy for divorced (no longer married and not single)
North	(0,1): dummy for living in the North of UK (North or North-West of England, Yorkshire, Scotland and Northern Ireland).
Midlands	(0,1): dummy for living in the Midlands of UK (East or West Midlands)
South East	(0,1): dummy for living in the South East of UK (East Anglia, London, South East England)
South West	(0,1): dummy for living in the South West of UK (South West of England and Wales)
Home Owner	(0,1): dummy for housing owner-occupier

3. Human capital variables

Variable	*Definition*
Higher	(0,1): dummy for having a higher degree, degree or equivalent as the highest qualification attained.
Further	(0,1): dummy for having A-levels or equivalent as the highest qualification.
Other	(0,1): dummy for having any other qualification as the highest qualification.
Employment tenure 1	(0,1): dummy for having less than one year employment with current firm
Employment tenure 2	(0,1): dummy for having one to two years employment with current firm.
Employment tenure 3	(0,1): dummy for having two to three years employment with current firm
Employment tenure 4	(0,1): dummy for having three to four years employment with current firm

Employment tenure 5	(0,1): dummy for having four to five years employment with current firm
Employment tenure 6	(0,1): dummy for having five to ten years employment with current firm
Employment tenure 7	(0,1): dummy for having ten to fifteen years employment with current firm
Employment tenure 8	(0,1): dummy for having more than fifteen years employment with current firm

4. Job grouping and occupational variables

Variable	*Definition*
Occupational Skills:	(0,1): dummy for being employed or previously employed in a given occupation defined as: • Skilled managers & administrators (excludes managers in transport, storing and horticulture) • Semi- skilled managers & administrators (managers in transport, storing and horticulture only) • Semi-skilled professional occupations or associate professional and technical occupations • Clerical & secretarial occupations • Craft & related occupations • Personal & protective service occupations • Semi-skilled sales occupations (buyers, brokers, agents and representatives only) • Manual sales occupations (excludes buyers, brokers, agents and representatives) • Plant & machine operatives

Non-manual worker	(0,1): dummy for being employed or previously employed as a professional, manager, clerical/secretarial or semi-skilled sales worker
Manual worker	(0,1): dummy for being employed or previously employed as a craft/trade, personal/security, manual sales, plant/machine operative and other manual workers

5. Industry variables

The industry data are inputted and vary over time. As a consequence data that refer to 12 months previous to the survey were coded using the appropriate annual averages. For example, when calculating union share 12 months prior to the survey, those people who appeared in the 1995 survey were given industry union density values calculated from the 1994 *QLFS* data. Growth, trade and wage data are all deflated into 1995 prices using the Retail Price Index from the Economic Trends Annual Supplement (2000).

Variable	*Definition*
Union share	The sub-industry union share is calculated separately for each year and is the average number of union members at the 3-digit level from the Spring quarter of the *QLFS*. The union shares were inputted for each individual that is employed or was previously employed in that industry. Therefore, all individuals in the same sub-industry have the same union share value.
Relative average sub-industry pay	Average hourly pay is calculated by averaging the hourly pay for those individuals employed in a given 3-digit sub-industry for a given year. The relative industry pay is calculated by dividing the sub-industry average by the overall average across all manufacturing for a given year. These relative industry average hourly pay values were inputted for each individual employed or previously employed in that sub-industry. All years are calculated separately and individuals in the same sub-industry have the same relative average sub-industry pay.
Relative unemployment rate	Unemployment rates are calculated at the 3-digit level for individuals employed or previously employed (if unemployed at the time of the survey) in a given sub-industry. These are averaged over 1995-2000 because of small numbers of previously employed (unemployed at the time of survey) at this level of disaggregation. The relative sub-industry unemployment rate is calculated by dividing the sub-industry rate by the overall unemployment rate across all manufacturing. Again these relative sub-industry unemployment rates were inputted for each individual employed or previously employed in that sub-industry. Individuals in the same sub-industry in each of the 6 years have the same relative unemployment rate.

Annual growth in GVA	The annual growth rates of Gross Value Added for each sub-industry were provided by the Annual Business Inquiry Department at the Office for National Statistics. The data are the annual averages over 1995-2000 because the 2000 data are not yet available. The sub-industry growth rates were inputted for each individual employed or previously employed in that sub-industry
Scale Industry	These are scale intensive industries of employment or previous employment as defined by the OECD (1987). See Table 6.
Trade Openness	Trade openness is defined as imports+exports/GDP. Trade data were provided by the Annual Business Inquiry at the sub-industry level. Trade openness values were inputted for each individual employed or previously employed in that sub-industry. All years are calculated separately and individuals in the same sub-industry have the openness value. Trade values are in constant prices.
IIT	IIT is calculated using the standard Grubel and Lloyd index that measures the share of trade at the 3-digit level that is intra-industry in nature where GL=2*min(exports,imports)/imports+exports.
UMCIT	Calculated as the change in exports minus the change in the imports calculated as UMCIT=$\lvert \Delta exports - \Delta imports \rvert$ and measures the amount of unmatched (net) trade change that requires inter-industry factor reallocation. Trade values are in constant prices.

6. List of 3 digit SIC92 Sub-Industries. * denotes scale industries as defined by the OECD (1987) "Structural Adjustment and Economic Performance", Paris,1987

SIC92	*three digit industry codes*
15.1	Production, processing and preserving of meat and meat products
15.2	Processing and preserving of fish and fish products
15.3	Processing and preserving of fruit and vegetables
15.4	Manufacture of vegetable and animal oils and fats

15.5	Manufacture of dairy products
15.6	Manufacture of grain mill products, starches and starch products
15.7	Manufacture of prepared animal feeds
15.8	Manufacture of other food products
15.9	Manufacture of beverages
16.0	Manufacture of tobacco products
17.1	Preparation and spinning of textile fibres
17.2	Textile weaving
17.3	Finishing of textiles
17.4	Manufacture of made-up textile articles, except apparel
17.5	Manufacture of other textiles
17.6	Manufacture of knitted and crocheted fabrics
17.7	Manufacture of knitted and crocheted articles
18.1	Manufacture of leather clothes
18.2	Manufacture of wearing apparel and accessories
18.3	Dressing and dyeing of fur; manufacture of articles of fur
19.1	Tanning and dressing of leather
19.2	Manufacture of luggage, handbags and the like, saddlery and harness
19.3	Manufacture of footwear
20.1	Sawmilling and planing of wood, impregnation of wood
20.2	Manufacture of veneer sheets; manufacture of plywood, laminboard, particle board, fibre board and

	other panels and boards
20.3	Manufacture of builders' carpentry and joinery
20.4	Manufacture of wooden containers
20.5	Manufacture of other wood products; manufacture of articles of cork, straw and plaiting materials
21.1	Manufacture of pulp, paper and paperboard
21.2	Manufacture of articles of paper and paperboard
22.1	Publishing
22.2	**Printing and service activities related to printing ***
22.3	**Reproduction of recorded media ***
23.1	Manufacture of coke oven products
23.2	Manufacture of refined petroleum products
23.3	Processing of nuclear fuel
24.1	Manufacture of basic chemicals
24.2	Manufacture of pesticides and other agro-chemical products
24.3	Manufacture of paints, varnishes and similar coatings, printing ink and mastics
24.4	Manufacture of pharmaceuticals, medicinal chemicals and botanical products
24.5	Manufacture of soap and detergents, cleaning preparations, perfumes and toilet preparations
24.6	Manufacture of other chemical products
24.7	Manufacture of man-made fibres
25.1	**Manufacture of rubber products ***
25.2	**Manufacture of plastic products ***

26.1	**Manufacture of glass and glass products ***
26.2	**Manufacture of non-refractory ceramic goods other than for construction purposes; manufacture of refractoryceramic products ***
26.3	**Manufacture of ceramic tiles and flags ***
26.4	Manufacture of bricks, tiles and construction products, in baked clay
26.5	Manufacture of cement, lime and plaster
26.6	Manufacture of articles of concrete, plaster and cement
26.7	Cutting, shaping and finishing of stone
26.8	Manufacture of other non-metallic mineral products
27.1	**Manufacture of basic iron and steel and of ferro-alloys (ECSC) ***
27.2	**Manufacture of tubes ***
27.3	**Other first processing of iron and steel and production of non-ECSC ferro-alloys ***
27.4	Manufacture of basic precious and non-ferrous metals
27.5	**Casting of metals ***
28.1	**Manufacture of structural metal products ***
28.2	**Manufacture of tanks, reservoirs and containers of metal; manufacture of central heating radiators and boilers ***
28.3	**Manufacture of steam generators, except central heating hot water boilers ***
28.4	**Forging, pressing, stamping and roll forming of metal; powder metallurgy ***
28.5	**Treatment and coating of metals; general mechanical engineering ***
28.6	**Manufacture of cutlery, tools and general hardware ***
28.7	**Manufacture of other fabricated metal products ***

29.1	Manufacture of machinery for the production and use of mechanical power, except aircraft, vehicle and cycle engines
29.2	Manufacture of other general purpose machinery
29.3	Manufacture of agricultural and forestry machinery
29.4	Manufacture of machine tools
29.5	Manufacture of other special purpose machinery
29.6	Manufacture of weapons and ammunition
29.7	Manufacture of domestic appliances not elsewhere classified
30.0	Manufacture of office machinery and computers
31.1	Manufacture of electric motors, generators and transformers
31.2	Manufacture of electricity distribution and control apparatus
31.3	Manufacture of insulated wire and cable
31.4	Manufacture of accumulators, primary cells and primary batteries
31.5	Manufacture of lighting equipment and electric lamps
31.6	Manufacture of electrical equipment not elsewhere
32.1	Manufacture of electronic valves and tubes and other electronic components
32.2	Manufacture of television and radio transmitters and apparatus for telephony and line telegraphy
32.3	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods
33.1	Manufacture of medical and surgical equipment and orthopaedic appliances
33.2	Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment

33.3	Manufacture of industrial process control equipment
33.4	Manufacture of optical instruments and photographic equipment
33.5	Manufacture of watches and clocks
34.1	**Manufacture of motor vehicles ***
34.2	**Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers/semi-trailers***
34.3	**Manufacture of parts and accessories for motor vehicles and their engines ***
35.1	**Building and repairing of ships and boats ***
35.2	**Manufacture of railway and tramway locomotives and rolling stock ***
35.3	Manufacture of aircraft and spacecraft
35.4	**Manufacture of motorcycles and bicycles ***
35.5	**Manufacture of other transport equipment not elsewhere classified ***
36.1	Manufacture of furniture
36.2	Manufacture of jewellery and related articles
36.3	Manufacture of musical instruments
36.4	Manufacture of sports goods
36.5	Manufacture of games and toys
36.6	Miscellaneous manufacturing not elsewhere classified
37.1	Recycling of metal waste and scrap
37.2	Recycling of non-metal waste and scrap

Appendix 3 *Tables A and B*

Table A. Intra-sectoral mobility Probit, QLFS 1995-2000.
Dependant variable=1 if the individual has changed firm or sub-industry (at the 3-digit level) or industry (at the 2-digit level) in the 12 months prior to the survey, and zero otherwise

9 Variable	Coefficient (Standard Error)	Marginal Effect
	-0.344 (0.057)*	-0.004
Age	0.011 (0.001)*	0.002
Age Squared	-0.048 (0.042)	-0.006
Female	-0.022 (0.024)	-0.003
Child	-0.079 (0.028)*	-0.010
Single	-0.013 (0.033)	-0.002
Divorced	0.079 (0.047)**	0.010
Midlands	-0.032 (0.047)	-0.004
South East	0.012 (0.041)	0.0001
South West	-0.134 (0.032)*	-0.018
Home Owner	0.059 (0.035) **	0.007
Foreign Born	0.093 (0.033)*	0.012
Highest Qualification: Higher	0.052 (0.042)	0.007
Highest Qualification: Further	-0.002 (0.035)	-0.0003
Skilled Manager	0.037 (0.076)	0.005
Semi-Skilled Manager	-0.093 (0.060)	-0.011
Semi-Skilled Professional		

	-0.067 (0.039)**	-0.008
Clerical/Secretarial	-0.003 (0.066)	-0.0004
Craft/Trade	-0.123 (0.104)	-0.014
Personal/Security	0.295 (0.057)*	0.046
Semi-Skilled Sales	0.195 (0.082)*	0.029
Manual Sales	0.025 (0.040)	0.003
Plant Operator	-0.031 (0.046)	0.004
Other Manual	0.203 (0.483)	0.026
Union Share	0.158 (0.261)	0.201
Relative Average Industry Pay	0.115 (0.149)	0.015
Relative Unemployment Rate	0.002 (0.004)	0.0003
Annual Growth in GVA	0.235 (0.178)	0.029
Scale industry	0.001 (0.001)	0.00004
Trade Openness	0.199 (0.112)**	0.0246
High IIT	-0.001 (0.001)**	-0.00003
UMCIT	0.020 (0.054)	0.003
Year 1996	0.015 (0.084)	0.002
Year 1997	0.044 (0.099)	0.006
Year 1998	0.036 (0.098)	0.005
Year 1999	0.070 (0.107)	0.009
Year 2000	-1.000 (0.345)*	
Constant		

	55368
	0.0372
N	
Pseudo R Squared	

Notes: Source: QLFS 1995-2000
Standard errors in parentheses.
* Denotes statistical significance at the 5% level.
** Denotes statistical significance at the 10% level.

Table B. Earnings functions. QLFS 1995-2000. Excluding sub-industry characteristics (Dependent variable log of hourly gross earnings)

Variable	With Industry Variables	Without Industry Variables
Age	0.039 (0.003)*	0.041 (0.003)*
	-.0004(0.00003)*	-.0005 (0.00003)*
Age Squared	-0.230 (0.011)*	-0.246 (0.017)*
Female	-0.049 (0.007)*	-0.049 (0.007)*
Single	0.020 (0.008)*	0.021 (0.008)*
Divorced	0.009 (0.010)	0.002 (0.014)
Midlands	0.123 (0.013)*	0.130 (0.016)*
South East	0.019 (0.011)**	0.026 (0.013)**
South West	0.072 (0.008)*	0.077 (0.009)*
Home Owner	-0.018 (0.023)	-0.016 (0.027)
Foreign Born	0.311 (0.013)*	0.325 (0.013)*
Highest Qualification: Higher	0.114 (0.008)*	0.124 (0.009)*
Highest Qualification: Further	-0.072 (0.012)*	-0.084 (0.012)*
Firm Tenure 1-2 years	-0.085 (0.012)*	-0.092 (0.013)*
Firm Tenure 2-3 years	-0.073 (0.014)*	-0.076 (0.014)*
Firm Tenure 3-4 years	-0.059 (0.016)*	-0.064 (0.015)*
Firm Tenure 4-5 years	-0.009 (0.011)	-0.014 (0.011)
Firm Tenure 5-10 years	0.018 (0.011)	0.018 (0.011)
Firm Tenure 10-15 years	0.085 (0.010)*	0.095 (0.011)*
Firm Tenure >15 years		

	0.175 (0.013)*	0.157 (0.014)*
Manager* **	0.009 (0.041)	0.007 (0.041)
Semi-Skilled Professional	-0.201 (0.012)*	-0.209 (0.014)*
Clerical/Secretarial	-0.230 (0.014)*	-0.247 (0.018)*
Craft/Trade	-0.337 (0.028)*	-0.360 (0.036)*
Personal/Security	0.043 (0.018)*	0.023 (0.020)*
Semi-Skilled Sales	-0.295 (0.032)*	-0.317 (0.035)*
Manual Sales	-0.271 (0.013)*	-0.288 (0.014)*
Plant Operator	-0.378 (0.017)*	-0.405 (0.018)*
Other Manual	0.253 (0.070)*	
Union Share	-0.120 (0.024)*	
Relative Unemployment Rate	-0.008 (0.0005)	
Annual Growth in GVA	-0.0002 (0.015)	
Scale industry	-0.00002 (0.00001)	
Trade Openness	-0.010 (0.015)	
High IIT	0.00003 (0.00002)	
UMCIT	-0.053 (0.013)*	-0.052 (0.013)*
Move inter-Industry	0.022 (0.010)*	0.039 (0.016)*
Move intra-Industry	0.059 (0.008)*	0.064 (0.008)*
Year 1996	0.007 (0.009)	0.006 (0.007)
Year 1997	0.067 (0.012)*	0.076 (0.012)*
Year 1998		

	0.097 (0.010)*	0.109 (0.009)*
Year 1999		
	0.100 (0.012)*	0.112 (0.012)*
Year 2000		
	1.111 (0.054)*	1.058 (0.049)*
Constant		
	-0.675 (0.049)*	-0.685 (0.046)*
	45858	45858
	3603	3603
Correlation Coefficient ρ	42255	42255
	0.3946	0.3803

10 N

Censored

Uncensored

11 R Squared

Notes: Source: QLFS 1995-2000 Standard errors are in parentheses.
* Denotes statistical significance at the 5% level
** Denotes statistical significance at the 10% level.
*** Skilled and semi-skilled managers are grouped together.

Likelihood Ratio Test for restricting the industry variables to zero is 1988.73, with

χ^2 (7 d.o.f. Critical value 14.067)