

## ESTIMATING THE WAGE EFFECTS OF JOB MOBILITY IN BRITAIN

David Campbell

November 2001

### Abstract

Switching from one job to another would appear to be an important part of an individual's experience within the labour market. In Britain, approximately one in three workers are observed changing jobs over a three year period. Models of voluntary job mobility predict that in the long run, switching jobs exerts a positive effect on lifetime earnings. This long run gain, however, may be generated through either shifts in the earnings profile, or changes in its slope. Using data from the British Household Panel Survey, it is found that the total wage gain arising from mobility over a three year period is around 10%. Further analysis suggests that four-tenths of this gain is generated by an upward shift in the earnings profile at the point of job change and the remaining six-tenths due to the movement into a job with a higher rate of on-the-job wage growth.

**JEL Classification:** C23, J31

**Keywords:** Job mobility, wage growth

**Acknowledgements:** The British Household Panel Survey data were originally collected by the ESRC Research Centre on Micro-Social Change at the University of Essex, now incorporated within the Institute for Social and Economic Research.

**Address for Correspondence:** David Campbell, Department of Economics, Keynes College, University of Kent at Canterbury, Canterbury, Kent CT2 7NP, UK. Tel: +44 (0)1227 823334; Fax: +44 (0)1227 827850; email: d.m.campbell@ukc.ac.uk.

## ESTIMATING THE WAGE EFFECTS OF JOB MOBILITY IN BRITAIN

### 1. Introduction

Human capital theory predicts that following entry into the labour market, workers will continue to invest in additional productivity enhancing skills while employed within a job. These investments will be in both specific and general human capital, which increase productivity within the current firm and alternative firms respectively. Theoretical models generally predict that the incentive to invest in general human capital diminishes with experience in the labour market, while the incentive to invest in specific skills declines with tenure in the current job. In order to test the empirical validity of these predictions, economists often use years of labour market experience and job tenure as explanatory variables when analysing the determinants of earnings at a point in the life cycle. Evidence from numerous studies suggests that earnings do increase with both experience and tenure, but at diminishing rate. The existence of concave experience-earnings profiles in particular, is often interpreted as providing strong evidence in support of the theory of human capital accumulation. There are, however, alternative explanations for why a worker's earnings may increase at a diminishing rate as they accumulate experience in the labour market. Theories of job mobility are capable of generating experience-earnings profiles that are concave in nature independently of any investment in human capital. In this case, part of the positive returns associated with experience that have been detected in the empirical literature may be attributable to the wage gains arising from job mobility.

Although the theoretical literature suggests that there are a number of ways of viewing the mobility process, all of the approaches are based on the notion that a worker will only have an incentive to switch jobs if such a job change raises the expected present value of lifetime

earnings. In the long run, therefore, the mobility wage gain is predicted to be positive. The manner in which this positive long run gain is generated, however, is less clear cut. For example, some theories of mobility suggest that when switching jobs, a worker receives a once and for all wage increase which induces an upward shift in their earnings profile. Alternatively, the positive long run gain may arise as a result of switching into a job associated with a higher rate of on-the-job wage growth, causing the earnings profile to become steeper. The challenge from an empirical point of view is to not only estimate the magnitude of the total mobility wage gain, but to also attempt to gain an understanding of the way this gain is generated. The empirical analysis undertaken in this study uses data from the British Household Panel Survey (BHPS) in order to estimate the total wage gain received by individuals who switch jobs over a three year period. The methodology adopted also enables an attempt to be made at identifying the part of the total gain that is attributable to a shift in the earnings profile and the part due to the movement onto a steeper profile.

In the remaining sections of this paper, section 2 summarises some of the main theoretical approaches to analysing the wage effects associated with job mobility. By drawing on these theoretical contributions, it is possible to gain an understanding of why the earnings profile may shift or change slope following mobility. Section 3 then reviews some of the existing empirical literature relating to estimating the mobility wage gain. Two studies are focused on as a way of outlining the two methodologies that have been used for analysing the effect that changing job has on earnings. The two studies considered (Holmlund, 1984; Abbott and Beach, 1994) highlight the differing techniques used to correct for the effects of selectivity bias which are likely to exist when comparing the wages of job movers and stayers. The fourth section then describes the methodology adopted within this study, which is essentially an extension of the dummy variable framework used by Abbott and Beach (1994). In section 5, a

description is given of how the BHPS data is used to estimate a wage change equation over the period 1991-1994. Some summary statistics are also presented to illustrate the mobility behaviour of individuals over a period of time. Section 6 reports the results obtained from the statistical analysis, while the final section considers any conclusions that may be drawn from the study.

## **2. Theoretical Approaches**

There are numerous models within the theoretical literature analysing the determinants of job mobility and the subsequent effect that such mobility has on the earnings of an individual over time. Although the models approach the issue of mobility in differing ways, all envisage a labour market characterised by some degree of heterogeneity or imperfect information. It is widely assumed that there exists a range of jobs in the labour market, arising from the fact that firms differ in the tasks that they require workers to perform. Each individual worker differs in their ability to perform these tasks required for each of the available jobs. Heterogeneity is also likely to exist across workers in the sense that for any given job, two individuals may differ in their productivity on that job. Some models of mobility also introduce the assumption of imperfect information, with firms initially being uncertain of the actual productivity associated with a new recruit to the job. Introducing these assumptions has the implication that mis-matches may occur in the labour market where workers are initially not employed in the jobs in which they are most productive. Job mobility then provides the mechanism for the market to move towards an efficient allocation of resources where workers locate themselves in the jobs that maximise their productivity.

The three approaches to job mobility described in this section provide differing insights into the way that the positive long run gain from switching jobs is generated. In particular, the job search approach implies that mobility induces an upward shift in the earnings profile, while the matching and on-the-job training approaches suggest that the profile may shift down at the point of job change, but become steeper. These different approaches are considered to be non-competing in that each is likely to contribute to an overall understanding of the mobility process. This section briefly describes each of the approaches in order to demonstrate how the earnings profile may be influenced by a change of job.

## **2.1 The Job-search Approach**

Within the set of models described by Jovanovic (1979) as “pure search good” models of job change, the most commonly referred to in the mobility literature is that of Burdett (1978). One of the most important assumptions of this approach is that a worker’s productivity remains constant while employed within a particular job. This implies that the earnings profile remains horizontal for the duration of any job. The assumption of heterogeneity, however, suggests that the worker is associated with a distribution of productivity and wages, reflecting their differing ability to perform the tasks required for each of the jobs available. In a way, the worker may be seen as entering the labour market with a stock of human capital, which remains constant over time, and firms differ in the level of productivity that they can extract from the worker. If upon entry into the labour market, the worker accepts the first job made available to them, their initial wage may be seen as a random draw from a distribution of wage offers reflecting their differing performance in all of the available jobs. Once employed within the first job, the individual is able to engage in search activity. Each firm the worker approaches offers the individual a wage that is related to their productivity within the firm. Some wage offers will be greater than the current wage and others will be lower than the wage

currently received. The more intensely the worker searches, the faster is the arrival rate of wage offers. If the worker successfully identifies a job offering a higher wage, they will have an incentive to switch jobs if the present value of the earnings stream in the alternative job exceeds that associated with the current job, after allowing for any costs incurred as a result of switching jobs. The existence of these costs implies that the wage offer in the new job needs to be significantly greater than the current wage to induce an individual to switch jobs.<sup>1</sup> This simple search approach, therefore, predicts that mobility exerts a positive effect on lifetime earnings. The mobility wage gain in this case arises as a result of a vertical shift in the earnings profile, which remains flat while employed within any particular job. Figure 1 below illustrates the earnings profile (*ABCDEF*) for an individual who enters the labour market at *S* and switches jobs at times  $t_1$  and  $t_2$ .

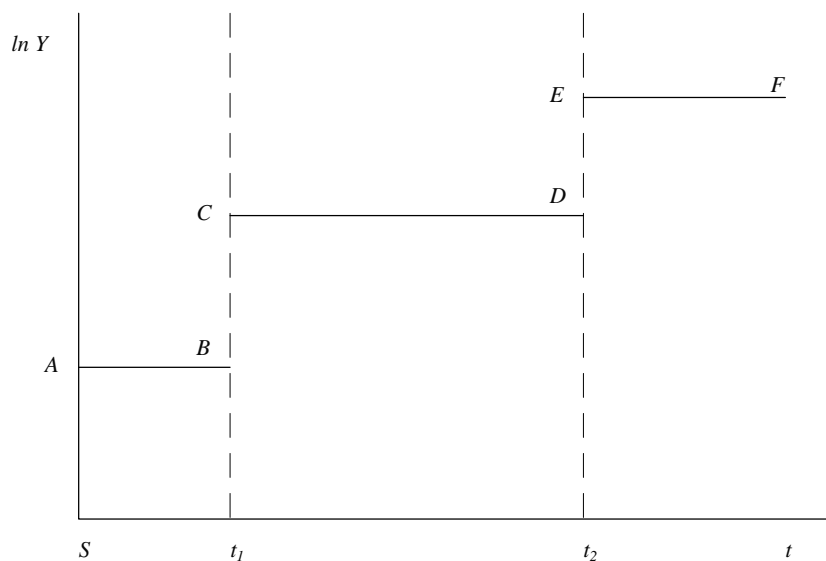


Figure 1 The pure search approach to mobility

---

<sup>1</sup> With zero mobility costs, workers would only require a marginal increase in the wage to provide them with an incentive to move.

A common finding in the empirical literature relating to the theory of human capital is the observation of earnings profiles that are concave with respect to years of labour market experience. In human capital theory, this finding is explained by investment ratios that are positive in any period but which decline with experience. Even though in the search model described previously, both productivity and wages remain constant on any job, the search approach is capable of providing an alternative explanation for the existence of concave earnings profiles. Within the search approach, more experienced workers are not associated with higher wages because they have become more productive over time, but because they have had more time to locate themselves into higher paying jobs. With each job change, the worker moves further along the wage offer distribution, leaving them with fewer jobs in which it will be worthwhile for them to move into in the future. If they continue searching with the same intensity, the probability of switching jobs is then expected to decline with experience. Even if the worker does identify a superior alternative, it is also likely that the wage gain associated with such a job change will be lower than the gains that were made earlier in the life cycle. As individuals accumulate more experience, it is also possible that search intensity falls and mobility costs rise, which further influences the propensity to move. With the probability of moving and the wage gains associated with mobility declining with experience, the earnings profile in figure 1 begins to trace out the conventional concave shape. The search approach may, therefore, be seen as providing an alternative explanation for the concave earnings-experience profile that is observed in the empirical literature.

## **2.2 The On-the-job-training Approach**

The on-the-job training approach differs from the search approach in that it is no longer assumed that a worker's productivity remains constant while employed in a particular job. One of the main elements of the theory of human capital is that productivity increases with

tenure on a job as a result of the accumulation of specific human capital. Rising productivity then gives the potential for on-the-job wage growth as the firm and worker share the returns generated by specific human capital investments. The earnings-tenure profile is predicted to be concave if the incentive to invest in specific human capital is greatest when the worker starts a job, but then gradually declines with the accumulation of job tenure. New recruits to a job are therefore expected to be on the part of the earnings profile that is relatively steep, while those who have been employed in the job for many periods will be associated with a flat wage profile.

In the version of the training approach considered by Mortensen (1988), an individual may be willing to accept a pay cut when switching jobs in order to receive a higher rate of wage growth in the new job. The intuition behind this result is that the rate at which earnings grow on a particular job is related to the amount of tenure accumulated on that job. A worker who has been employed in a job for a long time will receive little additional investment in specific human capital and, therefore, expect their wage profile to be relatively flat if they continue in the same job. If the same worker were to switch jobs, however, their level of tenure resets to zero and they will receive a high level of specific human capital investment, which will, in turn, imply that they will be faced with a steep earnings profile.<sup>2</sup> In each period after the job

---

<sup>2</sup> Mortensen assumes an infinite time horizon, which is capable of generating the result that when a worker switches into a new job, tenure resets to zero, and the rate of specific human capital also returns to an initial value associated with zero tenure. If this investment profile is the same across jobs, new recruits always face a steep earnings profile as a result of a high rate of human capital accumulation. With a fixed retirement date, however, it is likely that the entire tenure-specific human capital profile decreases with age. When starting a new job, a worker will actually invest in less specific human capital at the start of the new job compared to the start of the previous job since their age has increased. This implies that the rate of growth of earning in the early years of a job falls with each new job that the worker moves into as a result of their age increasing.

change occurs, the rate of wage growth the worker receives in the new job will always exceed that which they would have received had they continued in the initial job. This is because in all subsequent periods, the level of tenure in the new job will always be lower than the tenure that would have been accumulated in the previous job. Following a job change, therefore, the worker may move onto a wage profile that is always steeper than the profile they would have been on had they chosen not to move.

When a worker does quit a particular job, the specific human capital accumulated on that job is lost, leaving them with just their stock of general human capital to transport into the new job. Assuming for the moment that the stock of general skills remains constant over time, the starting salary offered in the new job will depend on the level of productivity that the new firm can extract from the worker's skills. This means that the starting wage associated with the new job could be greater or less than the wage that was received at the end of the previous job. Although the worker loses their wage enhancing specific skills when they leave one job, it is possible that they switch into a job that pays a higher rate of return on their general skills than the previous job paid. In this case the starting salary in the new job will not fall all the way back to the wage that was initially received in the previous job. A likely outcome is that the starting wage in the new job will lie somewhere between the starting wage and final wage received in the previous job. An alternative outcome, however, is that the worker identifies a new job offering a return on their general skills great enough to create a starting salary on the new job that exceeds the final wage received in the previous job. The instantaneous effect of switching job, therefore, may see the worker's earnings either increase or decrease relative to the final wage received in the previous job. Once employed in the new job, however, the earnings profile is predicted to become steeper since the worker has low tenure on that job and so receives a relatively large quantity of specific human capital investment. Under these

circumstances, an individual maximising the present value of future earnings would be willing to accept a wage cut at the point of job change in the knowledge that earnings in the new job will eventually catch up with and overtake the earnings they would have received had they continued in the previous job. Mortensen argues that at the point of job change, workers will have a reservation wage offer that leaves the individual indifferent between staying on the current job and switching into a new job. This reservation offer will always be lower than the current wage. Since any actual wage offer greater than the reservation offer will be accepted, the starting salary in the new job could be either greater or less than the wage received at the end of the previous job. Overall, therefore, mobility will cause the earnings profile to become steeper, but could either shift up or down at the point of job change.

### **2.3 The Job-matching Approach**

Another group of models used to analyse labour mobility consider a job as a “pure experience good”.<sup>3</sup> As in the search approach, most models assume that a worker’s actual productivity on a given job remains constant, which implies that there is no additional investment in valuable human capital once employed within a job. The most important assumption of the matching approach is that there may initially be uncertainty over a worker’s actual productivity within a particular job. As job tenure is accumulated, additional information is revealed relating to the worker’s actual productivity on the job. In the light of such new information, the firm makes adjustments to the wage paid to the worker. This then gives the opportunity for wages to grow on a job even though actual productivity remains constant.

---

<sup>3</sup> This terminology is used by Nelson (1970) and Jovanovic (1979).

The matching approach may be viewed as an extension of the search approach described previously. Heterogeneity implies that workers face a distribution of actual productivity arising from their differing ability within the jobs available in the labour market. The presence of imperfect information, however, implies that upon entry into a particular job, an individual's actual productivity on that job is not known with certainty. The starting salary offered by the firm is based on the expected value of productivity given the information available at the time the job commences. As job tenure is accumulated, the firm gains new information relating to the worker's actual productivity. This additional information enables the firm to form a new estimate of actual productivity, which in turn, leads to an adjustment of the wage paid to the worker. Under these circumstances, a worker may see their earnings either increase or decrease in a given job. A worker whose actual productivity on the job is relatively high can expect a positive rate of wage growth while employed on the job. Due to the assumptions that Mortensen and others make concerning the way information is accumulated, the rate at which earnings grow is greatest at low levels of job tenure. This produces an earnings-tenure profile that is concave for those who remain on the same job. Positive on-the-job wage growth is therefore observed as a result of sample selection bias. This bias arises because only those individuals who are relatively productive on a particular job will remain on that job. Those in poor matches, where earnings decline on the job, or grow at a slow rate, are the ones who are most likely to quit the job that they are currently employed in.

The main implications of the job matching approach described by Mortensen are the same as that of the training approach - workers will be willing to accept a pay cut when switching jobs in order to move into a job with a higher rate of on-the-job wage growth. An individual who has accumulated a large amount of tenure on a job will be associated with a low rate of on-

the-job wage growth. This is because with high tenure, the firm's estimate of the worker's productivity will be close to the actual value. Any further wage adjustments that occur following the arrival of new information are likely to be small. If the individual were to switch jobs, however, there is the potential for the rate of on-the-job wage growth to be relatively high. When starting the new job, there may initially be great uncertainty over actual productivity which implies that as new information arrives, future earnings may rise considerably above or below the starting wage.<sup>4</sup> The probability of receiving a high rate of on-the-job wage growth is therefore greater in an alternative job than remaining in the current job, but there is also a higher probability of incurring wage losses in a new job. Mortensen argues that because workers are insured against negative wage growth as a result of the option to quit to non-employment, workers will be willing to accept the risk associated with the path of future earnings in the new job. With the possibility of moving onto a steeper earnings profile in the new job, individuals maximising future incomes would be willing to move into a job that pays a starting wage less than the wage currently received. As in the training approach, a reservation offer will exist that leaves the worker indifferent between quitting and remaining on the current job. Any starting wage offer on a new job that exceeds this reservation offer will be accepted. In this case, the starting wage offer will be drawn from a distribution of offers reflecting firms initial assessments of productivity rather than actual productivity.

---

<sup>4</sup> The process of information accumulation is assumed to be the same across all jobs. Once an individual quits a job, all information accumulated on that job is lost and the process starts again in the new job. Other matching models assume such information is valuable across firms, for example Eriksson (1989) and Liu (1986).

## 2.4 Summary of the Main Theoretical Issues

The aim of this section has been to describe how different theoretical tools may be combined in order to develop an understanding of the effect that switching jobs has on the earnings profile. The ideas embodied in the training and matching approaches may be referred to when describing how earnings grow while employed in a particular job, whereas the search approach provides an insight into how the starting wage on a new job compares to the final wage received on the previous job. Whatever theoretical model that is referred to, in the long run it is expected that the mobility wage gain is positive since workers will only switch jobs if it enhances their lifetime earnings. The search, training, and matching hypotheses suggest that part of this gain is due to a shift in the earnings profile following a job change and another part due to a change in the slope of the profile. Either of these individual wage effects could be negative even though the total mobility wage gain is positive. For example, in Mortensen's version of the matching approach, the earnings profile may shift down following mobility but become steeper. In other versions of the matching approach, such as Eriksson (1989), which are based on slightly different assumptions, the earnings profile is predicted to shift up following a job change, but become flatter.<sup>5</sup> In both cases, the overall wage gain associated with mobility is positive although the way that this gain is generated differs. For this reason, it would appear to be an important empirical issue to go beyond estimating the magnitude of the long run mobility wage gain and investigate how this gain arises in terms of shifts and changes in the slope of the earnings profile.

---

<sup>5</sup> Eriksson assumes that information relating to productivity on jobs is endogenous in that it is obtained as a result of investing in general human capital. This information may then be used to assess productivity in all jobs and not just the job in which the worker is currently employed. Once the job where productivity is maximised is identified, earnings rise at the point of job change, but the rate of growth of earnings falls since the incentive to invest in human capital for informational purposes declines.

### 3. Review of the Existing Empirical Literature

Most existing studies of job mobility provide an estimate of the total wage gain received by workers who switch jobs at some point during a particular time interval. The issue of whether the total gain arises as a result of a shift in the earnings profile or a change in slope has generally not been addressed. Instead, the focus of attention in the empirical literature is to estimate the total mobility wage gain while controlling for the effects of selectivity bias which are likely to be present when comparing two groups of individuals such as job movers and stayers. The purpose of this section is to briefly review two existing studies as a way of describing the alternative methodologies that have been adopted for obtaining unbiased estimates of the mobility wage gain.

One of the most commonly referred to empirical studies within the mobility literature is that by Holmlund (1984).<sup>6</sup> Using data from the 1968 and 1974 Swedish Level of Livings Surveys, Holmlund attempts to estimate the total wage gain received by workers who switch jobs at some point during this time interval. In the model considered, it is assumed that an individual earns an initial wage and faces the decision of whether to remain on the current job or switch into an alternative. The two jobs differ in their rates of on-the-job wage growth, so if the individual switches jobs, they may be seen as moving onto a steeper earnings profile. Figure 2 below provides a simple representation of Holmlund's approach for an individual who switches job at some point fractionally after 1968. In a way, figure 2 may be interpreted as being a special case of the matching and training approaches where there is no vertical shift in

---

<sup>6</sup> A similar empirical methodology is used by Borjas and Rosen (1980), Kidd (1991) and Simpson (1990).

the earnings profile following mobility, only an increase in its gradient.<sup>7</sup>

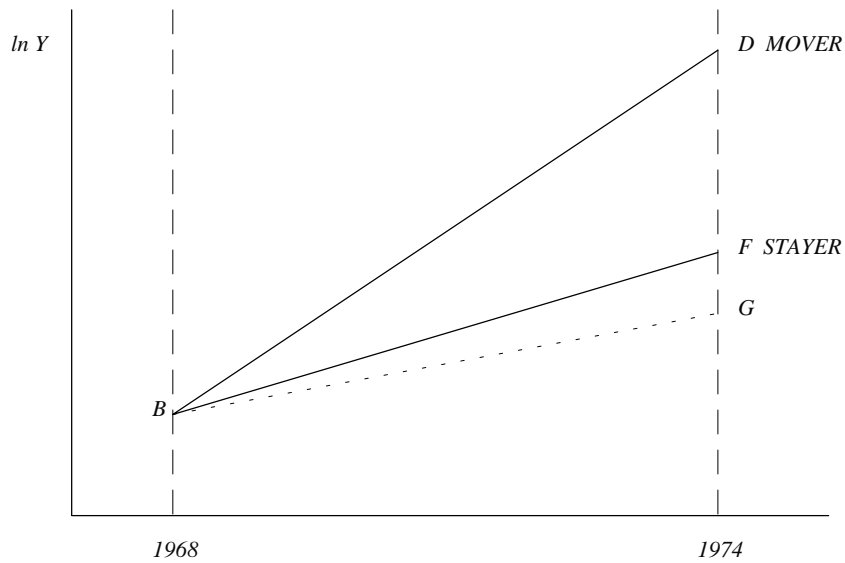


Figure 2 Holmlund's estimate of the mobility wage gain

In order to calculate the mobility wage gain, Holmlund estimates separate wage change equations over the 1968-1974 period for those who switch jobs and for those who remain on the same job. The possible existence of sample selection effects, however, may mean that the coefficients within a conventional wage change equation are biased. If it were the case that stayers possess unobservable characteristics that enhance their on-the-job wage growth, such as high ability, then the coefficients associated with the observable characteristics within the stayers' wage change equation would be biased upwards. Taking the mean observable characteristics of the sample of movers and then applying them to the stayers' wage equation would tend to exaggerate the estimate of the change in earnings a mover would have received

---

<sup>7</sup> In section 2 it was discussed how there exists a reservation offer that lies below the current wage. Any wage offer from a new job that exceeds this reservation offer is accepted. The starting salary in the new job could then be greater than, less than, or exactly equal to the current wage received.

had they stayed. When this estimate is then compared to the actual change in earnings received by movers, the mobility wage gain will be understated.

As a way of correcting for the potential upward bias of the coefficients associated with the observable characteristics within the stayer and mover wage equations, Holmlund uses Heckman's (1979) procedure for sample selection effects. This essentially involves re-estimating the stayer wage equation while controlling for factors such as high unobservable ability in order to obtain consistent coefficient estimates for the observable characteristics. Using this corrected version of the stayer wage equation, a stayer with mean observable characteristics would be predicted to have lower wage growth than when these mean observable characteristics are applied to the uncorrected wage equation. By removing the wage enhancing effects associated with unobserved ability, the earnings profile of stayers may be represented by the additional flatter profile, *BG*, in figure 2. In estimating the unbiased version of the stayer wage equation, Holmlund finds evidence for the existence of sample selection effects. The estimated coefficient on the selectivity term in the corrected stayer wage equation implied that those who remain on their jobs would receive higher wage growth than similar movers would have received had they not moved. This suggests that the observed profile associated with stayers is steeper than the profile movers would have been on had they not moved. This highlights the need to estimate the version of the stayer wage equation that corrects for sample selection effects when estimating the gains associated with job mobility. In order to derive an estimate of the mobility wage gain, Holmlund applies the mean observable characteristics of the sample of movers to the corrected stayer equation in order to obtain an estimate of the wage growth a mover would have received during the 1968-74 period if they had not changed jobs. This hypothetical wage growth is then compared to the actual mean observed wage growth of movers. By undertaking these calculations, Holmlund

finds that the average annual rate of wage growth for movers is 2.3% higher than the growth rate they would have received had they not switched jobs.

The estimate of the mobility wage gain obtained by Holmlund may be viewed as a long run estimate. The theoretical issues discussed previously suggested that part of the total wage gain is due to a shift in the earnings profile and another part due to a change in slope of the profile. If, as in figure 2, mobility is assumed not to induce a shift in the wage profile, the 2.3% per annum gain calculated by Holmlund would reflect the gains made by movers as a result of moving onto a steeper wage profile. If it were the case, however, that the earnings profile also shifted up following a job change, the 2.3% per annum gain would incorporate both the wage gain arising from a shift in the earnings profile and the wage gain associated with a greater rate of on-the-job wage growth. Most existing estimates of the mobility wage gain include both the gains arising from shifts and changes in slope of the earnings profile and so may therefore be interpreted as longer run estimates. The next challenge from an empirical point of view is take an estimate of the total mobility wage gain and attempt to determine how much of this gain is due to a rise in earnings that occurs at the point of job change and how much is attributable to a faster rate of on-the-job wage growth in the new job.

There exists a second group of studies within the empirical literature that adopt a different methodology in order to estimate the wage gains associated with job mobility. These studies estimate a single wage change equation for all individuals within the sample and incorporate a dummy variable capturing whether the worker is a mover or a stayer. The coefficient on this dummy variable then gives the difference in the change in earnings between those who actually move and those who actually stay. This is unlikely to provide an accurate estimate of the mobility wage gain, however, if the on-the-job wage growth of stayers does not serve as a

good approximation for the wage growth movers would have received had they not moved. In order to correct for this bias, it is necessary to find a third group of individuals within the data who are associated with an earnings profile similar to *BG* in figure 2, which may be used to proxy the change in earnings that movers would have received had they not moved. One possibility, proposed by Mincer (1986), is to identify those individuals who stay in their jobs in the period over which the wage change equation is estimated, but who then switch jobs in the subsequent period. These “next period movers” may be associated with similar levels of unobservable characteristics to those workers who are observed as moving in the current period. Effectively, both “next period movers” and “current period movers” are considered as being members of the group of movers and so possess the characteristics associated with that group. In this case, the on-the-job wage growth that next period movers receive in the current period may be used as a way of approximating the growth in earnings that current period movers would have received had they not moved. Next period movers may therefore be seen as being on a profile similar to that of *BG* in figure 2. An estimate of the long run mobility wage gain may then be calculated by comparing the wage change of current period movers with next period movers.

Abbott and Beach (1994) adopt the dummy variable approach in order to estimate the mobility wage gain for a sample of Canadian women from the Labour Market Activity Survey. They consider a sample of individuals who held either one or two jobs during the period 1986-1987. From their sample, they identify several groups of individuals who are differentiated with respect to their mobility behaviour over the two year period. Firstly, there are 1986 movers, who experience a job change at some point during 1986. A second group of workers, defined as 1987 movers, remain on the same job throughout 1986, but then switch jobs during 1987. Finally, Abbott and Beach are able to identify the group of stayers, who are observed as

remaining on the same job throughout the entire 1986-87 period. In order to calculate the mobility wage gain, Abbott and Beach estimate a single wage change equation for the 1986 period with the inclusion of dummy variables indicating the different types of mobility behaviour. By comparing the change in wages over the 1986 period for those who switch jobs in 1986 with the change in wages over the 1986 period for those who move in 1987, Abbott and Beach calculate the mobility wage gain to be around 8%. This estimate is believed to correct for selectivity bias since the groups of 1986 movers and 1987 movers are hypothesised to possess similar unobservable characteristics. The results obtained from the wage change equation also suggest that simply comparing current period movers with stayers would understate the mobility wage gain. Those who remain in the same job throughout the entire 1986-87 period are observed as having higher wage growth over the 1986 period than the group of 1987, or next period, movers. This result is consistent with Holmund's evidence concerning sample selection effects in that the wage growth of stayers tends to overstate the wage growth that movers would have received had they not moved.

#### **4. Empirical Methodology for Estimating the Gains from Mobility**

The search, matching and training approaches suggest that the gains arising from job mobility may occur either as a result of a shift in the earnings profile, or a change in the slope of the profile, or both. For the purposes of this study, the vertical shift in the earnings profile that occurs at the point of job change is referred to as the short run mobility wage gain (SRMWG). The total wage effect that includes both the shift in the profile and the change of slope is referred to as the long run mobility wage gain (LRMWG). Most existing empirical studies examining the wage effects associated with mobility offer an estimate of the LRMWG. In order to estimate this LRMWG, the existing literature highlights the need to employ a

technique that addresses the issue of selectivity bias which arises when comparing two groups of individuals like movers and stayers. The first aim of the empirical analysis undertaken within this study is to derive an estimate of the LRMWG for UK employees using data from the British Household Panel Survey (BHPS). From this estimate of the LRMWG, an attempt is also made to identify the proportion of this gain that is due to a shift in the earnings profile (i.e. the SRMWG) and the proportion occurring as a result of a change in the gradient of the wage profile following mobility. Being able to perform such a decomposition is of interest because it enables an insight to be gained into whether the earnings profile shifts up or down following mobility and whether it becomes steeper or flatter. Answering these questions may contribute to an overall understanding of exactly how individuals gain in the long run by switching jobs. To estimate the LRMWG in the presence of possible sample selection effects, a version of the dummy variable approach similar to that of Abbott and Beach is used. An extension of this technique is then used in order to decompose the LRMWG into the two relevant components.

It is assumed that an individual enters the labour market at time  $S$  with a stock of general skills which remains constant throughout their working life. In figure 3 below, the individual is then observed at a later date,  $t_1$ , with earnings given by the point  $B$ . Fractionally after this date, the worker switches into an alternative job that pays a starting wage of  $C$ .<sup>8</sup> Once employed within this new job, earnings may grow as a result of specific human capital accumulation or as a result of additional information concerning actual productivity being revealed. The earnings profile over the period  $t_1$  to  $t_2$  for a current mover is then given by

---

<sup>8</sup> To keep the diagram simple, it is assumed that the starting wage in the new job exceeds the current wage i.e. the earnings profile shifts up following mobility.

$BCD$ . At time  $t_1$ , another individual is associated with earnings  $B$  who is observationally similar to the current mover but remains on the same job throughout the period  $t_1$  to  $t_2$ . The earnings profile for the current stayer is given by the line  $BF$ . The profile of the mover is drawn steeper than the stayer reflecting the predictions of the matching and training approaches outlined in section 2. Those who remain on the job will have higher tenure at any point between  $t_1$  and  $t_2$  than the mover and so may receive less investment in specific human capital. With the stayer's higher tenure, it is also possible that the rate at which earnings grow as a result of the arrival of new information relating to actual productivity is lower.

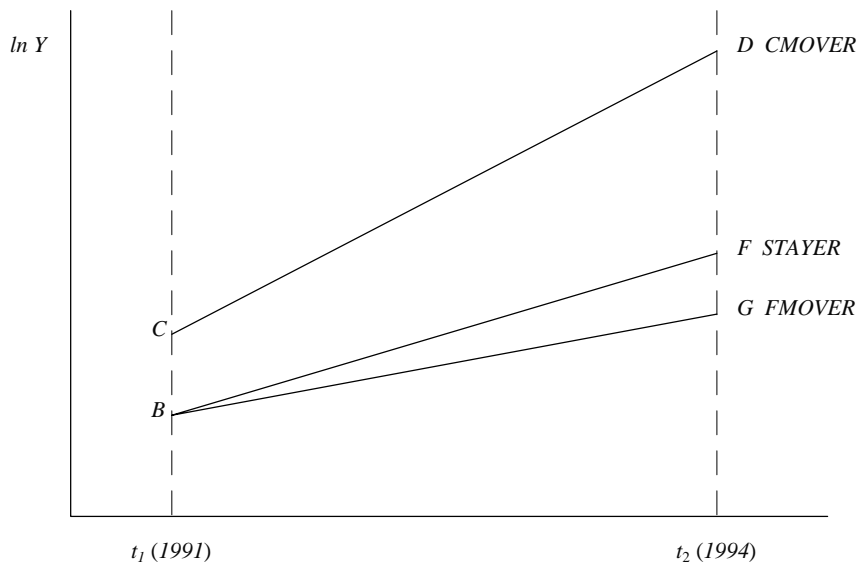


Figure 3 Estimating the long run mobility wage gain

The change in wages for the mover is given by the vertical distance between  $B$  and  $D$ , while for a stayer, the wage change is given by the vertical distance between  $B$  and  $F$ . The difference in the wage change of movers and stayers over the period  $t_1$  to  $t_2$  is then given by  $FD$ . As was discussed in the previous section, however, comparing the wage change of observationally similar movers and stayers may not provide an accurate estimate of the LRMWG. This is

because stayers may be associated with unobservable characteristics that cause their on-the-job wage growth to be greater than the wage growth observationally similar movers would have received had they not moved. The technique used in this study to correct for this potential bias is similar to that used by Abbott and Beach. Some of the individuals who are observed as staying between  $t_1$  and  $t_2$  will go on to experience a job change at some point beyond  $t_2$ . These individuals are referred to as “future movers”. It may be the case that future movers are more similar in terms of their unobservable characteristics to the group of current movers than current stayers. Without the same wage growth enhancing unobservable characteristics possessed by current stayers, a future mover may be associated with the profile  $BG$ .<sup>9</sup> The on-the-job wage growth of future movers in the period  $t_1$  to  $t_2$  may then be used as a way of approximating the change in earnings a current mover would have received had they not moved. An estimate of the LRMWG could then be derived by comparing the change in earnings of a current mover with that of a future mover. If both current movers and future movers are similar in terms of unobservable characteristics such as ability, then the difference in their earnings growth over the period  $t_1$  to  $t_2$  may be seen as occurring as a result of mobility and not as a result of differences in unobservable characteristics. The vertical distance  $GD$  may then provide an estimate of the LRMWG.

The estimate of the LRMWG will exceed the SRMWG ( $GD > BC$ ) if the earnings profile becomes steeper following a job change. In order to derive an estimate of the SRMWG, it is necessary to find a way of filtering out the contribution made to the total wage gain arising

---

<sup>9</sup> When introducing future movers, the current stayer profile in figure 3,  $BF$ , should be viewed as being the profile associated with those who stay in both the current period and the future period. Whether the future mover profile,  $BG$ , lies above or below  $BF$  is an empirical issue and provides evidence for the direction of the selectivity bias.

from the movement onto a steeper earnings profile. If future movers may be used to approximate the wage change current movers would have received had they not moved, then it could be argued that the wage change over the period  $t_1$  to  $t_2$  of “past movers” may proxy the wage change current movers would have received had they already been employed in their new jobs at time  $t_1$ . From the set of individuals who are observed as remaining on the job between  $t_1$  and  $t_2$ , there will be some who experienced a job change just before  $t_1$ . According to the matching and training hypotheses, these past movers will be associated with a relatively steep earnings profile since they are new to their current jobs and, therefore, have low tenure. The earnings profile of an individual who moved fractionally before  $t_1$  may be given by the profile  $BE$  in figure 4.

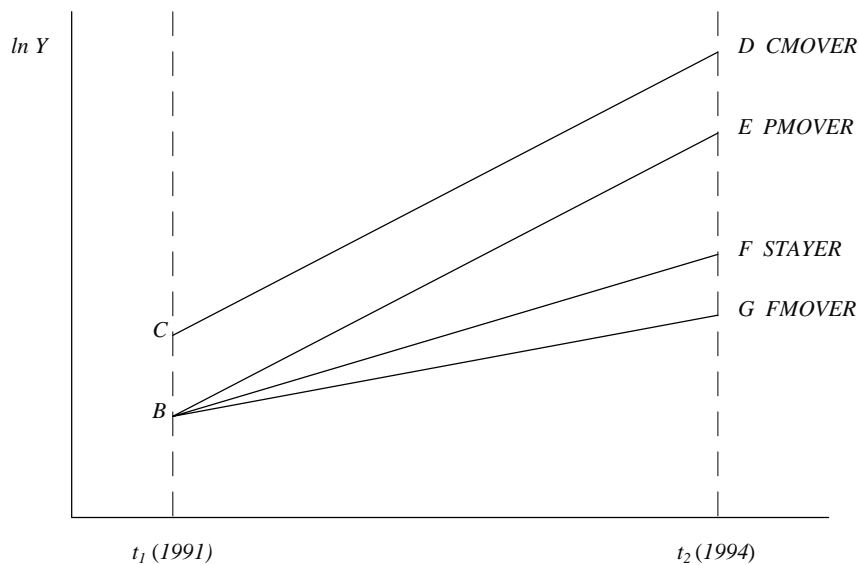


Figure 4 Estimating the short run mobility wage gain

Figure 4 shows the earnings profiles associated with current movers, past movers, and future movers. The stayers profile is different to that shown in figure 3 in that it now relates to individuals who not only remain in their jobs over the period  $t_1$  to  $t_2$ , but who also stay on the same job in the past and future periods. These individuals may, therefore, be viewed as long

term job stayers. As in figure 3, an estimate of the LRMWG may be derived by comparing the wage change of current movers with future movers. Some additional insight, however, into the wage effects associated with mobility may be gained by comparing the change in earnings of future movers with past movers. Neither of these groups of workers experience any mobility over the period  $t_1$  to  $t_2$  and both may be considered as possessing unobservable characteristics that are consistent with the overall sample of movers. In this case, the difference in wage change between these two types of workers,  $GE$ , may be seen as being due to the fact that past movers are associated with a steeper wage profile. The distance  $GE$  may then provide an estimate of the mobility wage gain arising from the movement onto a steeper earnings profile. When comparing current movers with future movers, the estimate of the LRMWG,  $GD$ , includes both the effect of a shift in the earnings profile and a change in slope. By subtracting from the LRMWG the estimate of the wage gain arising from the movement onto a steeper profile,  $GE$ , it is possible to derive an estimate of the vertical shift in the earnings profile associated with mobility (SRMWG). This estimate of the SRMWG,  $ED$ , will accurately estimate the actual SRMWG,  $BC$ , if the earnings profiles associated with past movers and current movers are parallel. If they are parallel, the main difference in the wage change of these two types of worker will be due to the vertical shift in the earnings profile received by current movers when they switch jobs.<sup>10</sup>

---

<sup>10</sup> It is unlikely that these two profiles will be parallel. At any point between  $t_1$  and  $t_2$ , current movers will always have less tenure than past movers and so may be on a steeper profile. If past movers switched jobs fractionally before  $t_1$  and current movers fractionally after  $t_1$  the difference in these slopes may be small, but the more time that elapses between past movers and current movers switching jobs, the greater will be the difference in the slopes of their associated wage profiles.

The empirical methodology described in this section, therefore, relies on being able to identify a worker's mobility behaviour over three periods. Although the wage change equation is only estimated for the current period, it is necessary to consider whether the individual experienced a job change in the previous period and in the subsequent period. By combining the information relating to mobility behaviour in each of the periods, an individual may be classified as either a mover or a stayer. A mover is defined as someone who experiences a job change in any of the three periods, while a stayer is defined as a worker who remains on the same job throughout all three periods. The groups of movers and stayers may possess different unobservable characteristics making it inappropriate to compare their wage changes in the current period in order to estimate the mobility wage gain. Instead, the wage change of those who switch jobs in the current period (current movers) may be compared to individuals who remain in their jobs in the current period but who experience mobility in either the previous or subsequent period (past or future movers). In particular, comparing current movers with future movers may provide an estimate of the LRMWG since these individuals may be associated with similar unobservable characteristics and so only differ in terms of their mobility decision within the current period. Additional insight into the wage gains arising from mobility may then be obtained by comparing future movers with past movers. Essentially, the estimates of the mobility wage effects are calculated by comparing current, future, and past movers who are all assumed to belong to the overall group of movers. This technique provides a way of correcting for sample selection bias if the three different types of job mover are similar in terms of their unobservable characteristics.

## **5. Description of the BHPS data and Statistical Model**

### **5.1 Deriving the Mobility Variables**

The source of data for this study is the British Household Panel Survey (BHPS), which is a continuing longitudinal survey of individuals living in Great Britain. The first wave was undertaken in September 1991 with approximately 10,000 individuals being interviewed from 5,000 households. Annual follow-ups have taken place in each year up to 1999, although only the data from the waves leading up to 1997 are referred to within this study. BHPS data contains a rich source of information relating to the jobs held by individuals during the 1990s. In particular, at the time of each interview, individuals provide information relating to the date at which their current job started. For those in employment at the time of the 1991 wave, data is available for the month and year in which the current job began. Using this information, it was possible to identify which individuals started their current job no more than three years before their date of interview in 1991.<sup>11</sup> Those who are observed as having started their current job at some point between 1988 and 1991 are considered as having experienced mobility within the ‘past period’.

In 1994, individuals who are observed as being in employment are once again asked to register the date at which their current job started. Since the exact date of each interview is known, it is possible to determine whether the current job started at some point between the 1991 and 1994 interview dates. A dummy variable was then constructed to indicate whether the individual switched jobs between their 1991 and 1994 interviews. Individuals recording a value of one for this variable are seen as experiencing mobility within the ‘current period’.

---

<sup>11</sup> Most of the interviews in 1991 took place in September, but in subsequent waves, the interviews occurred between September and April.

The definition of a current period mover, therefore, is only based on whether the worker is observed in a different job in 1994 compared to 1991. The number of moves made in this period and whether the job changes occur within the same firm or across firms is not explicitly considered.

The empirical methodology outlined in the previous section requires being able to identify job changes that occur in the period beyond that in which the wage change equation is estimated. This is achieved by analysing the start dates for the jobs held by workers at the time of the 1997 round of BHPS interviews. If the start date for the job held in this wave of the BHPS was between the 1994 and 1997 interview dates, the individual was recorded as having experienced mobility in the 'future period'. The sample of individuals obtained, therefore, is relatively restricted since it is required that individuals are in employment at the time of the 1991, 1994, and 1997 interviews. The wage change equation for the sample is estimated over the current period (1991-94), although information is available relating to mobility occurring in the past period (1988-91) and the future period (1994-97). Individuals within the sample may be considered in terms of two main groups, depending on whether or not they experienced any job changes over the entire 1988-97 period. The group who did experience mobility are then divided into four separate categories. Firstly, current movers (*CMOVER*) are identified as those who switch jobs during the current period. Past movers (*PMOVER*) are defined as being those who remain in the same job throughout the current period, but who switched jobs in the previous period. Those who do not change jobs in the current period, but who go on to experience mobility in the subsequent period are referred to as future movers (*FMOVER*). Finally, there will be some multi-period movers (*PFMOVER*) who remain in the same job in the current period, but who experience job changes in both the past and future periods. For the purposes of estimating the wage gains associated with mobility discussed in

section 4, it is these four types of job movers who are assumed to be similar in terms of their unobservable characteristics. Table 1 summarises the mobility behaviour in each of the three periods for the four different types of job movers, along with the additional group of long term job stayers.

## 5.2 Equation to be Estimated

The version of the wage change equation estimated using the BHPS data is similar that of Keith and McWilliams (1997). The change in earnings between 1991 and 1994 is regressed on a set of control variables and a number of dummy variables representing the five types of worker described in table 1. The wage change equation to be estimated may be written in the following form:

$$\Delta \ln W_i = \delta \ln W_{i,1991} + \beta_2 \Delta X_i + \beta_3 CMOVER_i + \beta_4 PMOVER_i + \beta_5 FMOVER_i + \beta_6 PFMOVER_i + \varepsilon_i^* \quad (1)$$

where:  $\Delta \ln W_i$  is the change in deflated log gross monthly pay between 1991 and 1994

$\ln W_{i,1991}$  is deflated log gross monthly pay in 1991

$\Delta X_i$  is the change in the set of explanatory variables between 1991 and 1994

$CMOVER_i$  equals one if the individual changed jobs between 1991 and 1994

$PMOVER_i$  equals one if the worker is a past mover

$FMOVER_i$  equals one if the worker is a future mover

$PFMOVER_i$  equals one if the worker is a multi period mover

$STAYER_i$  equals one if the worker is a stayer (excluded case)

$\varepsilon_i^*$  is a random error term and  $\delta, \beta_j, j = 2, \dots, 6$  are coefficients to be estimated

As shown by Holmlund (1984) and Keith and McWilliams, the inclusion of the initial wage allows the coefficients associated with the explanatory variables to vary between the two wage level equations that form the wage change equation. In moving from 1991 to 1994, each individual will accumulate a number of years of additional experience within the labour

market. This change in experience, valued according to the return per year of experience in 1994, could be entered as an explanatory variable in the wage change equation. It is possible, however, that the return per year of experience within the 1994 wage level equation is different from that associated with the 1991 wage level equation. The inclusion of the initial (1991) wage detects any difference in the coefficients of the explanatory variables in 1991 ( $\beta_1$ ) with those in 1994 ( $\beta_2$ ). A negative coefficient estimate for  $\delta$  would imply that the coefficients associated with the explanatory variables in 1994 are lower than those in 1991. If the coefficients relating to variables such as years of experience are observed to be declining, the inclusion of initial earnings in the wage change equation will capture the concave nature of the experience-earnings profile when viewed across the whole life cycle.<sup>12</sup> When including initial earnings, however, there is the possibility of obtaining biased coefficient estimates in the wage change equation due to the potential correlation between the initial wage and the composite error term.<sup>13</sup>

Although many existing studies include the change in years of experience within the wage change equation, this variable is not included in the estimation of equation (1) using the BHPS. Instead, a dummy variable was constructed indicating whether each individual within the sample worked continuously throughout the 1991-94 period, or experienced any spells of unemployment. The theoretical approaches discussed in section 2 generally relate to job changes that occur voluntarily. Workers who voluntarily switch jobs may be less likely to

---

<sup>12</sup> In the empirical approach described in section 4 and depicted in figure 4, the log wage profile is seen as being linear. Over a short interval, such as three years, the profile could be approximated as a linear function, although over the full working life, the profile may be of a concave nature.

<sup>13</sup> A more detailed discussion of the wage change model and the potential estimation concerns is presented in the Appendix.

experience any spells of frictional unemployment over the period in which the wage change equation is estimated. For the sample of individuals working continuously over the 1991-94 period, the only discontinuity in the wage profiles depicted in figure 4 is associated with the vertical shift experienced by the group of current movers at the point of job change. In order to estimate the wage gains associated with mobility as illustrated in the previous diagrams, equation (1) is initially estimated for those who remain in continuous employment from 1991 to 1994. As an extension, the equation is then estimated allowing for the possibility that some individuals experience a spell of unemployment when moving from one job to another. Since any workers observed with unemployment will be employed in a different job in 1994 to the one held in 1991, the sample of current period movers is separated into those who switch jobs with no unemployment over the three year period and those who switch jobs but experience intervening unemployment.

The existence of an unemployment spell is likely to have several effects on the change in earnings over the period 1991-94 for the group of current movers. One possibility is that it exerts an additional effect on the shift in the earnings profile that arises when the new job commences. It could be the case that the earnings profile shifts down as workers who are laid off are willing to accept a low starting wage in the new job in order to minimise the time spent in unemployment. Alternatively, during the unemployment spell, an individual may search more intensely allowing them to identify a new job offering a higher starting wage. In this case, the earnings profile would shift upwards relative to its position in the previous job. Workers who switch jobs with intervening unemployment may also be expected to suffer a wage penalty relative to those who switch jobs instantaneously since no on-the-job wage growth is possible throughout the duration of the unemployment spell. Even if they do eventually find a job similar to that of instantaneous movers, their subsequent earnings in the

new job will always be lower since several periods of on-the-job wage growth would have been lost relative to those who switch jobs without experiencing unemployment. With the data available, it would be difficult to identify the exact wage effects arising from mobility involving a spell of unemployment. Simply segregating the movers into those who switch jobs with and without intervening unemployment, however, may provide some insight into the average wage effects of these two forms of mobility. Those who switch jobs without experiencing unemployment may be seen as voluntary job movers, while those who do experience a spell of unemployment between jobs could be viewed as involuntary movers. Evidence from existing studies generally finds that workers who quit their jobs receive positive gains while those who are laid off are associated with negative gains (Bartel and Borjas 1981; Keith and McWilliams 1997).

In addition to the mobility variables, equation (1) also contains some further explanatory variables. These variables relate to changes in marital status, educational attainment, and usual hours worked per week between 1991 and 1994.<sup>14</sup> All of these variables are obtained at the date at which individuals within the sample were interviewed. At the time of interview, individuals are also asked to provide information relating to their earnings within the job currently held. The dependent variable used in equation (1) is the real change in log usual gross monthly pay between the 1991 and 1994 interview dates.<sup>15</sup> For the reasons outlined previously, log gross monthly pay in 1991 is also included among the set of explanatory variables.

---

<sup>14</sup> For each of the 1991 waves, a set of six dummy variables was constructed indicating the highest academic qualification obtained. An individual's educational attainment changes if they move up at least one category on the six level classification.

<sup>15</sup> Given the exact date of interview, the earnings data for 1991 and 1994 is deflated using the retail price index with January 1991 as the base month.

### 5.3 Summary Statistics

From the BHPS, a final sample of 1673 individuals was obtained, all of whom were observed as being in employment at the time of the 1991, 1994, and 1997 waves of BHPS.<sup>16</sup> Within this sample, 1553 were observed as experiencing no unemployment during the 1991-94 period in which the wage change equation was estimated.<sup>17</sup> The figures presented in table 2 show that for the sample of 1553 individuals who worked continuously, 36% of individuals experienced a job change at some point between 1991 and 1994. A further 27% were observed as not only staying in the current period, but also in the previous and subsequent periods (*STAYER*). The percentage of employees identified as being past movers and future movers were 18% and 8% respectively. The remaining 10% stayed in the current period, but moved in both the previous and subsequent periods (*PFMOVER*).

The figures shown in table 2 offer some preliminary evidence relating to the effect that mobility has on earnings growth. It may be seen that current movers are associated with the greatest log wage change over the 1991-94 period. An important point to note is that the wage change of future movers over the 1991-94 period (*FMOVER*) is less than that of long term job stayers (*STAYER*). This would imply that an estimate of the long run mobility wage gain based on a comparison of current movers with stayers would be less than that based on a comparison with future movers. The observation of lower wage growth associated with male future movers is consistent with the matching approach in the sense that individuals who are

---

<sup>16</sup> The sample was restricted to only include full time employees at the time of 1991 and 1994. Since the 1997 wave is only used to determine whether individuals were still in employment, and no earnings data is used from this wave, the restrictions of full time employment and not being in self employment are not applied.

<sup>17</sup> Individuals who experienced time out of employment for other reasons, e.g. maternity leave and full time education, are excluded from the initial sample of 1673 workers.

on the verge of switching jobs are the ones most likely to currently be employed in relatively poor matches. Following a job change, these individuals may move onto a steeper wage profile. It may also be seen in table 2 that those who recently switched jobs (*PMOVER*) are observed to have higher wage growth than future movers. If both past movers and future movers are similar in terms of characteristics such as unobservable ability, the difference in their wage growths over the 1991-94 period may be seen as being due to the movement onto a steeper wage profile following a job change. Overall, the figures in table 2 provide some evidence for the positioning of the earnings profiles associated with the different types of workers depicted in figure 4.

## 6. Results

Some estimates of the short run and long run mobility wage gains were derived by estimating equation (1) for the sample of BHPS workers. The dependent variable is the change in log gross monthly earnings between 1991 and 1994. This wage change is regressed on a set of explanatory variables and four dummy variables representing the four different categories of job mover. The fifth type of worker, long term stayers (*STAYER*), represents the excluded case when estimating the wage change equation. Column (1) of table 3 reports the results obtained when the sample is restricted to only include those who work continuously between 1991 and 1994. In column (2) the sample also includes those who experienced a spell of unemployment between the jobs held in 1991 and 1994. Since those who experience unemployment would have changed jobs, the current mover category is segregated into those who switched jobs with no unemployment, *CMOVER(no u/p)*, and those who switched jobs with a spell of intervening unemployment, *CMOVER(u/p)*.

It may be seen in columns (1) and (2) of table 3 that the coefficient associated with initial log earnings (*PAY91*) is found to be negative and statistically significant. In terms of the statistical model outlined in section 5.2, this implies that the coefficients attached to the explanatory variables included within the wage level equations are greater in the 1991 equation than in the 1994 equation. Any changes in the explanatory variables between these two dates, such as becoming married, contributes to the total wage change in accordance with the value of being married in 1994. The results shown in table 3, however, suggest that changes in these explanatory variables, such as hours worked, education and marital status, generally exert no significant effects on the change in earnings between 1991 and 1994.

The coefficients of particular interest are those associated with the dummy variables capturing the different types of job movers. Those who remained on the same job throughout the entire 1988-97 period (*STAYER*) represent the excluded case so the estimated coefficients for the dummy variables capture the difference in the log wage change between the different types of mover and the long term stayers. For the sample of 1553 individuals who worked continuously, column 1 of table 3 suggests that current movers (*CMOVER*) receive the highest change in earnings between 1991-94 out of the five categories of individuals. The wage change of these current movers is found to be significantly greater than long term stayers. For the reasons outlined previously, however, the wage change of stayers may be an unsuitable approximation for the growth in earnings movers would have received had they not switched jobs. An alternative way of estimating the LRMWG is to compare the wage change of current movers with those who remain in their jobs in the current period but who move in the subsequent period i.e future movers (*FMOVER*). This comparison may provide an estimate of the LRMWG which corrects for selection bias if both current and future movers are assumed to belong to the overall group of movers and so possess similar unobservable characteristics.

The difference in the wage changes between these two types of mover may then be seen as being a consequence of mobility and not due to differences in unobservables.

One of the most important features of the results shown in table 3, column 1 is that within the current period, the wage change of future movers (*FMOVER*) is lower than that of stayers, although the difference is found to be insignificant. This is consistent with the evidence concerning the direction of the sample selection bias found in the studies reviewed in section 3. If the wage change of future movers is interpreted as a proxy for the wage change current movers would have received had they not moved, it would appear that stayers do better by remaining on the job than movers would do if they also stayed. The estimate of the LRMWG may then be derived from the difference in the coefficients associated with current movers and future movers ( $\beta_3$  minus  $\beta_5$  in equation (1)). Current movers receive, on average, 0.085 higher log wage change than stayers, while the log wage change of future movers is 0.007 less than stayers. The difference in log wage change between current movers and future movers is then 0.092 which gives a LRMWG estimate of 9.6%.

The estimate of the LRMWG will include both the gains arising from a shift in the earnings profile and from a change in the slope of the profile. In order to gain additional insight into the way in which individuals gain by switching jobs, it is necessary to be able to identify the separate contributions that shifts and changes in the slope of the earnings profile make to the LRMWG. The method used for attempting such a decomposition involves comparing the wage change in the current period of future movers with past movers. Neither of these individuals experience mobility within the current period so any difference in their wage change will not be due to a shift in the earnings profile that occurs at the point of job change. If both of these individuals are assumed to be members of the overall group of movers, they

may be associated with similar characteristics such as unobservable ability. With this assumption, the difference in their wage changes will not be a result of one category of individuals being associated with higher ability. The difference in their wage changes over the 1991-94 period may therefore be interpreted as capturing the idea that those who have recently switched jobs have moved onto an earnings profile that has a different gradient to those who are on the verge of a job change. The wage changes of future movers and past movers are viewed as representing the slope of the earnings profile before and after the move respectively.

The results in column 1 of table 3 imply that past movers receive higher wage change over the 1991-94 period than future movers. By undertaking the relevant  $F$ -test, the difference in the wage change between these two types of mover was found to be significant. It would appear, therefore, that individuals who are new to a job are associated with a steeper earnings profile than those who are about to switch into a new job. This provides some empirical support for the versions of the matching and training hypotheses described in section 2. New recruits will always have lower tenure throughout the 1991-94 period than future movers and so may receive greater investment in specific human capital. Alternatively, those new to a job may see their earnings rise at a faster rate as a result of larger wage adjustments taking place when new information arrives concerning actual productivity on the job. The comparison of future movers with past movers enables the contribution made to the LRMWG arising from the movement onto a steeper wage profile to be identified. The difference in the log wage changes of future movers and past movers is, on average, 0.057. The total difference in the log wage change between current movers and future movers (which is used to calculate the LRMWG) is 0.092. As a proportion of the LRMWG, the wage gain arising from the movement onto a steeper earnings profile may then be calculated as 62%. The remaining 38%, which may also

be seen from the difference between current movers and past movers, may then be considered as an estimate of the vertical shift in the earnings profile that follows mobility, or the short run mobility wage gain (SRMWG).<sup>18</sup> As was discussed in section 4, the accuracy of these estimates depends on how similar the slopes of the wage profiles of current movers and past movers are over the 1991-94 period. If the profile associated with current movers is steeper, the estimate of the vertical shift in the profile that occurs at the point of job change will be overstated while the gain arising from a change of slope will be understated (see figure 4).<sup>19</sup>

Column 2 of table 3 presents the results obtained when the wage change equation is estimated with the inclusion of individuals who experienced a spell of unemployment during the 1991-94 period. Since these individuals would be employed in a different job in 1994 compared to 1991, the effect of unemployment is incorporated by dividing the sample of current movers into those who switched jobs with and without intervening unemployment. The coefficient associated with  $CMOVER(u/p)$  implies that workers who change jobs with unemployment receive 7.1% lower wage growth over the 1991-94 period than long term job stayers. As in column 1, those who smoothly switch from one job to another,  $CMOVER(no\ u/p)$  earn around

---

<sup>18</sup> If the earnings profiles of current movers and past movers are close to being parallel, the only difference in the wage change between these individuals is due to the vertical shift received by the current movers when they switch jobs.

<sup>19</sup> There may also be another, more serious inaccuracy in the estimates. In figure 4 it was assumed that current movers switched jobs fractionally after the initial period e.g. 1991. It is possible that a worker could remain on the initial job for a while after 1991, receive a pay cut when they switch jobs and then move into a job with an earnings profile steeper than that of past movers. By 1994 the current mover may still be observed with higher earnings than that of a past mover. The technique used to decompose the LRMWG, however, would estimate the vertical shift to be positive since it assumes that the profile of past movers is parallel to that of current movers. Too little of the LRMWG would then be attributed to a change in slope, leaving a positive remainder attributed to the SRMWG. The technique used would only yield a negative estimate of the SRMWG if current movers had lower earnings in 1994 than past movers.

9% more than stayers. These results would suggest that the costs of being laid off are relatively large, assuming that those who switch jobs with intervening unemployment are changing jobs involuntarily. Over the three year period, involuntary movers would appear to receive lower wage growth than what they would have received had they not moved (given by the *FMOVER* coefficient), while those who appear to voluntarily switch jobs do considerably better.

In outlining the statistical model in section 5.2, it was discussed how the estimated coefficients within the wage change equation may be biased due to the potential correlation between the error term and initial earnings. The composite error term in (1) will include the error term from the 1991 wage level equation. It is therefore likely that when including 1991 earnings as an explanatory variable within the 1991-94 wage change equation, it will be correlated with the error term. In order to obtain unbiased coefficient estimates for the wage change equation, it is necessary to re-estimate the model by instrumental variables, where predicted values of 1991 pay are used in place of actual values. Predicted values of initial earnings were obtained by estimating a wage level equation where 1991 earnings was regressed on a set of explanatory variables. The instruments used within this equation relate to tenure in the job held in 1991, age, region of residence, and regional unemployment.<sup>20</sup> The results from re-estimating (1) with the inclusion of predicted values for initial earnings, *PAY91*, in place of the actual values are shown in columns (3) and (4) of table 3. For the sample of 1553 individuals working continuously, the LRMWG is calculated to be 10.4% which is comparable to the 9.6% estimate calculated from column (1).

---

<sup>20</sup> Monthly regional unemployment data was obtained from NOMIS and matched to each individual according to their region of residence and date of interview in the 1991 wave of the BHPS.

## 7. Conclusion

The switching from one job to another would appear to be a common activity within the labour market since in the sample of BHPS individuals used in this study, around one-third experience mobility during the years 1991-94. If individuals do experience a number of job changes within their working lives, the wage effects associated with such mobility is likely to be an important determinant of lifetime earnings. It then becomes an important empirical issue to attempt to estimate the magnitude of these mobility gains and the form that these gains take. Theory suggests that the mobility wage gain will be positive in the long run since individuals only switch jobs if they gain from doing so in terms of lifetime earnings. This long run gain, however, may arise from a shift in the earnings profile at the instant the job change occurs, or from a change in the rate of on-the-job wage growth when moving from one job to another, or both. Most existing estimates of the mobility wage gain are long run estimates in that they include both the wage effects associated with a shift and a change in the slope of the earnings profile. The main aim of this study has been to develop an empirical approach that allows not only the long run gain to be estimated, but also an attempt to be made at breaking this gain down into its constituent parts. For a sample of UK individuals taken from the BHPS, it was found that the total mobility wage gain arising over a three year period was 9.6%. Approximately six-tenths of this gain is interpreted as a result of individuals moving into a job with a steeper earnings profile and the remaining four-tenths being attributed to a positive shift in the profile at the point of job change.

As in many existing studies of mobility, the empirical analysis undertaken highlights the existence of selectivity bias, which should be controlled for when deriving estimates of the mobility wage gains. To estimate the long run mobility wage gain, it is necessary to find an approximation for the wage growth movers would have received had they not moved. Using

the on-the-job wage growth of those individuals who are observed within the data as staying in their jobs over the relevant period may not be a suitable approximation. This is because many of these individuals may remain within their jobs for long periods of time and may be considered as a different group of individuals who possess different unobservable characteristics. The methodology used in this study suggests that the individuals who are observed as staying in their jobs over the current period should be separated into those who experience mobility either in the previous period or the subsequent period, and those who experience no mobility over a long period of time. Individuals who experience mobility in either the past, current or future periods are considered as belonging to a group of overall movers, while those who stay in all periods form another group. These groups of individuals may differ in terms of their unobservable characteristics which means that when comparing the wage change of movers with long term stayers, it is not possible to detect how much of the difference is due to mobility and how much is due to unobservable differences between the individuals. If past, current and future movers, however, are similar in terms of such unobservables, then comparing the wage changes of these individuals may enable the wage effects associated with mobility to be detected. In particular, the difference in the wage changes of current movers and future movers may estimate the long run mobility wage gain if the on-the-job wage growth of future movers approximates the earnings growth current movers would have received had they not moved. The results obtained suggested that future movers receive lower on-the-job wage growth than long term stayers. The difference in wage growth, however, was insignificant, suggesting that overall, failure to account for selectivity bias has little effect on the estimates of the mobility wage gains.

One of the main limitations of the study is that it does not adequately consider the case of mobility wage effects that differ according to the type of job change experienced. In the most

basic regressions, an individual is defined as being mobile if they are employed in a different job at one point in time compared to an earlier date. No distinction is therefore made between job changes that occur within the same firm or across firms. As a way of attempting to distinguish between voluntary and involuntary separations, the sample of current movers was divided into those who experienced no unemployment between jobs and those who did experience intervening unemployment. It was found that there exists relatively large costs associated with job loss in that those who have a spell of unemployment between jobs are associated with lower wage growth over a three year period than those who continue in the same job throughout. This result is consistent with other studies which use superior data to analyse the wage effects of different types of job change.

**Table 1****The Division of Movers into Four Categories**

<i>Variable name</i>	<i>Description</i>	<i>1988-1991 (past period)</i>	<i>1991-1994 (current period)</i>	<i>1994-1997 (future period)</i>
<b><i>STAYER</i></b>	Stay in all periods	Stay	Stay	Stay
<b><i>CMOVER</i></b>	Current mover	Stay or Move	Move	Stay or Move
<b><i>PMOVER</i></b>	Past mover	Move	Stay	Stay
<b><i>FMOVER</i></b>	Future mover	Stay	Stay	Move
<b><i>PFMOVER</i></b>	Moves in both past and future	Move	Stay	Move

**Table 2****Summary Statistics for Wage Growth and Initial Pay**

<i>Sample</i>	<i>N</i>	<i>WGROWTH</i>	<i>PAY91</i>
<b><i>CMOVER</i></b>	565	0.157 (0.319)	6.961 (0.497)
<b><i>PMOVER</i></b>	281	0.128 (0.284)	6.919 (0.535)
<b><i>FMOVER</i></b>	130	0.052 (0.188)	7.021 (0.428)
<b><i>PFMOVER</i></b>	162	0.108 (0.234)	7.035 (0.550)
<b><i>STAYER</i></b>	415	0.071 (0.263)	6.945 (0.492)

Notes:

1. *WGROWTH* is the change in log gross monthly pay between 1991 and 1994.
2. *PAY91* is log gross monthly pay in 1991.
3. Standard deviations are given in parentheses.
4. Sample includes 1553 males and females working continuously between 1991 and 1994.

Table 3

## Estimation of the Wage Change Equation (1)

Variable	OLS coefficients and <i>t</i> -ratios				2SLS coefficients and <i>t</i> -ratios			
	(1)		(2)		(3)		(4)	
<i>PAY91</i>	-0.173	(8.20)	-0.200	(9.74)	-0.089	(2.96)	-0.124	(4.12)
<i>ΔHOURS</i>	0.003	(1.66)	0.003	(2.18)	0.003	(2.04)	0.004	(2.48)
<i>ΔEDUC</i>	-0.003	(0.10)	0.004	(0.16)	0.004	(0.13)	0.011	(0.33)
<i>SINGLE-MARRIED</i>	0.012	(0.54)	0.012	(0.53)	0.009	(0.37)	0.006	(0.24)
<i>MARRIED-SINGLE</i>	-0.049	(1.14)	-0.045	(1.10)	-0.057	(1.21)	-0.055	(1.23)
<i>CMOVER</i>	0.085	(4.73)	-		0.082	(4.36)	-	
<i>CMOVER(u/p)</i>	-		-0.074	(1.89)	-		-0.049	(1.14)
<i>CMOVER(no u/p)</i>	-		0.085	(4.75)	-		0.082	(4.35)
<i>PMOVER</i>	0.050	(2.40)	0.049	(2.36)	0.052	(2.39)	0.051	(2.36)
<i>FMOVER</i>	-0.007	(0.35)	-0.005	(0.22)	-0.017	(0.81)	-0.016	(0.74)
<i>PFMOVER</i>	0.028	(1.38)	0.024	(1.20)	0.030	(1.43)	0.026	(1.23)
constant	1.280	(8.43)	1.465	(9.96)	0.696	(3.25)	0.932	(4.40)
R-squared	0.121		0.143		0.035		0.045	
N	1553		1673		1553		1673	

**REFERENCES**

- Abbott, Michael, and Charles Beach (1994). "Wage Changes and Job Changes of Canadian Women." *Journal of Human Resources*, 29(2), 429-60.
- Bartel, Ann P., and George J. Borjas (1981). "Wage Growth and Job Turnover: An Empirical Analysis." In *Studies in Labor Markets*, edited by Sherwin Rosen. University of Chicago Press, 65-84.
- Borjas, George J., and Sherwin Rosen (1980). "Income Prospects and Job Mobility of Younger Men." In *Research in Labor Economics*, vol. 3 edited by Ronald G. Ehrenberg, Greenwich, Conn.: JAI Press, 159-81.
- Burdett, Kenneth (1978). "A Theory of Employee Job Search and Quit Rates." *American Economic Review*, 68, 212-20.
- Eriksson, Goran (1989). "Human Capital Investments and Labour Mobility." *Journal of Labor Economics*, vol. 9(3), 236-54.
- Heckman, James J. (1979). "Sample Selection Bias as a Specification Error." *Econometrica*, 47(1), 153-61.
- Holmlund, Bertil (1984). "Job Mobility and Wage Growth: A Study of Selection Rules and Rewards." In *Studies in Labor Market Dynamics*, edited by G. R. Neemann and N. C. Westgard-Neilson, 238-60, Berlin: Springer-Verlag.
- Jovanovic, Boyan (1979). "Job Matching and the Theory of Turnover." *Journal of Political Economy*, 87, 972-99.
- Keith, Kristen, and Abigail McWilliams (1997). "Job Mobility and Gender-Based Wage Growth Differentials." *Economic Enquiry*, vol. XXXV, April, 320-33.
- Kidd, Michael P. (1991). "An Econometric Analysis of Interfirm Labour Mobility." *Canadian Journal of Economics*, 24(3), 517-35.
- Liu, Pak-Wai (1986). "Human Capital, Job Matching and Earnings Between Jobs: An Empirical Analysis." *Applied Economics*, 24(3), 517-35.
- Mincer, Jacob (1986). "Wage Changes in Job Changes." In *Research in Labor Markets*, edited by Sherwin Rosen, NBER and University of Chicago Press, 21-63.
- Mortensen, Dale T. (1988). "Wages, Separations, and Job Tenure: On-the-Job Specific Training or Matching?" *Journal of Labor Economics*, 6(4), 445-470.
- Nelson, Phillip (1970). "Information and Consumer Behaviour." *Journal of Political Economy*, 78, 311-29.
- Simpson, Wayne (1990). "Starting Even? Job Mobility and the Wage Gap Between Young Single Males and Females." *Applied Economics*, 22, 723-37.

## APPENDIX

### Further Description of the Statistical Model

The model estimated in this study is essentially the same as that described by Holmlund (1984) and Keith and McWilliams (1997). The earnings of an individual  $i$  in the years  $t$  and  $t+3$  may be expressed as:

$$\ln W_{i,t} = \alpha_1 + \beta_1 X_{i,t} + \varepsilon_{i,t} \quad (\text{A.1})$$

$$\ln W_{i,t+3} = \alpha_2 + \beta_2 X_{i,t+3} + \varepsilon_{i,t+3} \quad (\text{A.2})$$

Subtracting (A.1) from (A.2) then gives

$$\Delta \ln W_i = \alpha_2 - \alpha_1 + \beta_2 X_{i,t+3} - \beta_1 X_{i,t} + \varepsilon_{i,t+3} - \varepsilon_{i,t} \quad (\text{A.3})$$

Keith and McWilliams then suggest adding and subtracting the term  $\beta_2 X_{i,t}$  to the right-hand-side of (A.3):

$$\begin{aligned} \Delta \ln W_i &= \alpha_2 - \alpha_1 + \beta_2 X_{i,t+3} - \beta_2 X_{i,t} + \beta_2 X_{i,t} - \beta_1 X_{i,t} + \varepsilon_{i,t+3} - \varepsilon_{i,t} \\ \Delta \ln W_i &= \alpha_2 - \alpha_1 + \beta_2 \Delta X_i + (\beta_2 - \beta_1) X_{i,t} + \varepsilon_{i,t+3} - \varepsilon_{i,t} \end{aligned} \quad (\text{A.4})$$

Using Holmlund's assumption that the coefficients in the wage level equations are linearly related:

$$\beta_2 = \beta_1 + \delta \beta_1 \quad (\text{A.5})$$

then if  $\delta$  is equal to zero, the coefficients remain constant over time, but if  $\delta$  is negative then the  $X$  coefficient values decline over time. Rearranging (A.5) gives:

$$\beta_2 - \beta_1 = \delta \beta_1 \quad (\text{A.6})$$

Substituting (A.6) into (A.4):

$$\Delta \ln W_i = \alpha_2 - \alpha_1 + \beta_2 \Delta X_i + \delta \beta_1 X_{i,t} + \varepsilon_{i,t+3} - \varepsilon_{i,t} \quad (\text{A.7})$$

From (A.1),  $\ln W_{i,t} - \alpha_1 - \varepsilon_{i,t} = \beta_1 X_{i,t}$  which multiplied by  $\delta$  gives:

$$\delta \ln W_{i,t} - \delta \alpha_1 - \delta \varepsilon_{i,t} = \delta \beta_1 X_{i,t} \quad (\text{A.8})$$

Substituting (A.8) into (A.7):

$$\begin{aligned} \Delta \ln W_i &= \alpha_2 - \alpha_1 + \beta_2 \Delta X_i + \delta \ln W_{i,t} - \delta \alpha_1 - \delta \varepsilon_{i,t} + \varepsilon_{i,t+3} - \varepsilon_{i,t} \\ \Delta \ln W_i &= \alpha_2 - \alpha_1(1 + \delta) + \beta_2 \Delta X_i + \delta \ln W_{i,t} + \varepsilon_{i,t+3} - \varepsilon_{i,t}(1 + \delta) \\ \Delta \ln W_i &= \alpha_0 + \beta_2 \Delta X_i + \delta \ln W_{i,t} + \varepsilon_i^* \end{aligned} \quad (\text{A.9})$$

where  $\alpha_0 = \alpha_2 - \alpha_1(1 + \delta)$  and  $\varepsilon_i^* = \varepsilon_{i,t+3} - \varepsilon_{i,t}(1 + \delta)$ .

The problem with estimating equation (A.9) is that it is likely that the composite error term will be correlated with the value of earnings in the initial period. In terms of (A.1), a positive shock to the error term  $\varepsilon_{i,t}$  will raise the natural log of initial earnings which means that in (A.9) there may exist correlation between the composite error  $\varepsilon_i^*$  and initial earnings which appears as a right-hand-side variable.