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Wage dispersion and mobility

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WAGE DISPERSION AND MOBILITY

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Abstract

This paper examines the influence of wage dispersion on job mobility. An on-the-job search model is used to describe the strategy of working individuals. We derive and estimate elasticities with respect to moments of the wage offer distribution. For this we do not need to assume a specific parametric form of this distribution, nor do we have to estimate the whole distribution. We also examine what happens to mobility if, in addition to a change of the wage offer distribution, the present wage changes by an amount proportional to the difference of the wage and the mean of the wage offer distribution. The results suggest that the effects depend on whether the present wage is smaller or larger than the mean wage offer.

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JEL Classification: J6, C5.

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1. Introduction

One of the main issues in the debate on labour market policy concerns the influence of wage dispersion on job mobility. It is often argued that the existence of wage dispersion forms an incentive for employed individuals to search for jobs with higher wages. An increase of the spread of net wages may then stimulate job mobility, since for moving to another job to be attractive, the wage rise involved should at least offset the transaction costs associated with such a move. Such an increase of dispersion could be imposed by means of a weakening of the progressive structure of the tax system. A high degree of job mobility may be associated with a high efficiency of the allocative performance of the labour market, and, therefore, may be regarded as desirable. Up to now, empirical research on these issues is scarce. This may be because such research requires examining how a wage (offer) distribution in a certain segment of the labour market influences the strategy of an individual in that segment. Thus, it seems that reliable estimates of these distributions are necessary, in addition to a model describing the strategy of individuals.

This paper does not provide new results on all of these issues. Rather, it focuses on one aspect involved. In particular, we estimate the elasticity of the transition rate from one job to other jobs with respect to the spread of the wage offer distribution. The transition rate from one job to other jobs is supposed to be an indicator of job mobility. The model describing the strategy of working individuals is an on-the-job search model that pays particular attention to the costs associated with moving from one job to another job. These transaction costs are likely to be among the important factors determining job mobility.

To estimate elasticities with respect to parameters (moments) of the wage offer distribution, we need information on that distribution. In this paper we develop a method to estimate such elasticities that does not require estimates of the whole wage offer distribution. Indeed, only the mean of the wage offer distribution is needed. By combining the estimates of the mean with estimates of the transition rate to other jobs and the costs of moving to another job, we are able to estimate elasticities of the transition rate to other jobs, and the reservation wage, with respect to the mean and variance of the wage offer distribution. Our estimation method bears some resemblance to the method developed by Lancaster & Chesher (1983) to estimate elasticities for unemployed individuals in a job search framework, using subjective responses on their strategy.

In Section 2 we present the on-the-job search model and discuss the estimation of the transaction costs and the transition rate to other jobs. In addition to duration data, we use rather unique data on self-reported reservation wages of employed individuals. In Section 3 we derive expressions for the elasticities and present the procedure to estimate them. Section 4 contains the results. First we consider what happens to mobility if the wages of new jobs become more dispersed, which corresponds to an increase in dispersion of the wage offer distribution with present wages held constant. Then we consider what happens if all wages become more dispersed. In the latter case the present wage also shifts in a way corresponding to its place in the distribution of wage offers. Section 4 also examines whether the results are robust with respect to possible misspecifications. In particular it is examined whether the results are biased because of a bias in the estimates of the mean of the wage offer distribution due to a neglect of human capital accumulation. Section 5 concludes.

2. The model and the data

2.1. Model specification

This section presents an on-the-job search model and a semi-structural estimation method for the costs of moving to other jobs and the transition rate to other jobs. Because the model, the data, and the estimation method have been discussed extensively elsewhere (Van den Berg (1992)), the present exposition will be brief. In Section 3 we examine the elasticities of interest and we examine which additional data are needed to be able to estimate them.

The theory of on-the-job search tries to explain the behaviour of employed individuals who search for a better job (for a survey, see Mortensen (1986)). In the basic version of the theory, search and job turnover are costless so in principle everybody is engaged in search. Suppose an individual works at a wage w . Offers of new jobs arrive according to a Poisson process with arrival rate λ . Such job offers are random drawings (without recall) from a wage offer distribution $F(x)$. For the moment we assume that a job is characterized by its wage level and that jobs can be held forever. Every time a job offer arrives the decision has to be made whether to accept it or to reject it. Individuals aim at maximization of their expected discounted lifetime income (over an infinite horizon). They are assumed to know λ and $F(x)$. The subjective rate of discount is denoted by ρ .

Most papers on on-the-job search assume that the model is stationary (see e.g. Hey & McKenna (1979), Holmlund (1984), Mortensen (1985), Albrecht, Holmlund & Lang (1986), Burgess (1988)). This means that w , λ and $F(x)$ are assumed to be independent of the duration of being in the present job and independent of all events during the stay in the present job. Further, λ and $F(x)$ are not allowed to depend on w . The motivation for adopting stationarity is that in a nonstationary setting the model equations become intractable. Also, most empirical studies using structural job search models for the unemployed assume stationarity of the models for computational reasons. In Van den Berg (1992) the stationarity assumption is tested using the same data as used in this paper. It appears that the stationary model gives a good representation of the data.

The model does not allow for transitions into unemployment. From a conceptual point of view such an extension can be made easily. However, our main interest is in job-to-job transitions. Inclusion of transitions into unemployment would make the model equations more complicated and would require more data than presently used to estimate the model.

We incorporate the transaction costs associated with moving from one job to another, by assuming that every time one moves from one job to another, an amount of money c has to be paid. Also, since there are various reasons to assume that c depends on the present wage, we allow c to be a function of w . For example, the amount of pension claims that may be lost when moving to another job may be related to the present wage. Also, individuals who earn a high wage may have spent more money on their house and their children's education. If the costs associated with changing houses and education are correlated with the value of the old house and the money already spent on education, then c will be larger for individuals who earn a high wage.

To maintain stationarity, we assume that c as a function of w does not depend on the time spent in the present job nor on events during the stay in the present job. In combination with the infinite horizon assumption, stationarity of the model implies that the employed individual's perception of the future is independent of the time spent in the present job. Consequently, the optimal strategy is constant during the present job.

Analogous to Hey & McKenna (1979) we do not incorporate per-period search costs in the model. This is because in our opinion actual search (noticing advertisements when reading newspapers, contacting potential employers, making expenses-paid visits to them etc.) is relatively costless for the individuals in the data set. Also, allowing for nonzero search costs would generate computational problems when estimating the model, because the presence of such

costs implies that it is optimal for some individuals not to search on the job (see e.g. Burdett (1978)). As shown in Van den Berg (1992), the data suggest that in some sense all employed individuals are engaged in search.

Allowing c to be a non-constant function of w has important consequences for the properties of the optimal strategy of an employed individual. Indeed, the set of acceptable wage offers may not be connected. In that case the optimal strategy does not have the reservation wage property, that is, there is no quantity such that a job offer is acceptable if and only if its wage exceeds that quantity. This is basically because the value of a (new) job depends not only on its wage x , but also on the costs $c(x)$ that have to be paid when leaving that job. It can be shown however that if $c'(w) < 1/\lambda$ for every w , then the optimal strategy can be characterized in terms of reservation wages (see Van den Berg (1989)). Whether this is a strong condition cannot be said a priori, but the estimation results in Van den Berg (1992) seem to be consistent with it. In the sequel we assume that the condition is satisfied.

Consequently, the optimal strategy for an individual earning a wage w can be written as follows: accept a wage offer x if $x > \xi(w)$ and reject it if $x < \xi(w)$. We call $\xi(w)$ the reservation wage, which of course depends on all the explanatory variables in the model. It can be shown that $\xi(w)$ has the following properties.

- (i) $\xi(w) \geq w \Leftrightarrow c(w) \geq 0$
- (ii) $\xi'(w) \geq 0 \Leftrightarrow c'(w) \geq -\frac{1}{\rho}$
- (iii) if $c'(w)=0$, then: $\xi'(w) < 1 \Leftrightarrow c(w) > 0$

The results in (i) and (ii) make sense. If job changing costs are positive then one is more reluctant to move to another job than when such costs are absent. If c as a function of the wage level decreases very fast at w then the job offers that are not acceptable at w become acceptable for wages larger than w .

The case $c'(w)=0$ for every w , $c>0$ has been analyzed extensively by Hey & McKenna (1979). In that case $\xi(w) > w + \rho \cdot c$, and the gap between $\xi(w)$ and w is a decreasing function of w . This can be understood by the following argument. Individuals take into account that they may change jobs more than once in the future. Therefore, the reservation wage has to exceed the sum of the present wage and the long-run compensation of the transaction costs that have to be paid for the first move. The more job changes one expects, the larger the gap between $\xi(w)$ and w because one does not want to pay transaction costs too

frequently in order to reach a high wage level. Because the number of job changes one expects is relatively large for individuals who have a relatively low wage, this implies that the gap (between $\xi(w)$ and w) is decreasing in w .

To be able to use the model for structural empirical analysis, the reservation wage has to be solved in terms of w , $c(w)$, λ , $F(x)$ and ρ . The evolution of ξ as a function of w follows a complicated differential equation which does not have an explicit solution. Also, numerical methods would generate severe computational problems (see Van den Berg (1992)). The following equation provides local approximations of $\xi(w)$.

$$(1) \quad \xi(w) = w + \frac{\rho + \theta(w)}{1 - c'(w)\theta(w)} \cdot c(w) + o(c(w))$$

in which

$$(2) \quad \theta(w) = \lambda F(\xi(w)) \quad \text{with } F = 1 - F$$

Of course, $\theta(w)$ is the transition rate from the present job with wage w to other jobs, or, equivalently, the exit rate out of the present job. Equation (1) is a Taylor series expansion of $\xi(w)$ around $c(w)=0$, keeping w constant in the expansion. It can be shown that the approximate $\xi(w)$ that is obtained by deleting the $o(c(w))$ term in equation (1), preserves many of the properties of the exact $\xi(w)$, and is accurate in many instances (for details, see Van den Berg (1992)). Note that equation (1) is an implicit equation in $\xi(w)$, since $\theta(w)$ depends on the latter variable.

The equation for the approximate $\xi(w)$ has intuitive appeal. Suppose $c'(w)=0$. In that case $\xi(w)$ is approximated by $w + (\rho + \theta(w)) \cdot c(w)$. As explained before, if $c(w)$ is constant and positive then $\xi(w)$ exceeds $w + \rho c(w)$ because one takes into account that one may have to pay transaction costs more than once in the future. Further, the more job changes one expects and the higher the transaction costs, the larger the gap between ξ and $w + \rho c(w)$. The term $\theta(w) \cdot c(w)$ in the approximation takes account of this. Now suppose $c'(w)$ and $c(w)$ are positive. Then, in the approximation, $\xi(w)$ exceeds the $\xi(w)$ that would have prevailed if $c'(w)$ were zero. This effect is more pronounced if $\theta(w)$ is large. Again this is plausible: if transaction costs increase with wages and if one is still at the bottom of the wage distribution then $\xi(w)$ must be large to prevent paying too many transaction costs in order to reach a high wage level in the future.

From (2), $\theta(w)$ depends on all "structural" parameters λ , $F(x)$, $c(w)$, w and ρ . However, because of the stationarity assumption, $\theta(w)$ does not depend on

the elapsed duration in the present job. Consequently, the job duration has an exponential distribution with parameter $\theta(w)$.

2.2. *The data*

The data set used is constructed from the Labour Market Research Panel, a survey conducted by the Netherlands Organization for Strategic Labour Market Research (OSA). As of April 1985 a sample of about 4000 individuals living in The Netherlands is interviewed every one and a half year. The sample includes only individuals aged between 15 and 61. For our study only the first wave of the panel is available. Respondents are asked to recall their labour market history from January, 1980 until the date of the interview. Further, they were asked to provide information on their income on the date of the interview. The data set contains a wide range of job characteristics and information on the social and working environment of individuals who are employed in April, 1985. Another distinguishing feature of the data set is that individuals who were employed at the date of the interview were asked for their lowest acceptable net wage offer. Responses on this question are interpreted as the observed counterpart of the reservation wage $\xi(w)$.

For our estimation purposes we selected individuals who were employed in a paid job at the date of the interview. As a result of the selection we obtained a sub-sample containing 1757 individuals.

2.3. *Estimation of the model*

In this subsection we briefly discuss the estimation of particular parameters of the model. Specifically, the information on job durations and observed reservation wages is used to estimate $\theta(w)$ and $c(w)$.

By assuming that the individual inflow rate into the present job is constant before the moment of the interview, the elapsed job duration t has an exponential distribution with parameter $\theta(w)$ (see e.g. Ridder (1984)). The inflow rate may depend on the wage of the present job and other observables without affecting this result. The observed reservation wages are denoted by $\tilde{\xi}$. These may differ from the true reservation wages

$$(3) \quad \tilde{\xi} = \xi + \varepsilon$$

ε is an error term which is interpreted as a measurement error that is i.i.d. across individuals and independent of duration t and present wage w .

Consequently, individuals use ξ instead of $\tilde{\xi}$ as their strategy, so θ depends on ξ instead of $\tilde{\xi}$, and equation (2) does not depend on ε . In addition, t and $\tilde{\xi}$ are independent. The true reservation wage ξ is the solution of equation (1), deleting the $o(c(w))$ term in that equation.

$$(4) \quad \xi(w) = w + \frac{\rho + \theta(w)}{1 - c'(w)\theta(w)} \cdot c(w)$$

Not all structural parameters are identified from the data on t and $\tilde{\xi}$. In particular λ and F are not identified because both (2) and (4) only depend on the product $\lambda F(\cdot)$. The general approach to obtain identification of λ and F in structural job search models is to assume that F satisfies Flinn & Heckman (1982)'s recoverability condition and use data on post-spell wages. Because our data set is essentially a cross-section, it does not provide information on wages that are earned after moving to another job, so this approach cannot be used here. Moreover, even if we would have drawings of the truncated wage offer distribution with known points of truncation, the use of such data to estimate the parameters of an a priori chosen parametric class of distributions for F would be hazardous, since the estimates may be sensitive with respect to the chosen class (Flinn & Heckman (1982)).

However, we can do a reduced-form estimation of θ from the duration data and use these estimates in the reservation wage equation (4) in order to estimate $c(w)$ from (3). To estimate $c(w)$, λ and F need not be estimable separately. The estimation method proposed here is flexible in the sense that the structural parameters in $c(w)$ are estimated without the need to make strong assumptions on λ and F . Moreover, by using a reduced-form specification for $\theta(w)$ we are able to check whether certain predictions of the theory hold. For instance, the theory predicts that $\theta'(w) < 0 \Leftrightarrow \xi'(w) > 0$.

In Van den Berg (1992) the results obtained by using the estimation method proposed above are presented. These results will be used in Subsection 3.3 for the estimation of the elasticities of θ and ξ with respect to the moments of F . On the relevant wage interval, the cost of moving to another job $c(w)$ is written as a linear function of explanatory variables x_1 and the present wage.

$$(5) \quad c(w) = x_1' \gamma_1 + \alpha \cdot w$$

(Note that here x refers to explanatory variables whereas in Subsection 2.1 x referred to wage offers.) The vector x_1 includes characteristics of the neighbourhood in which one lives, personal characteristics and characteristics of the present job. The latter characteristics consist of occupation dummies

and pecuniary and non-pecuniary fringes.

The exit rate out of the present job $\theta(w)$ is written as an exponential function of explanatory variables x_2 and the logarithm of the present wage

$$(6) \quad \theta(w) = \exp(x_2' \gamma_2 - \beta \cdot \log w)$$

We assume that (6) gives a good approximation of (2) for the range of x_2 and w in the data. Recall that θ depends on all $c(w)$, by way of ξ . Consequently, x_2 has to include all explanatory variables in x_1 . Most of these explanatory variables also influence λ and F . For instance the age of an individual or whether he is married may influence $c(w)$ but may also give an indication of the productivity of the job searcher, and therefore influence λ .

The parameters β and γ_2 are estimated by ML using the duration data. We plug these estimates into equation (4) and substitute (5) into (4). The resulting equation is used to estimate α and γ_1 by nonlinear least squares (see equation (3)). Note that by using this procedure we do not have to choose a parametric class of distributions for the error term ϵ .

The subjective rate of discount ρ is fixed at 15% a year. From an extensive examination in Van den Berg (1992) of the model quality, it appears that the estimation results satisfy non-imposed properties of the theoretical model. Further, the results are robust with respect to changes in some of the assumptions made (like the assumption that $\rho=15\%$), whereas other assumptions (like the no-heterogeneity assumption) are not rejected by the data.

We will summarize some results that are relevant for the sequel. For most individuals in the sample, the estimate of $c(w)$ (resulting from the estimates of α and γ_1) is positive. The estimate of α is significantly positive. Still, for all individuals in the sample, this estimate is smaller than one over the estimate of $\theta(w)$. So, the estimate of $1-\alpha \cdot \theta(w)$, which is the denominator of the ratio in (4), is always positive. As a result, $\xi(w)$ is generally larger than w . Now note from equation (4) that $\xi(w)$ can be thought of as being the sum of a part due to w and a part due to $c(w)$. It appears that on average $w/\xi(w)$ equals about 0.88, so the presence of transaction costs accounts on average for about 12% of the magnitude of $\xi(w)$.

Concerning the influence of w on $\xi(w)$ and $\theta(w)$ we have that the estimate of β equals 0.41 and is significantly different from zero (so $\theta'(w) < 0$) and that the estimate of $\xi'(w)$ is positive for all individuals in the sample. The sample average of the estimate of $\xi'(w)$ equals 1.11 and the standard deviation over the sample of the estimate of $\xi'(w)$ is small (0.05).

3. Elasticities with respect to moments of the wage offer distribution

3.1. Assumptions and derivation

As is clear from the previous section, we do not want to impose strong assumptions on the functional form of F . Our main interest is in the elasticities of θ and ξ with respect to the first two moments of F . We only make assumptions on the way these moments enter as parameters in the density function f of F . Specifically, we assume that the wage offer distribution has location-scale parameters $\mu \in \mathbb{R}$ and $\sigma > 0$ in the sense of Ferguson (1967): the wage offer density $f(x)$ at $x \in \mathbb{R}$ given the parameters μ and σ can be written as

$$(7) \quad f(x) = \frac{1}{\sigma} \cdot f_0\left(\frac{x-\mu}{\sigma}\right)$$

for some density f_0 which does not depend on μ and σ . In addition, we assume that the distribution corresponding to the density f_0 has mean and variance equal to zero and one, respectively. It follows that μ and σ are the mean and standard deviation of the wage offer distribution. Of course, we assume that $\mu > 0$. It should be stressed that we do not assume here that the wage offer distribution F belongs to some fully parameterized family of distributions. Rather, we make a minimal assumption necessary to be able to calculate elasticities w.r.t. the mean and standard deviation of F .

In the sequel we suppress the dependence of f and F on μ and σ . The distribution corresponding to f_0 is denoted by F_0 . From (7),

$$(8) \quad F(x) = F_0\left(\frac{x-\mu}{\sigma}\right)$$

The objective is to estimate the elasticities of θ and ξ with respect to μ and σ . By substituting equation (8) into equation (2) we obtain

$$(9) \quad \theta = \lambda F_0\left(\frac{\xi-\mu}{\sigma}\right)$$

Denote $\frac{\xi-\mu}{\sigma}$ by ξ^* . Differentiation of (9) with respect to σ results in

$$(10) \quad \frac{\partial \theta}{\partial \sigma} = -\lambda \cdot f_0(\xi^*) \cdot \frac{1}{\sigma} \cdot \left[\frac{\partial \xi}{\partial \sigma} - \xi^* \right] = -\lambda \cdot f(\xi) \cdot \left[\frac{\partial \xi}{\partial \sigma} - \xi^* \right]$$

The partial derivative of ξ with respect to σ is obtained by using equation (4). Note that ξ depends on σ (and on μ) only through θ . Before differentiation we may substitute equation (5) in equation (4), since the

former equation gives a parameterization of an explanatory 'variable' in the model. (Note that equation (6) cannot be used when deriving expressions for elasticities since it gives a reduced-form description of a dependent 'variable'.) We obtain

$$(11) \quad \frac{\partial \xi}{\partial \sigma} = \frac{1+\alpha\rho}{(1-\alpha\theta)^2} \cdot c \cdot \frac{\partial \theta}{\partial \sigma}$$

Let $\psi(x)$ be the failure rate of the wage offer distribution at x , so $\psi(x) = f(x)/\bar{F}(x)$. From (10) and (11) it follows that

$$(12) \quad \frac{\partial \log \theta}{\partial \log \sigma} = \frac{\psi(\xi) \cdot (\xi - \mu)}{1 + \theta \cdot \psi(\xi) \cdot \frac{1+\alpha\rho}{(1-\alpha\theta)^2} \cdot c}$$

The elasticity of ξ with respect to σ can be deduced from (11) and (12). The elasticities of θ and ξ with respect to μ can be derived analogously. As a result,

$$\frac{\partial \log \xi}{\partial \log \sigma} = \frac{\theta \cdot \psi(\xi) \cdot \frac{1+\alpha\rho}{(1-\alpha\theta)^2} \cdot c}{1 + \theta \cdot \psi(\xi) \cdot \frac{1+\alpha\rho}{(1-\alpha\theta)^2} \cdot c} \cdot \frac{\xi - \mu}{\xi}$$

$$\frac{\partial \log \theta}{\partial \log \mu} = \frac{\mu}{\xi - \mu} \cdot \frac{\partial \log \theta}{\partial \log \sigma}$$

$$\frac{\partial \log \xi}{\partial \log \mu} = \frac{\mu}{\xi - \mu} \cdot \frac{\partial \log \xi}{\partial \log \sigma}$$

Note that elasticities with respect to σ^2 are obtained by multiplying the elasticities with respect to σ with 0.5.

An increase of σ increases the dispersion of wage offers. One might say that in such a case the level of inequality of wage offers increases. The well-known Gini-coefficient is a measure of the level of inequality or concentration of a random variable. The following result provides a link between a change of the standard deviation σ of a distribution satisfying the assumptions we made, and the resulting change of the Gini-coefficient of this distribution.

For a wage offer distribution satisfying the assumptions made in this subsection, the elasticity of the Gini-coefficient with respect to the standard deviation is equal to one.

The proof is in the appendix. This result may help in understanding what it means when the standard deviation of the wage offer distribution increases by, say, 10%. (It might be interesting to note that, after the Second World War, in most industrialized countries, the Gini coefficient of post-(personal-)tax income is about 6% to 12% smaller than the Gini coefficient of pre-tax income (see e.g. Kakwani (1980), Hartog (1981), Silber (1989)). Kakwani (1980) examines the relation between tax parameters and these Gini coefficients in specific models.)

Let us examine the signs of the elasticities derived above. Assume that α and c are positive. One can distinguish two effects on the transition rate to other jobs θ if the mean μ of F increases. First, there is a direct positive effect because of the shift to the right of F : more job offers become acceptable, holding ξ constant. Secondly, there is an indirect effect on θ because of the change of ξ . The change of ξ has the same sign as the change of θ . If, for example, θ increases, then the expected number of transitions in the future increases. In order to prevent that one has to pay transaction costs too often in order to reach a high wage level, the reservation wage ξ then also increases. As a result, the direct and the indirect effect on θ are opposite. It follows that both ξ and θ increase in response to an increase of μ . This means that the first effect on θ dominates the second.

Now consider an increase of the standard deviation σ of F . Again there are two effects on θ . The sign of the direct effect (the effect of the larger spread of F , holding ξ constant) depends on whether $\xi \lesseqgtr \mu$. If $\xi > \mu$ ($\xi < \mu$) then probability mass is transferred from the region below (above) ξ to the region above (below) ξ , so $F(\xi)$ increases (decreases) and the effect is positive (negative). The indirect effect on θ works through ξ . Again the change of ξ has the same sign as the change of θ , for the same reason as in the previous paragraph. It follows that ξ and θ increase (decrease) in response to an increase of σ if $\xi > \mu$ ($\xi < \mu$). Consequently, the direct effect on θ always dominates the indirect effect.

Recall that on average the present wage equals about 88% of the reservation wage. Therefore, generally, individuals with $\xi < \mu$ are individuals who have low wages relative to other individuals in the same segment of the labour market. Because $\partial\theta/\partial\sigma < 0$ if $\xi < \mu$, it then follows that for individuals with relatively low wages, mobility is reduced when the spread of the wage offer distribution is increased.

One might argue that it is hazardous to use an expansion of ξ in terms of c to examine how ξ depends on μ and σ . For a general function $y(x,z)$ it is not always true that the derivative w.r.t. z of an expansion of y in terms of x

results in a good approximation of $\partial y/\partial z$. In Pittnauer (1972) general sufficient conditions are presented ensuring that such an approximation is good (for example, one of these conditions states that $y(x,z)$ should be analytical). It would be beyond the scope of this paper to check whether ξ , as a function of c , μ and σ , satisfies these conditions. However, it seems that ξ is sufficiently well-behaved for the conditions to hold.

3.2. *Shifting wages*

It can be argued that in some cases a policy that changes the wage offer distribution also affects the present wage. For instance, if such changes are effectuated by means of a change of the tax system, then present wages are also likely to change. Therefore, in this subsection, we derive elasticities with respect to the mean and standard deviation of F that take account of this. Let the following equation describe the way w varies with μ and σ .

$$w = \mu + \sigma \cdot k \quad \text{with } k \text{ independent of } \mu \text{ and } \sigma$$

This means that the influence of μ and σ on present wages is similar to their influence on wage offers in that μ and σ act as location and scale parameters. In other words, if μ or σ changes, then w shifts in a way corresponding to its place in the wage offer distribution, so $F(w)$ does not change.

First, consider a change of μ . When μ changes to $\mu+d\mu$, then w changes to $w+d\mu$ (so $\partial w/\partial \mu=1$). The derivatives of θ and ξ with respect to μ that take account of this, are denoted by

$$\frac{\partial \theta}{\partial \mu, w} \quad \text{and} \quad \frac{\partial \xi}{\partial \mu, w}$$

respectively. Of course there holds that $\partial \theta/\partial \mu, w = \partial \theta/\partial \mu + \partial \theta/\partial w$ and $\partial \xi/\partial \mu, w = \partial \xi/\partial \mu + \partial \xi/\partial w$, so

$$(13) \quad \frac{\partial \log \theta}{\partial \log \mu, w} = \frac{\partial \log \theta}{\partial \log \mu} + \frac{\mu}{w} \cdot \frac{\partial \log \theta}{\partial \log w}$$

$$(14) \quad \frac{\partial \log \xi}{\partial \log \mu, w} = \frac{\partial \log \xi}{\partial \log \mu} + \frac{\mu}{w} \cdot \frac{\partial \log \xi}{\partial \log w}$$

The elasticities with respect to w , on the right-hand side of (13) and (14), can be derived analogously to the elasticities derived in the previous subsection. Alternatively, they can be derived using equations (4) and (6), that is, using the empirical model specification, since the reduced-form

specification (6) of θ explicitly describes how θ depends on w .

Now consider a change of σ . Because $\partial w/\partial\sigma = k = (w-\mu)/\sigma$, it follows that if $w > \mu$ ($w < \mu$), then w increases (decreases) as σ increases. Moreover, the larger the difference between w and μ , the larger the change of w due to the change of σ . Using notation similar to that in the previous paragraph, $\partial\theta/\partial\sigma, w = \partial\theta/\partial\sigma + (\partial\theta/\partial w).(w-\mu)/\sigma$ and $\partial\xi/\partial\sigma, w = \partial\xi/\partial\sigma + (\partial\xi/\partial w).(w-\mu)/\sigma$, so

$$(15) \quad \frac{\partial \log \theta}{\partial \log \sigma, w} = \frac{\partial \log \theta}{\partial \log \sigma} + \frac{w-\mu}{w} \cdot \frac{\partial \log \theta}{\partial \log w}$$

$$\frac{\partial \log \xi}{\partial \log \sigma, w} = \frac{\partial \log \xi}{\partial \log \sigma} + \frac{w-\mu}{w} \cdot \frac{\partial \log \xi}{\partial \log w}$$

Recall that the estimation results implied that the elasticity of θ w.r.t. w is negative and that $\xi'(w) > 0$. Now, let us look at the signs of the elasticities w.r.t. (μ, w) . If μ increases, then w also increases, giving an extra upward push to ξ . Consequently, the elasticity of ξ w.r.t. (μ, w) is positive and larger than the elasticity of ξ w.r.t. μ if w does not change. On the other hand, this additional increase of w and ξ causes the elasticity of θ w.r.t. (μ, w) to be smaller than the corresponding elasticity if w does not change. By elaborating on equation (13) one can show that if $1-\alpha\theta > 0$ (which the estimation results confirmed), then the elasticity of θ w.r.t. (μ, w) is negative. It should be noted that if $\alpha=0$ then any increase of μ would imply an equally large change of ξ (so $\partial\xi/\partial\mu, w = 1$), thus holding $F(\xi)$ and therefore θ unchanged.

To examine the sign of the elasticity of ξ w.r.t. (σ, w) we have to distinguish different cases. If $\xi < \mu$ then $w < \mu$, and an increase of σ generates a decrease of w . Consequently, ξ decreases. If on the other hand $w > \mu$, then an increase of σ generates an increase of w . Because $w > \mu$ also implies that $\xi > \mu$, it follows that ξ increases. If $w < \mu < \xi$ then for the general case the sign of the elasticity is indeterminate.

Now let us examine the elasticity of θ w.r.t. (σ, w) . The partial effects of the increase of σ and the change of w generally work in opposite directions on θ . If for instance $\xi < \mu$, then the partial effect of σ is negative (see the previous subsection), while, because w decreases, the partial effect of w is positive. By elaborating equation (15) it can be shown that if $w < \mu$, then the elasticity is positive. In this case, the negative effect on θ that was found in the previous subsection is dominated by the decrease of w . More generally, the elasticity is positive if and only if $w < \mu + c/\alpha$, so for $w > \mu$ no general statement can be made. However, if w is large enough then the elasticity is negative. It should be noted that if $c=0$ then the elasticity is zero. The

reason for this is that $c=0$ implies that $\xi \equiv w$, so $F(\xi)$ does not change.

Summarizing, one might say that if a change of μ or σ is accompanied by a change of w , then the effects on ξ are more pronounced and the effects on θ are less pronounced than the effects that would prevail if w does not change.

3.3. Estimation of the elasticities

In this subsection we present an estimation method for the elasticities that neither requires strong assumptions on the shape of the wage offer distribution, nor requires the estimation of the whole distribution function F . As argued before, these are desirable properties for an estimation strategy.

The estimation of the model in Subsection 2.3 provides estimates of the parameters of c and θ . By substituting these into equations (4), (5) and (6), estimates of c , θ and ξ follow for every individual in the sample. From the equations on the elasticities in Subsection 3.2 it therefore follows that we only need estimates of μ and $\psi(\xi)$ to be able to estimate the elasticities. This does not imply that we need to estimate the whole distribution function F . In particular, though we aim at estimating elasticities w.r.t σ , no estimate of σ is needed if μ and $\psi(\xi)$ can be estimated directly from the data.

First, consider estimating $\psi(\xi)$. This variable enters the expressions for the elasticities because the derivative of θ w.r.t. ξ and the partial derivatives (holding ξ constant) of θ w.r.t. μ and σ depend on it. This implies that $\psi(\xi)$ can be estimated by estimating how θ depends on ξ ($\partial\theta/\partial\xi = -\lambda f(\xi) = -\theta\psi(\xi)$). By differentiating θ w.r.t. w it follows that $\partial\theta/\partial\xi = (\partial\theta/\partial w)/(\partial\xi/\partial w)$. Now note that the empirical model (equations (4), (5) and (6)), though being partly specified in reduced-form, explicitly describes how ξ and θ depend on w . So, from the empirical model, an estimable expression for $\partial\theta/\partial\xi$ can be derived. As a result,

$$(16) \quad \psi(\xi) = \frac{(1-\alpha\theta)^2 \cdot \beta}{(1+\alpha\rho) \cdot (w \cdot (1-\alpha\theta) - \beta\theta c)}$$

Note that this expression does not depend on μ . In Section 4 we will refer to the following alternative formulations of (16),

$$(17) \quad \psi(\xi) = -\frac{1}{\theta} \cdot \frac{\partial\theta/\partial w}{\partial\xi/\partial w} = \frac{\beta}{w \cdot \xi'(w)}$$

Substitution of (16) into the equations for the elasticities simplifies these equations considerably. For example, equation (12) reduces to

$$\frac{\partial \log \theta}{\partial \log \sigma} = \frac{1-\alpha\theta}{1+\alpha\rho} \cdot \beta \cdot \frac{\xi-\mu}{w}$$

and the elasticity of θ w.r.t. (σ, w) equals

$$\frac{\partial \log \theta}{\partial \log \sigma, w} = \frac{\rho+\theta}{1+\alpha\rho} \cdot \beta \cdot \frac{\alpha(\mu-w)+c}{w}$$

Now let us turn to the estimation of μ . Clearly, F (and therefore μ) is different in different segments of the labour market. We define 15 different segments by distinguishing between five levels of education (1: no certificate after primary education, 2: lower secondary education, 3: secondary education, 4: higher vocational training, 5: university) and three age categories (23–29, 30–40, 41–65). We assume that F is identical for every individual within a segment, with the qualification that within a segment μ is allowed to be a linear function of dummy variables indicating the occupation category (four categories are distinguished: academic, administrative/commercial, services, and industrial) and whether one is married or not, and of a variable related to the number of working individuals in the household. No restrictions across different segments are imposed. Note that all variables influencing F must be in x_2 in equation (6), since F is an explanatory ‘variable’ for θ .

If random drawings from F were available, then, under mild conditions, estimates for μ could be obtained by regressing such drawings on the explanatory variables for μ separately for each segment. As mentioned above, we do not observe random drawings from F in our data set, nor do we observe wages earned after the present spell. However, the present wages could be regarded as drawings from F truncated at the value of the reservation wage at the previous job or at the spell of unemployment that preceded. Note that we do not know anything about the values of these points of truncation, simply because the data do not provide income variables for spells that ended before the date of the interview. To examine whether this selection effect is prominent, we use an ad hoc reduced-form model. We take a latent variable y^* determining whether one is employed: w is observed if and only if $y^* > 0$. It is assumed that y^* is a linear function of observed exogenous variables and an error term. We assume that this error term and the wage offers follow a bivariate normal distribution.

Clearly, this procedure for estimating μ may be flawed for a variety of reasons. In particular, it may not be able to correct for selectivity. Therefore, in Subsection 4.2, we pay attention to the robustness of the results with respect to the estimates of μ , by re-estimating the elasticities using different estimates of μ .

To facilitate estimation of this latent variable model, data on unemployed individuals ($y^* < 0$) are used in addition to data on employed individuals ($y^* > 0$). For most segments, the estimated covariance of the bivariate normal distribution is insignificantly different from zero at the 5% level. This means that the events as captured by the latent variable y^* have no significant influence on w . (This is a result which is frequently encountered in the literature, see e.g. Van Opstal & Theeuwes (1986), Narendranathan & Nickell (1985) and Van den Berg (1990).) Furthermore, for the segments for which the covariance is significant, the estimates for μ are almost completely identical to the estimates obtained by performing OLS of w on the explanatory variables for μ . Therefore the latent equation is dropped and μ is estimated by OLS.

4. Results

4.1. Estimates of the elasticities

Table 1 presents the sample averages of the estimates of the elasticities that prevail if w does not change, i.e., the elasticities derived in Subsection 3.1. It may be interesting to examine in what sense the estimates depend on the location of the present wage relative to the wage offer distribution. For that purpose we construct six wage categories (category 1: $w < \mu - 2\omega$, 2: $\mu - 2\omega < w < \mu - \omega$, 3: $\mu - \omega < w < \mu$, 4: $\mu < w < \mu + \omega$, 5: $\mu + \omega < w < \mu + 2\omega$, 6: $\mu + 2\omega < w$). The numbers ω are simply estimated by the standard deviations of the error terms in the regressions performed to estimate μ . This results in different estimates of ω for each segment of the labour market. In fact, the boundaries of the wage categories will generally differ across individuals. Note that it is not our intention to interpret ω as an estimate of σ . The estimates ω are only needed for a rough indication of the location of w in F .

The differences between the sample averages for different age categories are minimal, so a subdivision into such categories is not presented.

The following may help in understanding the magnitude of the elasticity estimates. First, recall that the estimate of β equals 0.41 and the sample average of the estimate of $\xi'(w)$ equals 1.11, with a small standard deviation over the sample. (In particular, the differences between the sample averages of $\xi'(w)$ for the wage location categories are almost zero.) As a result, from equation (17), $\psi(\xi(w))$ is very close to $0.37/w$ for a wide range of w . Now recall that on average w is about 12% smaller than ξ . Therefore $\psi(\xi)$ can be

approximated by $0.42/\xi$ for a wide range of ξ . The function $\psi(x)$ corresponding to a Pareto distribution with parameters ν and w_0 ($F(x)=(w_0/x)^\nu$ with $\nu, w_0 > 0$) equals ν/w . If $\nu \leq 1$ then $E(x)$ does not exist. It follows therefore that in the relevant area in the domain of our F , the spread of the wage offers is quite large, or, in other words, the tail of our F is thick. This implies that the relative decrease of the proportion of acceptable wage offers (and therefore the transition rate θ) due to an increase of the reservation wage ξ is small. In formula, the elasticity of θ w.r.t. ξ equals $-\xi \cdot \psi(\xi)$, which has a sample average of -0.42 . Changes of ξ result in proportionally smaller changes of θ .

Table 1. Elasticities w.r.t. the mean and standard deviation of the wage offer distribution.

wage location category	1	2	3	4	5	6	overall
<i>(i) w.r.t. the mean μ</i>							
$\frac{\partial \log \xi}{\partial \log \mu}$ (reservation wage)	0.02 (0.01)	0.03 (0.01)	0.02 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.02 (0.01)
$\frac{\partial \log \theta}{\partial \log \mu}$ (exit rate)	0.55 (0.13)	0.51 (0.07)	0.42 (0.04)	0.34 (0.02)	0.28 (0.02)	0.22 (0.04)	0.38 (0.08)
<i>(ii) w.r.t. the standard deviation σ</i>							
$\frac{\partial \log \xi}{\partial \log \sigma}$	-0.01 (0.00)	-0.01 (0.00)	0.00 (0.00)	0.00 (0.00)	0.01 (0.00)	0.01 (0.01)	0.00 (0.00)
$\frac{\partial \log \theta}{\partial \log \sigma}$	-0.15 (0.07)	-0.09 (0.05)	0.00 (0.03)	0.08 (0.02)	0.14 (0.02)	0.20 (0.04)	0.03 (0.07)
<i>category sample size</i>	2	145	901	507	136	66	1757

in parentheses: standard deviation of the (estimated) elasticities across the sample.

The second notable fact concerns the insensitivity of ξ w.r.t. changes of

its determinants. As mentioned before, ξ can be thought of as being a sum of two parts, one of which is w , which on average equals about 88% of the magnitude of ξ . The elasticity of ξ w.r.t. the other term is therefore about 0.12. Any change in F influences ξ through this other term only. Therefore, unless this term is extremely sensitive w.r.t changes in μ or σ , any such change does not make the individual much more or much less selective with regard to job offers.

Because the reservation wages are almost completely insensitive w.r.t an increase of μ , the effect on θ of such an increase is virtually equal to the effect that would arise if ξ were constant. On average, a 10% increase of the mean of the wage offer distribution increases the transition rate from the present job to other jobs by 3.8%.

Turning to the more interesting elasticities (those w.r.t. σ) we again see that, because the reservation wage elasticities are virtually equal to zero, the effect on θ is again virtually equal to the effect that would arise if ξ were constant. It is not surprising that on average the elasticity of θ w.r.t σ is almost equal to zero, since it is positive for individuals with $\xi > \mu$ and negative for individuals with $\xi < \mu$. If σ increases then the shift in the distribution is more pronounced at points far away from μ than it is at points close to μ . For individuals for whom $w < \mu - 2\omega$, a 10% increase of the standard deviation of the wage offer distribution implies a 1.5% decrease of the transition rate from the present job to other jobs. For individuals with $w > \mu + 2\omega$, such an increase implies a 2% increase of this transition rate.

We now turn to the estimates of the elasticities prevailing if w changes in accordance with the changes of μ and σ , i.e., the elasticities derived in Subsection 3.2. Table 2 presents the sample averages.

The results in Table 2 are substantially different from those in Table 1. Concerning a change of μ , the effects on ξ (θ) are more (less) pronounced as in Table 1, as was to be expected. Note that $\partial w = \partial \mu$ (the infinitesimal changes are equal), so the proportional change of w occurring if μ changes, is larger for smaller w . As a result, the differences with Table 1 are the largest for the lowest wage location categories. The positive effect on θ of an increase of μ found in Table 1, is dominated by the negative effect of the increase of w , and in general the resulting elasticity is close to zero.

Let us turn to the elasticities w.r.t. σ in Table 2. There holds that $\partial w = ((w - \mu) / \sigma) \partial \sigma$, so the larger the difference between w and μ , the larger the change of w occurring when σ changes. As a result, the differences with the elasticities w.r.t. σ in Table 1 are largest for the lowest and highest wage location categories. Except for individuals with w close to μ , the effects on

ξ (θ) are more (less) pronounced than in Table 1. For individuals with $\xi < \mu$, the negative effect on θ of an increase in σ found in Table 1, is dominated by the positive effect of the decrease of w , though the resulting elasticity is close to zero. For individuals with $w > \mu$, the positive effect on θ of an increase of σ found in Table 1, is almost canceled by the negative effect of the increase of w .

Table 2. Elasticities w.r.t. the mean and standard deviation of the wage offer distribution if the present wage is also affected.

wage location category	1	2	3	4	5	6	overall
<i>(i) w.r.t. the mean μ</i>							
$\frac{\partial \log \xi}{\partial \log \mu, w}$	1.54 (0.08)	1.39 (0.15)	1.12 (0.11)	0.92 (0.09)	0.75 (0.07)	0.59 (0.12)	1.04 (0.21)
$\frac{\partial \log \theta}{\partial \log \mu, w}$	-0.07 (0.01)	-0.07 (0.03)	-0.05 (0.02)	-0.04 (0.02)	-0.03 (0.01)	-0.03 (0.01)	-0.05 (0.02)
<i>(ii) w.r.t. the standard deviation σ</i>							
$\frac{\partial \log \xi}{\partial \log \sigma, w}$	-0.51 (0.22)	-0.39 (0.15)	-0.13 (0.09)	0.08 (0.05)	0.24 (0.06)	0.41 (0.11)	-0.04 (0.20)
$\frac{\partial \log \theta}{\partial \log \sigma, w}$	0.07 (0.05)	0.08 (0.02)	0.06 (0.01)	0.04 (0.01)	0.04 (0.01)	0.03 (0.01)	0.05 (0.02)
<i>category sample size</i>	2	145	901	507	136	66	1757
in parentheses: standard deviation of the (estimated) elasticities across the sample.							

Concluding, one might say that if one is interested in an increase of mobility, then, for individuals with relatively high wages, an increase of the dispersion of the wage offer distribution is more effective than a joint increase of this dispersion and a change of the present wage. For individuals

with relatively low wages the opposite result holds, though for these individuals the increase of mobility under the latter policy is still quite small.

Of course, policy aims do not necessarily have to be restricted to changes of μ or σ only. For example, an increase of σ may be accompanied by an increase of μ to offset the shift to the left of the left tail of the wage offer distribution. The effects of joint changes of μ and σ can be determined simply by combining the elasticities w.r.t. μ and σ . Similarly, if σ (and/or μ) depends on a tax parameter τ , then the effects of a change of τ can be determined by using the elasticities w.r.t. σ (and/or μ) and the elasticities of σ (and/or μ) w.r.t. τ .

It should be noted that the results in this paper are based on a micro analysis focusing on one side of the labour market. At a macro level increases in μ or σ are likely to generate additional effects. For example, the strategy of the unemployed may change in response to changes of F , causing total unemployment to change. Because of this, unemployment insurance premiums may change, which may affect the distribution of net wage offers F . Also, an increase of σ may imply a decrease of the minimum wage. This may be an incentive for employers to create new jobs, which in turn may increase the job offer arrival rate λ . A promising topic for future research would be to analyze these issues in an equilibrium search framework (e.g. Burdett & Mortensen (1993)'s) which takes account of policy instruments like the structure of the income tax system and the minimum wage.

4.2. Robustness with respect to the estimates of the mean of F

The estimates of μ (and therefore of the elasticities) may be biased for a number of reasons. One of them is the neglect of the accumulation of human capital. If individuals accumulate job-specific human capital then it is likely that wages increase as a function of job duration. In that case the present wages of individuals at the moment of the interview are not random drawings from the truncated wage offer distribution. As a result, μ will be over-estimated. It is likely that such an effect will be more pronounced for older individuals, since on average these have larger job durations. The most extreme scenario would be that the whole difference between the estimates of μ for different age categories (but within the same education category) is due to accumulation of job-specific human capital. To examine the consequences of this possibility, we re-estimated the elasticities, using the estimates of μ from the lowest age category within an education category for every age

category. Table 3 presents the elasticity estimates. The estimates that are virtually equal to those presented in Tables 1 and 2 are deleted.

Table 3. Elasticities w.r.t. μ and σ corrected for human capital accumulation.

wage location category	1	2	3	4	5	6	overall
<i>(i) w.r.t. the mean μ</i>							
$\frac{\partial \log \theta}{\partial \log \mu}$	0.48 (0.03)	0.46 (0.04)	0.39 (0.03)	0.34 (0.02)	0.29 (0.02)	0.23 (0.04)	0.33 (0.07)
$\frac{\partial \log \xi}{\partial \log \mu, w}$	1.35 (0.07)	1.30 (0.15)	1.11 (0.12)	0.92 (0.08)	0.77 (0.06)	0.60 (0.11)	0.91 (0.22)
<i>(ii) w.r.t. the standard deviation σ</i>							
$\frac{\partial \log \theta}{\partial \log \sigma}$	-0.08 (0.02)	-0.05 (0.03)	0.02 (0.03)	0.08 (0.02)	0.13 (0.02)	0.19 (0.04)	0.09 (0.07)
$\frac{\partial \log \xi}{\partial \log \sigma, w}$	-0.33 (0.04)	-0.29 (0.10)	-0.09 (0.07)	0.08 (0.05)	0.21 (0.06)	0.38 (0.11)	0.09 (0.20)
<i>category sample size</i>	5	91	445	602	289	325	1757

in parentheses: standard deviation of the (estimated) elasticities across the sample.

Because, for individuals aged over 29, μ is generally smaller than it was before, the number of individuals in low (high) wage location categories has decreased (increased) in comparison to the numbers in Tables 1 and 2. However, for these individuals ω also has become smaller, causing a shift of individuals from categories with wages close to μ towards peripheral categories.

For individuals aged over 29, the individual estimates of the elasticities w.r.t. μ and (μ, w) are all smaller (closer to zero) than in the previous subsection. However, the main conclusions about the sample averages of these

estimates remain valid. The individual estimates of the elasticities w.r.t. σ with w constant are larger than before, in the sense that positive estimates become larger and negative elasticities tend to zero (and may become positive). The average effect of an increase of σ on mobility is therefore a bit more positive than was found in the previous subsection.

We also observe that for individuals over 29 the individual estimates of the elasticity of ξ w.r.t. (σ, w) are somewhat larger than before ('larger' in the same sense as in the previous paragraph). Most individual estimates of the elasticity of θ w.r.t. (σ, w) are almost the same as before and therefore close to zero.

As a conclusion, it seems that the results are robust w.r.t. biases in μ originating from a neglect of job-specific human capital accumulation.

Another reason for the estimates of μ to be biased is because the limited dependent variable model used to estimate μ may not capture all selection effects. The unaccounted selection effects may be such that μ is over-estimated. To examine whether the results are robust w.r.t. such misspecifications, we re-estimated the elasticities assuming that μ equals 0.8 times the original estimate of μ . Not surprisingly, the results very much resemble those reported in Table 3. In fact, they deviate a bit more from those in Tables 1 and 2 than the results in Table 3 do. Recall that now the elasticities also change for individuals under 30. Nevertheless, the robustness of the results w.r.t. the magnitude of μ is reinforced.

The value of $\psi(\xi)$ is an important determinant of the elasticity estimates, since it reflects to what extent changes of ξ , and changes of μ and σ , holding ξ constant, are translated into changes of θ (e.g. recall that $\partial\theta/\partial\xi = -\theta.\psi(\xi)$ and that the partial derivative of θ w.r.t. μ , holding ξ constant, equals $\theta.\psi(\xi)$). We estimate $\psi(\xi)$ using an expression for it that follows from the empirical model. This expression crucially depends on the specifications of the derivatives of θ and ξ as functions of w (see equations (17), (4), (5) and (6)). To examine whether the elasticity estimates are sensitive with respect to these specifications, the model is re-estimated using more flexible functional forms for $\theta(w)$ and $c(w)$. Specifically, the variables $(\log w)^2$ and w^2 are included as additional regressors in x_2 and x_1 , respectively (see equations (5) and (6)).

Adding w^2 in x_1 has almost no effect on the estimation results, whether $(\log w)^2$ is included in x_2 or not. In both cases $c(w)$ is virtually linear on the wage interval of interest. If $(\log w)^2$ is included in $\theta(w)$ then the estimates of the coefficients in $\theta(w)$ associated with $\log w$ and $(\log w)^2$ are -17.79 ($t=3.0$) and 1.112 ($t=3.0$), respectively. This means that $\theta(w)$ attains a

minimum at $w=2970$, so for individuals who have $w>2970$ (12% of the sample) the estimated $\theta(w)$ is increasing in w . However, if attention is restricted to the subsample for which $w>2970$, then it appears that $\theta(w)$ is not increasing on $w>2970$. The fact that $(\log w)^2$ has a significantly positive influence on θ may therefore be due to the nonlinearity of $\log \theta(w)$ in $\log w$ for small w . The estimates and standard errors of the other parameters in $\theta(w)$ and $c(w)$ and the main characteristics of the search process (c , θ , ξ) are almost identical to those reported in Van den Berg (1992).

Because of the inclusion of the $(\log w)^2$ term in $\theta(w)$, the sample average of the elasticity of θ with respect to w changes from -0.41 to -0.73 . Since the elasticity of ξ with respect to w does not change much, this implies that on average θ is now a bit more sensitive with respect to ξ . However, for individuals who have $w>2970$ the estimate of $\theta'(w)$ is positive, so the elasticity estimates are senseless if $w>2970$. Following the argument above, this is regarded as a consequence of the rigidity of the quadratic specification of $\log \theta(w)$ as a function of $\log w$. For individuals with $w<2970$ the sample averages of the elasticity estimates do not differ substantially from those in Tables 1 and 2. The main difference is that here the elasticity of θ w.r.t. σ is a bit smaller (more negative) for the lowest wage location categories. In sum, the main conclusions from Subsection 4.1 seem to be robust with respect to the specifications of θ and c as functions of w .

5. Conclusion

In this paper we have examined the influence of wage dispersion on job mobility. We used an on-the-job search model to describe the strategy of working individuals. This model pays attention to the costs associated with moving from one job to another job, because such transaction costs are likely to be among the important factors determining job mobility. For this model, we derived elasticities of the transition rate from the present job to other jobs (and of the present reservation wage) with respect to moments of the wage offer distribution. We developed and used an estimation method for these elasticities that does not require the assumption of a specific parametric form of this distribution, nor estimation of the whole distribution. It appears that the reservation wages are almost completely insensitive w.r.t. changes of the standard deviation of the wage offer distribution. The elasticity of the transition rate from the present job to other jobs w.r.t. this standard deviation is positive for individuals with relatively high

wages, while it is negative for individuals with relatively low wages. Still, the estimated elasticity values do not differ much from zero (they range from about -0.15 to 0.2).

It can be argued that policies aimed at changing the wage offer distribution also affect present wages of working individuals. Therefore we also examined what happens to mobility if, in addition to a change of the wage offer distribution, present wages change in a way corresponding to their place in that distribution. Generally, the effects on the transition rate to other jobs are less pronounced than in the case in which the present wage is constant.

All results are robust w.r.t. the estimated values of the mean of the wage offer distribution. Also, from the results it follows that for our purposes it does not matter much whether the model takes account of the costs of moving to another job. A model in which the reservation wage is assumed to be equal to the present wage would yield similar elasticity estimates.

It would be interesting to replicate the analysis using longitudinal data from a time period in which a change of the dispersion of wage offers actually occurs. However, if such a change is anticipated, then the model becomes nonstationary and, therefore, extremely complicated to handle. In practice it may be hard to distinguish between the effects of anticipation and other determinants of behaviour. Therefore, the survey should preferably follow individuals for a large number of years.

Appendix

The elasticity of the Gini coefficient with respect to the standard deviation

Let wage offers x have a distribution function F satisfying the assumptions in Subsection 3.1. We denote the standardized version of x by y , so $x = \mu + \sigma \cdot y$. Clearly, the p.d.f. of y equals f_0 . Let a_x and a_y denote the lower bounds of the intervals of support of x and y , respectively. It follows that

$$(A1) \quad a_x = \mu + \sigma \cdot a_y$$

Because $E(y) = 0$ and $V(y) = 1$, there holds that $a_y < 0$. We assume that $a_x > 0$. (This is a weak assumption. Note that the Gini coefficient is undefined for random variables that are negative with a positive probability.) Because f_0 does not depend on μ or σ , a_y does not either. Consequently, if σ changes then a_x will also change.

From Kakwani (1980), the Gini coefficient G of the distribution of x is defined as

$$G = \frac{1}{2\mu} \cdot \int_{a_x}^{\infty} \int_{a_x}^{\infty} |x-z| \cdot f(x) \cdot f(z) \, dx \, dz$$

This equation can be rewritten along the lines of Kakwani (1980),

$$(A2) \quad G = 1 - \frac{2}{\mu} \cdot \int_{a_x}^{\infty} x \cdot \bar{F}(x) \cdot f(x) \, dx$$

If we substitute equations (7), (8) and (A1) into (A2), and elaborate, we get

$$(A3) \quad G = \frac{\sigma}{\mu} \cdot \left[-2 \cdot \int_{a_y}^{\infty} y \cdot \bar{F}_0(y) \cdot f_0(y) \, dy \right]$$

Note that the term in square brackets in (A3) is positive. (In fact, it can be shown to equal $\frac{1}{2} E(|y_1 - y_2|)$, with y_1 and y_2 being independent random variables having the same distribution as y (i.e., having p.d.f. f_0 .)

The term in square brackets in (A3) does not depend on σ . Consequently, $\partial G / \partial \sigma = G / \sigma$, and the result follows.

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