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The Determinants of the Reservation Wage[¤][y]

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Abstract

Most theories of involuntary unemployment predict that the equilibrium wage in the labor market will be greater than the reservation wage of the unemployed. These theories concentrate on explaining why the labor market does not clear, with the market wage falling to the level of the reservation wage, as predicted by the classical paradigm. Relatively little, however, has been said about the behavior of reservation wages. This paper seeks to ¯ll the gap in the literature. We look at the empirical determinants of the reservation wage and suggest what this implies for the evolution of the natural rate of unemployment.

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[y] The data used in this paper were made available through the ESRC Data Archive. The data were originally collected by the ESRC Research Centre on Micro-social Change at the University of Essex. Neither the original collectors of the data nor the Archive bear any responsibility for the analyses or interpretations presented here.

1 Introduction

In all models of the labour market, the reservation wage | the wage that makes workers indi®erent between taking a job or remaining unemployed | is a central determinant of the actual wage, and in turn, of the unemployment rate. In competitive models, the actual wage is simply equal to the reservation wage. In models with bargaining or e±ciency wages, the actual wage is a markup on the reservation wage, the size of the markup being determined by the structure of the labour market. The purpose of this paper is to explore empirically the determinants of the reservation wage, and draw out the implications of our ¯ndings for wage determination and the natural rate of unemployment.

The standard way of thinking about the reservation wage is as follows. Unemployed workers face a wage distribution, which depends on their observable and unobservable (to the econometrician, not to employers) characteristics. The rate at which they get job o®ers depends on labour market conditions. While waiting or searching for o®ers, workers draw down assets, receive unemployment and other bene¯ts, and may get utility from leisure. In this standard model, the past does not directly matter. More formally, once we control for the wage distribution, unemployment bene¯ts etc., the wage that workers received in the previous job should be irrelevant.

It is easy to conceive, however, of reasons why this might not be the case i.e. reasons why previous wages might a®ect reservation wages, above and beyond what they may reveal about the characteristics of the workers. For example, workers may view the previous wage as the best indicator of their value to a potential employer. Thus they could simply set their reservation wage to equal the wage received in a previous job. Another reason is pride. Even if it is unrealistic to expect re-employment at the previous wage, it could be very di±cult for an unemployed worker to accept anything less.

With these issues in mind, we specify the reservation wage as a function not only of the relevant distribution of wages, labour market conditions, and unemployment bene¯ts, but also of the wage received in the previous job. We estimate this relation using the British Household Panel Survey over six years (1991-97). This data set contains explicit information about reservation wages, labour market status, previous wages, and can be used to construct a mean wage based on observable characteristics of each worker. The main econometric challenge is to disentangle whether the coe±cient on the previous wage re°ects causality, or the fact that the previous wage contains information about the unobservable characteristics of workers. We do so through use of the panel dimension of our data.

Our empirical conclusions are clear, and appear robust to a number of alternative speci¯cations and econometric treatments. We ¯nd a signi¯cant, but | to our surprise | a relatively small e®ect of the previous wage on the reservation wage. An increase in the previous wage of 10% increases the reservation wage by between 1:5%. We ¯nd a large and signi¯cant e®ect of the mean of the distribution of wages on the reservation wage (an elasticity of 0:3). We also ¯nd a signi¯cant but very small e®ect of unemployment bene¯ts (an elasticity of 0:015). One other surprising result is that the e®ect of labour market conditions (local or individual speci¯c unemployment rates) on the reservation wage, is small (elasticity of ¡0:1), and in some regressions, statistically insigni¯cant.

These results have interesting macroeconomic implications, because the reservation wage in part determines the natural rate of unemployment. Were it the case that the coe±cient on the previous wage was close to unity, reservation wages would be largely a function of the past. If we think of the market wage as being a mark up on the reservation wage, we would expect to see it following an autoregressive process with close to a unit root. Thus, changes in policy could have permanent (or at least long lasting) e®ects on wages and unemployment. One can imagine, for example, a negative terms of trade shock that shifts the mean of the distribution of wage o®ers down. But the unemployed, remembering what times were like before the shock, refuse to adjust to reality (i.e. the reservation wage is more in°uenced by the previous wage than by the mean of the current wage distribution). In e®ect the unemployed price themselves out of a job. Unemployment will persist for as long as it takes for their expectations to adjust to the new reality.

Our results suggest that the reservation wage (and therefore unemployment) will adjust to any shock relatively quickly. The coe±cients on the main variable that re°ects current reality, the expected future wage is bigger than the coe±cient on the historic variable, the wage in the previous job. Furthermore the coe±cient on the previous wage is much less than unity.

The paper is organised as follows. Section 2 gives a brief outline of a simple generic model of involuntary unemployment. We use this model to illustrate the importance of reservation wage formation for evolution of wages and unemployment. We also discuss the existing empirical evidence. Section three discusses issues of econometric speci¯cation. Section four discusses the data. Section ¯ve presents the results. Section six concludes.

2 Macroeconomic Implications of Reservation Wages

2.1 A Generic Model of Involuntary Unemployment

While theories of the determination of the natural rate of unemployment and equilibrium real wages are many and diverse, most of them can be accommodated within a simple theoretical framework that is a generalization of the standard competitive supply and demand model.[1] The first relation, equation (1), is basically a standard labour demand curve (although it is usually expressed as an inverse demand curve). It states that the real wage that a firm pays (W) is increasing in productivity of labour (A) and other factors that affect the demand for labour (X_d).[2]

$$W = Af(X_d) \tag{1}$$

Equation (2) is the "wage setting equation". It is a generalised version of (inverse) labour supply curve that allows for involuntary unemployment. It states that the real after tax wage demanded by the worker, $W(1-\tau)$, is markup on W^R, the real reservation wage (the worker's outside option). The markup, B, is a function of unemployment and X_s; a vector of variables that affect the workers' negotiating power.

$$W(1-\tau) = W^R B(u; X_s) \tag{2}$$

The wage setting relation includes the competitive labour supply curve as a special case with $W = W^R$ and zero involuntary unemployment in equilibrium. But most economists would see this as unrealistic, agreeing that there is some inefficiency in the labour market that prevents it from clearing in a classical fashion i.e. to the point where workers reservation wage equals the value of the marginal productivity of their labour to firms. The precise nature of the market failure determines the function B.

The presence of some inefficiency implies that, in equilibrium, there are unexploited rents to employment. Workers are able to appropriate a share of these rents and receive a wage in excess of their reservation wage. In general,

[1] See for example, Bean (1994), Layard, Nickell and Jackman (1991) and Blanchard and Katz (1997). Indeed this framework has become so ubiquitous that it has recently been incorporated into an undergraduate text (see Blanchard, 1997).

[2] For clarity, it is convenient, but not necessary, to assume Harrod neutral technology.

as the unemployment rate rises, workers' negotiating position worsens and the markup over the reservation wage falls i.e. $B_u < 0$.[3]

Equilibrium in the labour market is jointly determined by the interaction of both relations, with the natural rate of unemployment being de¯ned implicitly.[4] Note that unemployment is involuntary in a precise sense: in equilibrium, workers would be willing to accept any job o®er paying the market wage rate, as it is greater than their reservation wage rate, ($W > W^R$); but employers are unwilling to make the o®er because of some market failure.

For example, in a search model, such as Pissarides (1990) the market failure is the inability of ¯rms and workers to form matches instantaneously. This results in a stock of unemployed workers even while some jobs remain un¯lled. Firms are prepared to pay more than the reservation wage in order to avoid the cost of continued search. In this case B is an increasing function of unemployment and a decreasing function of the stock of un¯lled vacancies. In the case of the e±ciency wage models, such as Shapiro & Stiglitz (1984), market failure occurs because ¯rms cannot observe workers' productivity costlessly. Firms pay above the reservation wage in order motivate workers. The premium declines as unemployment rises, $B_u < 0$, because higher unemployment acts as a motivating device.

2.2 The E®ect of Shocks

Most research, both theoretical and empirical, has focused on nature of the market failure that generates involuntary unemployment i.e. the function B in our model. Other aspects of the model - for example the reservation wage - have typically not been analyzed in any great detail. In this paper we invert this logic, focusing our attention on the nature and determinants of reservation wage and remaining agnostic about the nature of the markup function (and therefore about the exact cause of involuntary unemployment).

The reason for this focus is that, as Blanchard and Katz (1997) show, the determination of the reservation wage has crucial implications for the adjustment of the macro-economy to shocks. In order to illustrate the point, consider the impact on the natural rate of an increase in ¿, the tax on wage

[3] If ¯rms and workers split the rents equally, then the wage will be given by (2). More sophisticated negotiating structures do not a®ect the basic implications of the model. See Layard et. al. (1991) for a discussion.

[4] $u^{¤}$ is the natural rate de¯ned by $B(u^{¤}; X_s) = \frac{(1 ¡ ¿)Af(X_d)}{W^R}$

income. (The following intuition will work just as well with a productivity shock or a terms of trade shock). Intuitively, if the burden of the taxes falls entirely on the workers, then the cost of labour does not rise and the tax has no implications for unemployment.[5] Workers, seeking to preserve the markup of net wage on the fixed reservation wage, shift some of the burden of taxes onto employers in the form of a higher gross wage. Firms respond to an increase in the cost of labour by cutting back on hires.[6]

This holds for a fixed reservation wage. If, however, the reservation wage itself changes in response to the tax, then the effect of the tax on the natural rate of unemployment turns out to be very different. Continuing the example, assume that the reservation wage is completely determined by unemployment benefits, b, and that these are taxable at the same rate as wage income, then $W^R = (1 - \tau)b$. Substituting for W^R in the wage setting equation (2) results in an expression for the equilibrium wage (and unemployment) that is independent of τ. Thus taxes will have no effect on equilibrium wages or unemployment, even in the short run. In this simplistic case the reservation wage adjusts immediately and completely to the change in taxes and workers bear the entire burden of the tax.

In a more realistic case, we might expect any adjustment in the reservation wage to take time. How long this adjustment takes will be an important determinant of the long run response of unemployment to shocks.

Bean (1994) and Blanchard and Katz (1997) point out that we might expect that the workers bear the entire burden of the tax in the very long run. Continuing the example, suppose that an individual derives utility from consumption (c) and leisure (l) according to the function $u(c_t; l_t) = \ln c_t + \ln l_t$. In this context the reservation wage can be defined as the marginal rate of substitution of consumption for leisure and is given by the expression $W^R = c/l$. Suppose also that credit markets are such that the individual can consume the annuity value of permanent income, so that c_t is given by $c_t = rY(1 - \tau)$, where Y is permanent income, r is the discount rate and τ is the tax rate on permanent income. In this case the reservation wage will

[5] Of course, individuals whose after tax wage has fallen, may withdraw from the labour force, leading to a fall in employment. These individuals, however, are not unemployed; they are non-participants.

[6] We can easily see this by totally differentiating (2) or the expression for u^* with respect to τ while keeping W^R fixed.

be given by (3)[7].

$$W^R = \frac{rY(1-\tau)}{l} \tag{3}$$

Substituting W^R from (3) into (2) results in expressions for the gross wage and for the natural rate of unemployment that is independent of the tax rate. Real wages are not rigid. Any change in taxation will fall entirely on the workers. Even a permanent increase in taxation will have no effect on unemployment.

Of course this story only works to the extent that the Permanent Income Hypothesis is true. But more importantly, it is also only true for the special case where the reservation wage is given by the marginal rate of substitution of consumption for leisure. There is still scope for taxes to have an impact on unemployment if we allow for a more general definition of the reservation wage. In particular, assume that it reflects, not just the value of leisure, but workers aspirations also. As a simple, if extreme, example of this aspirations scenario, suppose that pride ensures that an unemployed individual will never accept a job at a wage lower than the wage he received during a previous period of employment. In this case the reservation wage would be given by $W_t^R = W_{t-1}$: Substituting into equation (2) will generate

$$\ln W_t = \ln B(u; v; X) + \ln W_{t-1} - \ln(1-\tau) \tag{4}$$

The burden of the tax shifts entirely to firms. More importantly, the wage equation now has a unit root. Both these properties imply that increases in taxation will have a permanent effect on wages and unemployment. In this scenario the worker fails to adjust his aspirations to the new reality. Following a tax increase (from zero to τ), he still seeks the same after tax wage as he had before, despite the fact that this wage is now economically infeasible for the (marginal) employer. Unemployment results and will last as long as aspirations fail to adjust to the new reality.

The analysis holds equally well for other shocks, such as a slowdown in productivity growth. In the short run workers might seek to maintain living standards (reservation wages remains unchanged) and unemployment results. In the long run, however, we would expect that aspirations would adjust to reality and unemployment return to its previous level. Precisely how long

[7] I am being sloppy here. Presumably the possibility of being unemployed would effect the individual's permanent income as well as the definition of the reservation wage. I ignore these complications in order to illustrate the basic point.

this adjustment takes depends on the extent to which reservation wages are determined by reality (current unemployment levels, current "realistic" wage levels etc.) or by workers aspirations that may be influenced by out of date variables (e.g. pre-shock wage levels). This is exactly what we set out to measure in this paper.

2.3 Existing Empirical Evidence

Macroeconomists have estimated the relationship between wages and unemployment using aggregate data since at least A. W. Philips' original specification of the curve that bears his name. Typically the relationship found is between the level of unemployment and the change in the wage rate. Attempts to find a stable relationship between the level of unemployment and the level of wages in aggregate data have generally failed [8] The functional form that works is close to equation (4). Yet we know from the previous discussion, that the relationship predicted by most theories of involuntary unemployment is with the level of wages. Theory and macro-empirics can be reconciled if we assume that reservation wages are equal to previous actual wages ($W_t^R = W_{t-1}$)[9]. But this, as we have shown is quite an extreme case from a theoretical point of view. We would expect that other variables would impact on the reservation wage.

This macro-empirical regularity was challenged by Blanchflower and Oswald (1994). They argued that the regressions using aggregate data were misspecified because it involved a regression with a lagged dependent variable in the presence of strongly autocorrelated disturbances. They argued that this, and other, problems could be avoided if the relationship was estimated using regional level data. Doing so, they found that the autoregressive coefficient in the wage equation was close to zero. In other words they found a strong, stable relationship between the level of wages and the level of unemployment. This suggests that the reservation wage is primarily a function of variables that reflect current reality and that the impact of the previous wage is minimal.

Card (1995), Card and Hyslop (1996) and Blanchard and Katz (1997), all report that the Blanchflower and Oswald results are not robust to small

[8] See for example, Blanchard's and Katz (1997) estimation of and Error Correction Model for the US.

[9] In practice there would be a more complicated lag structure but the sum of the coefficients on the distributed lag of W would be approximately unity.

changes in econometric specification. They show that alternative specifications will tend to give a coefficient on the previous regional wage variable that is close to one, thus supporting the traditional macroeconometric evidence.

One could argue that the apparent contradiction is not important. We know from the sticky price literature (e.g. Caplin and Spulber[1987]) that slowly adjusting prices at the macro level do not necessarily imply slowly adjusting prices at the micro level and vice-versa. This kind of argument could be used to reconcile the unit root in aggregate wage equations with less extreme behaviour at the level of the individual. But this sort of argument stretches credulity. If the aggregate data suggests that wages have a unit root then it seems almost inescapable that individuals' reservation wages ought to be heavily influenced by their lagged wages.

The contradictory empirical evidence serves to illustrate our ignorance regarding the formation of reservation wages. In this paper we examine this issue explicitly to see whether an individual's reservation wage is determined, in part at least, by his own "lagged" wage i.e. the wage received in a previous job. If the coefficient is large, then we will find evidence of slow adjustment to shocks at the micro level, supporting the macro empirical evidence that wages have a unit root.

3 Econometric Specification

From the last section we know that basic idea is to run a regression with the reservation wage as the dependent variable and various potential influences on reservation wages as regressors. Of particular interest to us is the possibility that the reservation wage could be a function of the wage received during a previous period of employment. In essence we will be estimating equation such as (5) where, W^R_{it} is the reservation wage of person i at time t, W^L_{it} is the individual's wage when last employed, $F(W_{it})$ is vector of sufficient statistics for the distribution of wage offers, u_{it} is (person specific) unemployment rate, and X_{it} is a vector of control variables.

$$\ln W^R_{it} = \beta_0 + \beta_1 \ln W^L_{it} + \beta_2 \ln F(W_{it}) + \beta_3 \ln u_{it} + \beta_4 X_{it} + \varepsilon_{it} \qquad (5)$$

We choose the log-linear functional form so that the coefficients may be interpreted as elasticities. The control variables (X_{it}) include age, sex, number of dependent children, asset income (a_{it}) and the level of unemployment benefits is b_{it}.[10] Note also that the previous wage is indexed by time t, not $t-1$. This conveys the idea that reservation wage formation is (potentially) backward looking from time t. What matters is the size of the previous wage viewed from time t, not necessarily when it was earned.[11] Most of the time W_{it}^{L} will indeed equal W_{it-1}, so but this will not be so if the individual has been unemployed for more than one year.[12]

As discussed in section two, the reservation wage may change over time as individuals adjust to the reality of the labour market. We allow for this by including some measure of the current, person specific, distribution of wage offers, $F(W_{it})$ and a measure of the probability of receiving an offer, u_{it}. This latter can be viewed as an individual specific unemployment rate. An individual will be more likely to turn down any job offer if he feels he is relatively likely to receive a better offer sooner rather than later. The higher the mean of the wage distribution, and the lower its variance, the more likely is the individual to turn down a low wage offer, hence the reservation wage will be relatively high. Similarly, the lower the probability of remaining unemployed, the higher the likely reservation wage.

In effect these variables are the counter-balance to the lagged wage variable. Whereas W_{it}^{L} represents history, now possibly economically irrelevant, $F(W_{it})$ and u_{it} represent economic reality (assuming that we can measure them properly). Thus (5) is a regression of reservation wage on objective reality and an individuals subjective perception of reality. We want to see which is the more important determinant of reservation wages.

Before proceeding, we must comment on the relationship between this paper and the public finance literature that seeks the effect of unemployment benefits on labour market behavior. The classic example of this genre would be Feldstein and Poterba (1984), while an example using British data is Jones (1989). Essentially these authors regress the reservation wage on the level of unemployment benefits, controlling for the distribution of wage offers. Interestingly, they use the wage in the previous job as a proxy for the mean of the current wage offer distribution. This is valid on the assumption that

[10] We use actual asset income received (a_{it}) as a regressor rather than the stock of wealth or its change, because most individuals' savings tend to be held in illiquid forms such as housing or pensions.

[11] In section 5 we examine whether the lagged wage effect diminishes with increasing duration of unemployment.

[12] We use the superscript "L" to denote lagged wage. We use the terms "lagged wage" and "previous wage" interchangeably.

the distribution is stationary. But it also assumes that the lagged wage contains no information that is not already present in the moments of the wage offer distribution. This is the diametrically opposite assumption to ours. What we are interested in, is precisely the possibility that previous wage could influence the reservation wage independently of the current wage offer distribution. This could be for many reasons. For example, it may be the case that an individual believes that this wage indicates his value to a previous employer and is, therefore, an indicator of his likely value to a future employer. If he receives an offer at a wage below his previous wage, he may be inclined to think that this offer is from the low end of the distribution, and therefore reject it. In this case the lagged wage tells us more about the individuals' subjective perception of the wage distribution he faces rather than about the true wage distribution he actually does face. Alternatively, pride may make any individual less likely to accept a job at a wage lower than that earned in a previous employment, even if he is aware that a better offer is unlikely to arrive. We might expect both these effects to diminish over time. As reality begins to bite, the individual may revise down his wage expectations and swallow his pride. Either way, we want to allow for the possibility that the lagged wage may influence the reservation wage independently of the current offer distribution.

One other relevant paper is Arulampalam et. al. (1998). Using the same dataset as us (see below) they find that up to 40% of the observed persistence of unemployment is due to individuals' previous labour market experience (the balance being due to spurious correlation caused by individual specific unobservable effects). Arulampalam et. al. (1998) conduct their analysis by regressing employment status today on employment status in previous years. In a sense their regression is the quantity analogue or our "price" regression.

4 Data

We conduct the analysis using a British dataset, the British Household Panel Survey (BHPS).[13] This panel covers 6 years from 1991-97.[14] This dataset has two particular advantages for us. Firstly, the data includes observations of an individuals reservation wage. Secondly, as the data is a panel, we will

[13] For full details see Taylor (1996).

[14] During this period UK unemployment ranged from a minimum of 5.1% in 1997 to a maximum of 10.4% in 1993.

be able to control for individual speci¯c (unobserved) e®ects. As we explain below, this is crucial. The major disadvantage of the data is that there are relatively few observations. After elimination of missing values we are left with 2;240 observations of individuals without employment. These observations consist of 1;215 distinct individuals (1101 men, 1200 women). We do not observe every individual to be unemployed in each wave. The average number of observations in the time dimension is 1:8 per individual. The panel is highly unbalanced with some individuals observed to be unemployed in each of the six waves, and many experiencing only one (observed) period of unemployment. A total of 823 people experienced unemployment in two or more waves of the panel.

Table 1 contains the de¯nitions and summary statistics of the variables used in the analysis.[15] All the monetary variables are in pounds sterling per week and are de°ated by CPI in order to be in 1991 prices.[16] The human capital variables (educ, soc, pasoc) are all related to education and occupation.

The reservation wage variable, W_{it}^R, is the result of direct observation. Individuals who reported that they did not have a job, but who said that they would like one, were asked the following question:

> \What is the lowest weekly take home pay you would consider accepting for a job?"

We interpret the answer to this question as being the individual's reservation wage after tax.[17] We have observations of W_{it}^R for individuals who are unemployed and also for individuals who might be better described as non-participants or discouraged workers. The di®erence is that the unemployed reported that they had looked for a job within the previous four week, whereas the others reported, merely that they would \like" a job. The fact that an individual said that he would like a job, and could suggest what sort

[15] The summary statistics are calculated for the pooled cross section.

[16] It is not clear a priori whether equation (5) should be expressed in nominal or real terms. We tried both and found no signi¯cant di®erence. The results in the text are for real variables.

[17] The use of the phrase \take home pay" means that the question would be understood by the respondent to refer to the after tax wage. Tax illusion may cause problems, however. It is not clear whether, for example, individuals answered this question by ¯rst calculating a gross wage and applying some arbitrarily chosen tax rate or whether there preferences over alternative labor market states were already paramaterized in terms of net wages.

of job it might be, was sufficient for him to be asked the question quoted above.[18]

We acknowledge the potential objection that the answer to this question may not accord exactly with the theoretical concept of the reservation wage. Individuals may have little incentive to give an honest answer. Also there is the possibility that the ordering of the questions in survey may have led to some confusion.

As regards the honesty of the replies, this is a potential problem in all surveys. Two facts lead us to trust the answers in this survey. Firstly, the respondents knew that the survey was confidential. In particular they knew that the information they gave was not to be made available to tax and welfare authorities. Secondly, elsewhere in the survey many individuals who were receiving state unemployment benefits reported that they were not actively searching for work. This is despite the fact that active search is supposedly a requirement for receipt of those benefits. This suggests that respondents believed that survey was confidential.

The issue of the ordering of the question is more problematic. Before being asked the "reservation wage" question, individuals were first asked to specify the occupation that they "expected" to get. It is possible that they interpreted the subsequent "reservation wage" question as referring to the lowest wage for which they would accept that occupation, as distinct from the lowest wage they would accept for some arbitrary job. If there is some variance in the precise interpretation of this question, we believe that its answer is still indicative of an individuals relative willingness to leave unemployment. More formally, if there is an error in the W^R variable, there is no reason to expect that it is correlated with any of the regressors in (5). Least squares on (5) will still produce consistent estimates.

The wage in the last job, W^L, is calculated as the net weekly wage received in the most recent spell of employment. For many, but not all the unemployed, this is equal to the wage reported at a previous wave of the panel i.e. $W^L_{it} = W_{is}$ where $s < t$. For the rest the variable is calculated from the answers individuals gave to a series of questions about their labour market activities between the current and previous waves of the panel.[19] On

[18] The variable search in Table 1 shows that 54% of those providing a reservation wage satisfied the OECD's definition of involuntary unemployment i.e. actively searched for a job last month.

[19] The dataset contains detailed information on respondents labour market behaviour between waves. In principle, every time period is accounted for. See Halpin (1997) for a

average the reservation wage is 20% higher than the wage in the previous job i.e. $E(W^R_{it}=W^L_{it}) = 1{:}2$[20]

The bene¯ts variable is the level of state bene¯ts the respondent reported receiving at time of interview. This may be di®erent form the level of bene¯ts to which the individual is entitled. We do not investigate the issue of bene¯t take up rates any further. Not all the bene¯ts available are formally linked to employment status. Most of the bene¯ts, however, are means tested. Therefore they are likely to vary with employment status. It is also worth noting that the size of unemployment bene¯ts are not linked to the wage received when last employed. About 26% of the observations in the sample are of zero bene¯ts. We treat these individuals $0:25 in bene¯ts per week in order to avoid taking logs of zero.[21]

We can use two alternative procedures to account for the e®ect of the probability of receiving o®ers. The ¯rst method is to proxy the probability by the regional unemployment rates, in the spirit of Blanch°ower & Oswald (1994). We would expect that a high unemployment rate would make the unemployed less likely to turn down a job o®er even at a low wage, for fear that a better o®er is unlikely to materialize in reasonable time.

Card (1995) notes that this method su®ers from the problem that there are relatively few independent observations of the regional level data. As our sample in already small, there may be insu±cient variability in the unemployment variable to identify an e®ect, even if it exists. Therefore we adopt an alternative approach. We construct an individual speci¯c unemployment rate. We ¯rst estimate a probit model of employment on a sample consisting of all the employed and unemployed in the BHPS dataset. The independent variables in this model are regional unemployment rates, individual characteristics such as age, education (educ), occupation group (soc, pasoc) and region and time dummies and their interactions. The dependent variable is the individual's current reported employment status. We use (one minus) the predicted probability from this probit model as a regressor in (5).[22] The idea is that this variable represents the probability that an arbitrary indi-

detailed discussion of this aspect of the BHPS.

[20] The standard deviation of this ratio is 1:6 and the median is 0:88. Jones (1989) reports a mean and standard deviation of 1:05 and 0:5 respectively. Feldstein and Poterba (1984) report a mean of 1:07.

[21] We also applied this adjustment to the asset income variable. About 35% of individuals did not report any asset income.

[22] The detailed results of this probit are available on request.

vidual with the same characteristics as person i will get a job conditional on him searching.[23] This procedure can be thought of as being a generalization of the Blanch°ower & Oswald (1994) idea of using the unemployment rate for i's region as a regressor in wage equations. It goes some way towards meeting the Card (1995) objection that there is insu±cient variation in the regional unemployment variable.

We approximate $F(W_{it})$, the person speci¯c distribution of wages, by its mean We have two potential measures of the mean of the distribution of wage o®ers. The ¯rst, direct measure, is W_{it}^e, the individual's response to the question:

"What weekly take home wage would you expect to get?"

There is an obvious problems with interpreting the answer to this question as it is not clear whether the expectation is conditional on the o®er being acceptable i.e. the o®ered wage being greater than the reservation wage, $E(W_{it}|W_{it} > W_{it}^R)$. We want the unconditional mean of the distribution, $\bar{W}_{it}$.[24] In any case, W_{it}^e, may not be the appropriate variable. By its very nature it is subjective. What we want is a measure of the potential wage o®ers that the individual actually faces. In our setup the subjectivity is captured by the lagged wage variable.

We could estimate a measure of the variance of wages and use this to construct the unconditional mean from W_{it}^e. But it seems simpler to estimate the mean of the distribution directly, especially given the subjectivity of W_{it}^e. In order to construct $\hat{W}_{it}$, an alternative measure of the mean of the distribution of o®ered wages, we ¯rst estimate a standard wage equation on a sample consisting of all the employed. We regress the weekly net wage on regional unemployment rates, individual characteristics such as age, education (educ), occupation group (soc, pasoc) and region and time dummies and their interactions. We correct for sample selection using the two stage procedure of Heckman (1979). The $\bar{R}^2$ in the wage equation is 0:23 and the

[23] The probabilty is conditional on searching because we estimate the probit model on a sample consisting of the employed and the unemployed, but not the non-participants. We then construct the predicted probabilty for both the unemployed and the non-participants, as we observe reservation wage for both groups.

[24] In this data set W^e is less than W^R in only 2% of cases. The two are equal in 33% of cases and W^e is greater than W^R in 65% of cases. This suggests that W^e is the conditional mean.

coefficient on the inverse mills ratio is -0.88 with a standard error of 0.07.[25] We then use the coefficients from this regression to calculate fitted values for those who do not have a job. We interpret these fitted values, $\hat{W}_{it}$, as being the mean of the distribution of wage offers that an individual faces, conditional on his characteristics and the characteristics of the local labour market.

This procedure has the advantage that it is not open to the kind of problems of interpretation that undermine our confidence in W^e_{it}. But there are three problems with it. Firstly the fitted values were created via a regression of the wage on dummies derived from the human capital variables together with interactions between time and region dummies. Only the exogeneity of fathers occupation (pasoc), age and the time dummies are absolutely assured. One could argue that the human capital variables and even the regional dummies are all the result of choices that are made jointly with the choice of labour market status and are therefore not exogenous.[26]

It can be argued, however, that, while these variables are formally the result of choices, those choices are sufficiently independent of the choice of employment status to enable the resulting variables to be treated as exogenous in practice. For example, education may be thought to be endogenous because we choose a higher level of education in anticipation that this will enable us to earn higher wages, avoid unemployment etc. But it is also plausible to suggest that the choice of education is as much a result of available opportunities, parental encouragement, personal abilities etc. To the extent that this is so, the level of education can be considered to be exogenous. More precisely, most of the individuals in this dataset who are forming their reservation wage will probably not be considering returning to formal education. From their point of view the influence of education on the mean of the distribution of wage offers is fixed.[27]

A third problem with the Heckman (1979) procedure relates to the specification of the selection probit. Ideally we would like to exclude variable from the selection probit in order to identify the mills ratio in the wage equation. Without exclusion restrictions, the mills ratio is identified only by functional form i.e. the assumption that the errors are jointly normally distributed. Unfortunately, in this application there are no reasonable exclusion restrictions.

[25] The results of this regression are available on request.

[26] See Harmon and Walker (1997) for evidence of the endogeneity of schooling in the UK.

[27] Arulampalam et. al. (1998) use analagous reasoning in their quantity regressions.

Any variable that can be hypothesized to determine whether an offer will be received will most likely also affect the wage received. For this reason, we estimated the Heckman model without exclusion restrictions. Opinion is divided over whether this is acceptable. Vella (1998), however, reports Monte Carlo simulations that suggest that identifying by functional from is better than imposing unreasonable exclusion restrictions. In addition, we experimented with several alternative sets of (admittedly arbitrary) exclusion restrictions. The main results of the paper (the coefficients on $\hat{W}_{it}$ and W^L_{it}) were unaffected.

The third, and most serious, problem is that this procedure may render OLS estimates of (5) inconsistent. Replacing $\tilde{W}_{it}$ with $\hat{W}_{it}$ introduces the term $\tilde{W}_{it} - \hat{W}_{it}$ into the residual of the estimated equation. This term will, almost surely, have an individual specific component μ_i: This represents that component of the expected wage that is specific to the individual and is not correlated with the observed characteristics that were used to construct $\hat{W}_{it}$. The actual model estimated will have the form (6).

$$\ln W^R_{it} = \beta_0 + \beta_1 \ln W^L_{it} + \beta_2 \ln \hat{W}_{it} + \beta_3 \ln u_{it} + \beta_4 X_{it} + \mu_i + \varepsilon_{it} \qquad (6)$$

It is probably the case that W^L_{it} will be positively correlated with μ_i, because W^L_{it}, the wage received in the previous job, will probably have been affected by the individual specific unobservable. Thus OLS estimation of (6) will yield upward biased estimates of the effect of W^L_{it} on reservation wages. It was for this reason that Feldstein and Poterba (1984) and Jones (1989) rejected the use of a fitted value as an estimate of the mean of the wage offer distribution. They opted instead to use W^L_{it} as a proxy for $\tilde{W}_{it}$. This is not an option for us as we are interested in the possibility that W^L_{it} has an independent influence on the reservation wage. We need to include both variables in the regression and we need a method to combat the bias introduced by the unobservable component.

In order to combat the problem we tried to instrument for the lagged wage using firm size and industry effects. For this procedure to be valid, we need that the industry and firm size be correlated with W^L_{it} but uncorrelated with μ_i. The first of these requirements is easy to accept, but the latter is not. Even at the three digit level, the probability that an unemployed individual has exactly the same code on reemployment, as the most recent previous job, is 34%: To the extent that unemployed individuals are more likely to get a job in the same industry or similarly sized firm, the industry and size will be correlated with ¹$_i$ and they will not be valid instruments.[28]

The alternative to IV is to make use of the panel aspect of the data. We should be able to di®erence out the individual e®ect using the ¯xed e®ects or \within groups" estimator.[29] In fact we could have a great deal of con¯dence in the ¯xed e®ects estimator. It will solve the problem of the individual unobservable provided we are prepared to assume that the observable is constant over time. There is, however, a problem. We can apply the ¯xed e®ects estimator only to those individuals who experienced two or more periods of unemployment during the sample period.[30] This has the immediate e®ect of reducing the sample size, with likely adverse consequences for the signi¯cance of results. More importantly, it raises an issue of sample selection. We might expect that those who experience several periods of unemployment would have systematically di®erent labour market behaviour than those who experience only one spell of unemployment over a period of several years. It is not clear which way this bias goes. Which group is more likely to focus on its previous wage? Those who are unemployed only once? Or those who experience periods of unemployment regularly? If it is the former group that relies on the lagged wage the most, then ¯xed e®ects procedure, by excluding them, will tend to underestimate the signi¯cance of the lagged wage for the population as a whole. The results must be interpreted with this caveat in mind.

5 Empirical Results

We report the OLS estimates of equation (5) in Table 2. At this point, no attempt is made to account for the panel nature of the data, all waves are pooled together as if from one cross section. Furthermore, the regressions in columns 1 to 4 use a sample made up of both men and women. Columns 5 and 6 perform the analysis on both gender groups separately. In addition to the variables shown in the table, all regressions also include a cubic polynomial in age of respondent and the number of dependent children. These variables

[28] The IV results are available on request. They are very similar to the IV results of Jones (1989) who used education as the instrument.

[29] The \random e®ects" (GLS) estimator would su®er from the same inconsistency problem as the OLS estimator.

[30] Recall that out of $1;215$ individuals, 823 experience unemployment in two or more periods.

are of no particular interest and so are omitted from the tables for clarity.

The ¯rst column shows the estimates of (5) when $\overset{1}{W}_{it}$, the mean of the distribution of o®ered wages is proxied by W^e_{it}, the individuals subjective expectation of future wages. The coe±cient on the expected wage variable, W^e_{it} is large and highly signi¯cant. In fact this variable alone explains most of the variation in the dependent variable, W^R_{it}. The R^2 at 0:85 is extraordinary high for a cross section wage regression. The coe±cients on the \wage in the previous job" variable, W^L_{it}, and on the bene¯ts variable, b_{it}, are small but statistically signi¯cant. The coe±cient on asset income a_{it}, is signi¯cant but incorrectly signed.

The size of the coe±cient on W^e_{it} leads us to suspect that this variable may not truly capture the mean of the distribution of wage o®ers. It could be the case that individuals, when asked what they expect to earn, give as their answer a wage equal to their reservation wage plus 15%, for example. This sort of behavior generates a spurious correlation between the dependent variable W^R_{it} and the regressor W^e_{it}. This would explain the unusually high R^2: Alternatively, if W^e_{it} is the conditional mean, $E[W|W > W^R]$, then there is automatic functional dependence between W^R_{it} and W^e_{it} leading to simultaneous equation bias.

In order to avoid these problems, we present, in column two of Table 2, the estimates of (5) with W^e_{it} replaced by $\hat{W}_{it}$, the ¯tted value from a wage regression. If W^e_{it} measures the mean of the wage distribution, then the results in the ¯rst two columns of table 2 should not be signi¯cantly di®erent. The coe±cient on $\hat{W}_{it}$ is signi¯cantly lower than the coe±cient on W^e_{it}. The $\overset{1}{R}^2$ for this regression is less than half that of column 1. This leads us to suspect that the estimates using W^e_{it} are contaminated by a spurious correlation and therefore the use of $\hat{W}_{it}$ is to be preferred. For purposes the most important di®erence between columns one and two is that the point estimate of the e®ect of W^L_{it} has risen by a factor of 6. Even so, it is still much lower than what we might have anticipated from the macroeconometric evidence.[31]

Surprisingly, the e®ect of the regional unemployment rate is insigni¯cant. This could indicate that local unemployment rates have no direct e®ect on reservation wages, perhaps only in°uencing reservation wages indirectly via

[31] Jones (1989) found a signi¯cant coe±cient of 0:24 on the previous wage and a statistically insigni¯cant coe±cient of 0:03 on bene¯ts. His regression was similar to ours with the exception that he did not include the ¯tted value $\hat{W}_{it}$

an e®ect on the distribution of wage o®ers. It may be, however, a manifestation of the problem of insu±cient variation discussed in the last section and by Card (1995). The number of independent observations of U_{rt} is only 57 and, from Table 1, we can see that the variance is small. This may not be su±cient to identify an e®ect even if one exists.

We re-estimate equation (5) with the regional variable, U_{rt} replaced by $\hat{U}_{it}$, our constructed individual speci¯c unemployment rate. These estimates are presented in the third column of Table 2. The coe±cients on all the variables are virtually unchanged from those of column 2. The $\bar{R}^2$ is similarly unchanged. Note that the coe±cient on the unemployment variable is still incorrectly signed and statistically insigni¯cant.

The coe±cient on asset income in all the ¯rst four columns seems to be incorrectly signed but signi¯cant. We would expect that higher asset income would lead to a higher reservation wage. An individual with more savings can a®ord to be a more choosey regarding any jobs o®ers that he might receive. The negative coe±cient could be explained by a spurious correlation caused by the intertemporal nature of savings. Those who have relatively high savings would tend to be those with less experience of unemployment through time. And those with relatively low reservation wages would, ceteris paribus, tend to experience less unemployment. Thus the regression could pick up the e®ect of previous unemployment on asset accumulation rather than the e®ect of assets on labour market behaviour.

We next consider the possibility that there is multicolinearity between the wage in previous job and the mean of the distribution. This could be the case if the wage in the last job is drawn from the distribution which has $\hat{W}_{it}$ as its mean i.e. if the wage distribution is stationary. Both variables could be picking up the e®ect of personal characteristics on the reservation wage even if previous employment per se had no e®ect on the reservation wage. Therefore we re-estimated the regression excluding the lagged wage variable. These results are presented in the fourth column of Table 2. These results should be compared with those in column 3 of Table 2, where the regressors are identical but for the inclusion of W_{it}^L. The coe±cient on $\hat{W}_{it}$, the constructed mean of the distribution of wage o®ers, has risen and is signi¯cantly di®erent from that in column 3. The other variables are also signi¯cantly a®ected. This suggests that there is some degree of positive collinearity between W_{it}^L and $\hat{W}_{it}$. Nevertheless, the wage received in the previous job does appear to exert an independent in°uence on the formation of reservation wages.

Finally, it is useful to see if the e®ect of previous employment is di®erent for men and for women. In columns 5 and 6 of Table 2 we report the estimates of the model where the full sample is split into two sub-samples, one consisting of men only and the other consisting of women only. All the variables are the same with the exception of the two ¯tted values ($\hat{U}_{it}$ and $\hat{W}_{it}$) which are now calculated from ¯rst stage regressions on single sex samples. The results are not that di®erent from the pooled sample. But it does seem that the lagged wage matters less, and the market wage matters more, to women than to men. On re°ection, this is not too surprising, women are often thought to have more °exible labour market behaviour.

As explained in the last section, we might expect that OLS estimation of (5) is inconsistent because W^L_{it} is correlated with the residual when $\hat{W}_{it}$ is a regressor due to the likely presence of an individual speci¯c unobserved component to wages. The e®ect of this inconsistency is to bias the coe±cient on the lagged wage upwards. So we can treat the estimate of this coe±cient reported in columns 3, 5 and 6 as upper bounds on the true values. A striking implication of this observation is that the true coe±cient must be very low. Certainly it is much lower than unity.

We present the ¯xed e®ects results in the ¯rst column of Table 3. These are quite di®erent from the OLS estimates. The ¯xed e®ects estimate of the coe±cient on W^L_{it} is substantially lower than in the OLS case. This is not surprising, as OLS is probably biased upward. As noted earlier, it is possible that the ¯xed e®ects estimate is biased downwards, because of sample selection. . In an attempt to asses the direction and degree of any bias, we estimate OLS on a sub-sample of those who experienced unemployment in two or more waves of the panel. These estimate were not signi¯cantly di®erent from OLS on the whole sample. In any case, the striking result is that this value is much lower than unity.Even if the ¯xed e®ects estimate is biased downwards we can view it as being a lower bound for the true value-Combining this with OLS upper bound we have a range for the true value of the coe±cient of (0:15; 0:25) | much less than unity.

The coe±cient on the expected future wage is signi¯cant, but only half the size of the OLS estimate. It is not obvious why the presence of individual speci¯c error term should have biased the OLS estimate of this coe±cient upwards. As in the OLS case, the coe±cient on the bene¯ts variable is correctly signed, signi¯cant but surprisingly small in magnitude. A doubling of bene¯ts would lead to an increase in the reservation wage of only 1:5%. The coe±cient on the individual speci¯c unemployment rate is also signi¯cant and correctly signed. Curiously it is almost exactly equal to 0:1, the value obtained by Blanchflower and Oswald (1994). Although in their case the regression was of market wages on regional unemployment rate. Finally, note that the coefficient on asset income is now positive (although insignificant). This suggests that the OLS estimator does indeed suffer from a spurious correlation brought on by the link between savings and employment over time. The fixed effects estimator takes account of this dynamic relationship.

Again we break down the analysis by sex in columns two and three of Table 3. Unlike in the case of the OLS estimates, there appears to be no significant difference between the two groups.

As a robustness check, it is useful to see if the effect of previous employment diminishes with the duration of unemployment. In columns 4 and 5 of Table 3 we report the estimates of the model where the sample is split into two sub-samples, one consisting of those out of work for 12 months or less and one consisting of those out of work for more than on year.[32] The results are pretty striking.[33] For the recently unemployed, the objective market wage (i.e. the estimated mean of the distribution) has basically no impact on the formation of reservation wages. The wage received in the previous job, however, has a significant affect on reservation wages. But the coefficient is much less than unity. The situation is reversed for those who have been out of work for more than a year. The wage in the previous job now has zero impact on the reservation wage. The mean of the distribution, on the other hand, has a large, and significant, impact on this groups reservation wages. This result is robust to changes in the sample split. If we split the sample at 6, 18 or 24 months duration, we get the same pattern of results. The lagged wage matters more to those with the shorter duration and the market wage to those with the longer duration. The difference is most stark, however, when the sample is split at 12 months.

Finally one last robustness check. We experiment including various extra variables in (6).[34] Inclusion of human capital, demographic variables and regional dummies reduce the significance of the coefficients on $\hat{W}_{it}$ and $\hat{U}_{it}$, which is not surprising given their construction. The coefficient on W^L_{it};

[32] Duration here is measured as the time elapsed since the previous wage was last earned. This may not be exactly the same as duration of unemployment, if people have moved between unemployment and non-participation.

[33] A caveat: we have ignored the possibility of simultaneous relationship beween duration and unemployment.

[34] In the interests of brevity, the results of this data mining are not reported here. They are available on request.

however, remains remarkably robust. No amount of tortures inflicted upon the data can get it depart significantly from 0.15. The only exception was when W^e_{it} was included as a regressor. As explained earlier, there are good reasons not to include this variable in any of the regressions.

6 Conclusions

This paper set out to find the determinants of the reservation wage and to indicate what the structure of reservation wages implies for the evolution of the natural rate of unemployment. We find that the wage in a previous job and the expected future wage are all important determinants of the reservation wage (with elasticities of 0.15 and 0.3 respectively). Surprisingly, we find that unemployment rates and the level of benefits,have only a small effect on reservation wages (elasticities of -0.1 and 0. -0.015 respectively).

Our results are clear, and appear robust to a number of alternative specifications. The central result of the paper is the effect of the wage in the previous job on reservation wages. At 0.15; our preferred estimate of this coefficient is surprisingly low. Even if we doubt the accuracy of this (fixed effects) estimate, we can reason that the true value must lie somewhere between it and the OLS estimate (0.25). This entire range is quite low. Most importantly it is much lower than unity, the value suggested by evidence from aggregate wage data. Thus our results seem to contradict some of the macroeconometric evidence on wage determination.

This result suggests that the reservation wage will adjust to any shock relatively quickly. The coefficients on the variables that reflect current reality, the level of benefits and the expected future wage, are larger than the coefficient on the historic variable, the wage in the previous job. This in turn implies that the natural rate of unemployment will adjust relatively quickly to shocks.

References

[1] Arulampalam, W., Booth, A. & Taylor, M. (1998). "Unemployment Persistence", mimeo, Department of Economics, University of Warwick

[2] Bean, C. (1994). "European Unemployment: A Survey." Journal of Economic Literature, vol. 32, pp. 573-619

[3] Blanchard O. (1997). Mcaroeconomics. Prentice-Hall, New Jersey

[4] Blanchard, O. & Katz, L. (1997). \What We Know and What We Do Not Know About The Natural Rate of Unemployment." Journal of Economic Perspectives, vol. 11, no. 1, pp. 51-72.

[5] Blanch°ower & Oswald (1994). \The Wage Curve." MIT press.

[6] Card, D. (1995). \The Wage Curve: A Review." Journal of Economic Literature, vol. 23, pp. 785-799

[7] Card, D. & Hyslop, D. (1996). \Does In°ation `Grease the Wheels' of the Labour Market". NBER Working Paper No. 5538

[8] Caplin, A. and Spulber, D. (1987). \Menu Costs and the Neutrality of Money". Quarterly Journal of Economics, vol. 102, pp. 703-25.

[9] Felstein, M. & Poterba, J. (1984). \Unemployment Insurance and Reservation Wages." Journal of Public Economics, vol. 23 , pp. 141-167

[10] Halpin, B. (1997). \Uni¯ed BHPS Work-life Histories: Combining Multiple Sources into a User-friendly Format". Technical Papers of the ESRC Research Centre on Micro-social Change. Technical Paper 13. University of Essex.

[11] Harmon, C. & Walker, I. (1995). \Estimates of the Economic Return to Schooling for the United Kingdom". American Economic Review, vol. 85, pp1278-1286

[12] Heckman, J. (1979). \Sample Selection as a Speci¯cation Error". Econometrica, vol.47 , pp.153-161 .

[13] Jones, S. (1989). \Reservation Wages and the Cost of Unemployment." Economica, vol. 56, pp. 225-246

[14] Layard, R., Nickell, S., & Jackman, R. (1991). Unemployment Macroeconomic Performance and the Labour Market. Cambridge: Oxford University Press.

[15] Pissarides, C. (1990). Equilibrium Unemployment Theory. Basil Blackwell.

[16] Shapiro, C. & Stiglitz, J. (1984). \Equilibrium Unemployment as a Discipline Device". American Economic Review, vol. 74, pp. 433-44.

[17] Taylor, M. (1996). (ed. with J. Brice et. al.). British Household Panel Survey User Manual, Volumes A and B. University of Essex

[18] Vella, F. (1998). \Estimation Models with Sample Selection Bias: A Survey", Journal of Human Resources, vol. 33, no. 1, pp. 127-169

Table 1: The BHPS Data

Variable	De¯nition	Mean	Variance
age	age at interview	37.73	13.31
b_{it}	bene¯ts received (per week)	37.28	39.77
W_{it}^{R}	reservation wage (per week)	93.93	63.34
a_{it}	investment income (per week)	3.8	14.2
W_{it}^{e}	expected wage (per week)	119.69	88.82
$\hat{W}_{it}$	constructed mean wage (per week)	178.92	58.94
W_{it}^{L}	wage in previous job (per week)	113.71	83.06
U_{rt}	Regional unemloyment. rate	8.51	2.12
rate_f	female regional unemployment rate	4.53	1.09
rate_m	male regional unemployment rate	11.57	2.98
$\hat{U}_{it}$	individual unemployment rate	9.83	7.64
length	time since W_{it}^{L} recorded (in months)	16.42	15.9
educ	level of education (0-6, 6=Masters/PhD 0= no academic quali¯cations 1=basic secondary school)	1.73	1.59
search	\actively searched" for a job during past month	0.54	0.49
kids	number of dependent children	0.81	1.04
tae	terminal age of education	17.56	4.35
soc	occupation code (1-9, 9 highest skill group)	5.72	2.3
pasoc	father's occupation (1-9, 9 highest skill group)	3.7	1.3
white	ethnic background (=1 if white)	0.96	0.19
sex	sex (=1 if male)	0.52	0.49

1. Statistics are calculated for the pooled cross section

Table 2: OLS Estimation

Dependent Variable: $\ln W_{it}^{R}$

Sample	(1) All	(2) All	(3) All	(4) All	(5)[2] Male	(6)[2] Female
$\ln W_{it}^{L}$	0.042	0.252	0.253	-	0.205	0.16
	(0.008)	(0.018)	(0.018)	-	(0.026)	(0.025)
$\ln b_{it}$	0.010	0.022	0.022	0.024	0.025	0.037
	(0.003)	(0.006)	(0.006)	(0.005)	(0.007)	(0.01)
$\ln \hat{W}_{it}$	-	0.743	0.746	0.999	0.437	0.647
	-	(0.035)	(0.035)	(0.026)	(0.09)	(0.06)
$\ln W_{it}^{e}$	0.887	-	-	-	-	-
	(0.008)	-	-	-	-	-
$\ln U_{rt}$	-0.001	0.073	-	-	-	-
	(0.021)	(0.048)	-	-	-	-
$\ln \hat{U}_{it}$	-	-	0.009	0.003	-0.045	0.064
	-	-	(0.018)	(0.015)	(0.026)	(0.032)
$\ln a_{it}$	-0.017	-0.025	-0.024	-0.029	-0.008	-0.021
	(0.004)	(0.009)	(0.009)	(0.008)	(0.011)	(0.014)
N	3069	2301	2301	3862	1101	1200
$\bar{R}^2$	0.85	0.38	0.38	0.31	0.30	0.22

1. Standard errors are in parentheses
2. The fitted regressors ($\hat{U}_{it}$ and $\hat{W}_{it}$) are calculated separately for each sub-sample.
3. All regressions also include a constant, cubic in age and number of dependent children

Table 3: Panel Data Estimation

Dependent Variable: $\ln \bar{W}^R_{it}$

	All	Sex[2]		Duration	
		Male	Female	12 months	> 12 months
$\ln W^L_{it}$	0.147	0.142	0.136	0.140	0.078
	(0.046)	(0.061)	(0.067)	(0.047)	(0.146)
$\ln b_{it}$	0.015	0.007	0.032	0.018	0.016
	(0.009)	(0.010)	(0.017)	(0.012)	(0.020)
$\ln \hat{W}_{it}$	0.314	0.464	0.473	0.046	0.443
	(0.104)	(0.208)	(0.145)	(0.151)	(0.198)
$\ln \hat{U}_{it}$	-0.096	-0.052	0.002	-0.099	-0.059
	(0.042)	(0.049)	(0.073)	(0.068)	(0.073)
$\ln a_{it}$	0.009	0.005	0.017	-0.032	0.047
	(0.017)	(0.02)	(0.029)	(0.028)	(0.032)
N	561	260	301	190	246
$\bar{T}$	2.9	3.0	2.8	2.3	2.7
R^2	0.27	0.13	0.26	0.28	0.21

1. Standard errors are in parentheses
2. The ¯tted regressors ($\hat{U}_{it}$ and $\hat{W}_{it}$) are calculated separately for each sample
3. All regressions also include a constant, cubic in age and number of dependent children