working paper 0212

Life Cycle Wage and Job Changes

by Ed Nosal and Peter Rupert

FEDERAL RESERVE BANK OF CLEVELAND

Working Paper 02-12 September 2002

Life Cycle Wage and Job Changes

by Ed Nosal and Peter Rupert

Evidence from the Panel Study of Income Dynamics shows that while the majority of job changers who state they were not fired or laid off choose jobs with wages that are higher than their previous jobs, a substantial proportion of these job changers choose jobs that have *lower* wages. A model is constructed that is consistent with workers choosing a career path that entails a job change to either a higher paying or lower paying job. In the model, a job consists of a tied wage and amenity package. Due to compensating wage differentials, higher wages are paid where other job amenities are unattractive. Given this, a worker chooses a career path that leads to a job change where the wage in the new job may be higher or lower than in the previous job, with the actual choice being determined by the rate of time preference.

JEL Classification: J0, J3, J6
Key Words: lifetime wage profile, occupation choice, job changes

Ed Nosal is at the Federal Reserve Bank of Cleveland and may be contacted at Ed.Nosal@clev.frb.org or (216) 579-2021. Peter Rupert is at the Federal Reserve Bank of Cleveland and may be contacted at Peter.C.Rupert@clev.frb.org or (216) 579-2040. The authors thank Rob Shimer, Richard Rogerson, Randy Wright, and participants at the SED meetings 2002, and NBER Summer Institute.

1 Introduction

In the Panel Study of Income Dynamics (PSID) it is possible to identify workers who have changed employers *voluntarily*.[1] That is, workers who report they were neither fired nor subject to a layoff or shutdown. While the majority of the voluntary leavers move to new jobs that pay more than their previous job, a surprisingly substantial proportion (approximately 42%) move to new jobs where the wages are actually *lower*.[2]

Why might people quit their higher paying jobs and move into lower paying ones? While there are many potential explanations, this paper models wages as only one component of a job.[3] That is, jobs consist of a tied wage and amenity package, with higher wages in jobs with higher levels of the disamenity. In a dynamic or life cycle context, it is entirely possible for a worker to choose a career path that leads to a job change where the observed wage is lower but the (perhaps unobserved) working conditions are better than in their previous job. Examples might include: Bond traders or stock brokers who work in high paying but also high stress and long hours jobs; sales jobs that require extensive travel; dangerous or risky jobs, and so on.

In this paper workers change employers without the arrival of new information. A model is constucted that allows workers to choose their career *path* over various jobs, where a job is defined by a wage and amenity combination, in a setting of complete information. Some workers will initially choose low paying jobs and will migrate to higher paying ones. Other workers will follow

[1] Although in principle it is difficult to know whether a separation is voluntary or involuntary, the question in the PSID asks workers to choose from several reasons as to why they left their last job, one of which being that they chose to leave.

[2] The model makes no distinction between employer changes or job changers, though in the PSID the question concerns employer changes. However, in this paper, job and employer changes are used interchangeably.

[3] Hwang, Mortensen, and Reed (1998) have amenities in a search model but focus on how hedonic wage models can be biased if search is introduced.

precisely the opposite strategy. The key variable that determines the choice of jobs over the lifetime is the worker's rate of time preference. Workers who have a relatively high rate of time preference will move to higher paying jobs over their lifetimes, while those who have a relatively low rate of time preference will move to lower paying jobs.

The movement of workers from high to lower paying jobs has proved somewhat troublesome for standard search models of the labor market. For example, while job changes in search models can be achieved through the arrival of new information or exogenous job destruction, to get individuals to move to *lower* paying jobs workers must go through a spell of unemployment and revise down their reservation wage, leading to acceptance of a lower paying job. However, the data show that most workers who change employers do so with no intervening unemployment spell (Matilla (1974); Akerlof, Rose, and Yellen (1988)).

Another reason workers may move to a job with a lower level of wages is that the rate of growth of wages is higher with the new employer. Examination of the PSID shows little difference between wage growth before and after the employer change.

Section 2 describes the data for workers who change employers in the PSID. Section 3 presents the model. Section 3.4 provides some intuition and extensions. Section 4 concludes.

2 Employer Changers in the PSID

Between 1984 and 1992 the Panel Study of Income Dynamics (PSID) asked individuals about their current and previous employer. For those workers who changed employers, a number of questions were asked: Their reasons for leaving the last employer; their wage with the last and current employer; when they left their last employer and when they began their current employment. The

actual question for 1989 in the PSID and choice of response was:[4]

Question: What happened with that employer—did the company go out of business, were you (HEAD) laid off, did you quit, or what?

Responses:

1. Company folded/changed hands/moved out of town; employer died/went out of business 1989
2. Strike; lockout
3. Laid off; fired
4. Quit; resigned; retired; pregnant; needed more money; just wanted a change in jobs; was self- employed before
5. Other; transfer; any mention of armed services
6. Job was completed; seasonal work; was a temporary job
7. NA; DK
8. Inap.: not working for money now; no other main-job employer during 1988; still working for other employer

After responding that an employer change took place, some follow-up questions were asked. In particular the worker was asked: How much their wage was when the job ended with their previous employer, how much they earned when they started with their new employer. In addition, the date of the ending of the last job and beginning of the current job was also asked. Reported wages were converted to real wages using the monthly CPI since the dates of job endings and beginnings are given as a month within the year.

For the nine years of data (1984-1992) containing the above question, there are 42,765 observations where the respondent had positive income, was either head of the household or spouse of the head, and between the ages 18 and 70. The numbers in Table 1 and Table 2 are averages

[4]The question and responses are slightly different for some years.

using all employer changes throughout all of the years. That is, each job change is considered one observation and no account is taken of the fact that some individuals in the data change employers several times while others may change only once.

From that population there were 3,599 people who changed employers for any reason. Table 1 shows summary statistics for all employer changers in the PSID from 1984-1992.

Table 1: All Job Changers

	To Lower Wage		To Same Wage		To Higher Wage	
	mean	std.	mean	std.	mean	std.
% of Job Changers	0.421	0.494	0.084	0.277	0.495	0.500
Age	33.6	9.62	34.5	10.2	32.6	9.06
Months Between Jobs	1.49	2.03	0.003	.057	0.906	1.51
N	3,599					

However, as mentioned above, this paper is concerned with those workers who answered with response #4. Table 2 provides summary statistics for those who changed employers voluntarily. There were 2,313 observations of employer changes between 1984 and 1992.

Though the majority of voluntary job changers, 53%, move to higher paying jobs, a very large proportion of voluntary job changers, 42.5%, move to jobs that pay lower wages. There is very little difference in age between those moving to higher or lower paying jobs, around 32-33 years of age. The median percentage change in real wages for those moving to lower paying jobs is -17.8%, while the median for those moving to higher paying jobs is nearly 20%, as can be seen in table 3.

Another reason to change jobs would be to move to a job that has the potential for higher wage growth than the current job. Although it is possible to track wage growth before and after the

Table 2: Voluntary Job Changers

	To Lower Wage		To Same Wage		To Higher Wage	
	mean	std.	mean	std.	mean	std.
% of Job Changers	0.424	0.494	0.048	0.214	0.528	0.499
Age	32.7	9.13	33.4	10.8	32.0	8.58
Months Between Jobs	1.32	1.88	0.009	.095	0.920	1.50
N	2,313					

Table 3: Wage Changes (%) for Voluntary Job Changers

	Quantiles				
	10%	25%	50%	75%	90%
moved to:					
lower wages	-2.03	-7.46	-17.8	-40.5	-72.5
higher wages	4.08	9.43	19.8	41.4	73.6

switch, the PSID only asked these job change questions between 1984 and 1992, so that there are not many years before or after the job change. In any event, it is possible to look at those who changed jobs exactly in the middle year of the data, 1988, and examine their wage growth four years before and four years after the job change. The results show very little difference between wage growth before and after the employer change. However, with so few years of data before and after the employer change, this result should be viewed with caution.

3 The Model

The model allows for job choice over the life cycle. Workers are born at date 0 and live for one period of continuous time. Job choice, is limited to a discrete number of wage/working condition packages. Within a job, working conditions or "job amenity" is fixed. A worker can only alter the job amenity by changing jobs.

For simplicity it is assumed that there are only two jobs. Each job $i \in 1, 2$ is characterized by a constant returns to scale production function and a fixed level of the amenity, A_i. At each instant in time workers inelastically supply one unit of labor to the production function in the specific job they have chosen. The constant returns to scale production function has labor as its only input. Let w_i, $i \in 1, 2$ represent the average and marginal product of labor for job i. The labor market is competitive, implying that agents who work in job i receive w_i for each unit of labor supplied.

Agent's preferences are defined over a private consumption good, c, and the job amenity, A_i. Agents discount the future at rate δ and can borrow and lend at interest rate r. The momentary utility function for an agent choosing job i is given by:

$$u(c, A_i) = \ln(c) + A_i. \tag{1}$$

Given our specification of preferences, A_i represents the momentary benefit associated with the amenity for job i. A_i can be positive, negative, or even zero.

The model is parameterized so that

$$u(w_1, A_1) = u(w_2, A_2). \tag{2}$$

This assumption is made for convenience. As long as the difference, $u(w_1, A_1) - u(w_2, A_2)$, is not "too big", all of the results in this paper remain valid.[5] In order to motivate the incentive to change jobs, the economy is parameterized so that $w_1 > w_2$ and $A_1 < A_2$. One interpretation is that jobs where working conditions are not as pleasant pay a higher wage.

At each date t the worker decides where to work. The function $\alpha(t)$ will be used to indicate the worker's job choice at date t. In particular, if $\alpha(t) = 1$, then the worker chooses job 1 at date t; if $\alpha(t) = 0$, then the worker chooses job 2 at date t. The worker's total savings (or stock of wealth) at date t is denoted by $a(t)$. The instanteous change in the worker's wealth at date t is given the sum of (i) interest income on existing wealth, $ra(t)$, and (ii) the difference between the date t wage, w_i, $i \in \{1, 2\}$, and consumption at date t, $c(t)$.

The worker will choose a consumption stream, $\{c(t)\}$, and where to work, $\{\alpha(t)\}$, in a manner that solves:

$$\max_{\{c(t),\, \alpha(t)\}} \int_0^1 e^{-\delta t}(\ln(c(t)) + \alpha(t)A_1 + (1 - \alpha(t))A_2)dt, \tag{3}$$

subject to

$$\dot{a}(t) = a(t)r + \alpha(t)w_1 + (1 - \alpha(t))w_2 - c(t). \tag{4}$$

and

$$a(0) = a(1) = 0 \tag{5}$$

[5] If the difference in momentary utility is substantial, workers would never choose the low utility job. Equating the momentary utilities greatly simplifies the mathematics.

The objective function (3) is the worker's lifetime utility. Equation (4) describes how the worker's wealth changes over time. The equations contained in (5) simply say that the worker begins life with no wealth and (optimally) ends his life with no wealth.

The (current value) Hamiltonian, $\mathcal{H}$, associated with the maximization problem $\{(3),(4),(5)\}$ can be represented as

$$\mathcal{H} = \ln(c(t)) + \alpha(t)A_1 + (1-\alpha(t))A_2 + \lambda(t)(a(t)r + \alpha(t)w_1 + (1-\alpha(t))w_2 - c(t)).$$

The solution is given by,

$$\frac{1}{c(t)} - \lambda(t) = 0, \tag{6}$$

$$\begin{aligned} &A_1 - A_2 - \lambda(t)(w_1 - w_2) > 0 \quad \text{implies} \quad \alpha(t) = 1 \\ &A_1 - A_2 - \lambda(t)(w_1 - w_2) < 0 \quad \text{implies} \quad \alpha(t) = 0 \\ &A_1 - A_2 - \lambda(t)(w_1 - w_2) = 0 \quad \text{implies} \quad \alpha(t) = 1 \text{ or } \alpha(t) = 0 \end{aligned} \tag{7}$$

and

$$\frac{\dot{\lambda}(t)}{\lambda(t)} = -r + \delta. \tag{8}$$

Differentiating (6) with respect to t and dividing the outcome by $\lambda(t)$, gives

$$\frac{\dot{\lambda}(t)}{\lambda(t)} = -\frac{\dot{c}(t)}{c(t)}. \tag{9}$$

Equating the right hand sides of (8) and (9) results in

$$\frac{\dot{c}(t)}{c(t)} = r - \delta. \tag{10}$$

The shape of the consumption profile is given by the sign of $r - \delta$; if $r - \delta > 0$, then consumption is strictly increasing over the worker's life; if $r - \delta < 0$, then consumption is strictly decreasing over the worker's life; and if $r - \delta = 0$, then consumption is constant.

The worker's job choice is determined by (7). Since $\lambda_t = 1/c(t)$, the worker's job choice can

be simplied to

$$\begin{aligned} c(t) < \tfrac{w_1-w_2}{A_2-A_1} \quad &\text{implies} \quad \alpha(t) = 1 \\ c(t) > \tfrac{w_1-w_2}{A_2-A_1} \quad &\text{implies} \quad \alpha(t) = 0 \\ c(t) = \tfrac{w_1-w_2}{A_2-A_1} \quad &\text{implies} \quad \alpha(t) = 0 \text{ or } \alpha(t) = 1 \end{aligned} \tag{11}$$

In other words, if at date t the worker's level of consumtion is less than $\frac{w_1-w_2}{A_2-A_1}$, then at date t it is optimal for the worker to be at job 1; if at date t the worker's level of consumtion is greater than $\frac{w_1-w_2}{A_2-A_1}$, then at date t it is optimal for the worker to be at job 2.

The worker will *always* change jobs (at least once) over his lifetime. To see this suppose that the worker spends his entire lifetime in job 1. Then, (10), (4), and (5) imply that at some date $t \in [0,1]$ the worker's level of consumption must equal w_1. If the worker spends his entire lifetime in job 1, then (11) implies that

$$w_1 < \frac{w_1 - w_2}{A_2 - A_1}.$$

Recognizing that $\ln(w_1) + A_1 = \ln(w_2) + A_2$, the above equation can be expressed as

$$\ln(w_1) - \ln(w_2) < \frac{w_1 - w_2}{w_1},$$

and can be rearranged to read

$$\ln(w_2) > \ln(w_1) + \frac{w_2 - w_1}{w_1}. \tag{12}$$

The right hand side of (12) is simply a linear approximation of $\ln(w_2)$ taken at w_1. But since $\ln(\cdot)$ is a strictly concave function, the right hand side of (12) must be strictly greater than the left hand side, a contradiction. Hence, it must be the case that $w_1 > \frac{w_1-w_2}{A_2-A_1}$, which, by (11), implies that the worker will not stay at job 1 for his entire lifetime.

Similarly, if we suppose that the worker spends his entire lifetime in job 2, then at some date $t \in [0,1]$ his consumption will equal w_2. Hence,(11) implies that

$$w_2 > \frac{w_1 - w_2}{A_2 - A_1}.$$

This inequality can be expressed as

$$\ln(w_1) > \ln(w_2) + \frac{w_1 - w_2}{w_2}. \tag{13}$$

For exactly the same kind of reasoning as above—i.e., the right hand side of (13) is a linear approximation of $\ln(w_1)$ taken at w_2—inequality (13) can not possibly hold. Hence, $w_2 < \frac{w_1 - w_2}{A_2 - A_1}$, which, by (11), contradicts the assertion that the worker will spend his entire lifetime in job 2.

We now describe the worker's sequence of job choices over his lifetime for various values of $r - \delta$.

3.1 $r > \delta$

When $r > \delta$, it is not possible for the worker to ever move *from* job 2 *to* job 1. If the worker did follow such a sequence, then consumption would necessarily have to fall after the job change, see (11). But when $r > \delta$, the worker's optimal consumption stream, implicitly given by (10), is strictly increasing over his lifetime. Hence, the only possible equilibrium job choice strategy for the worker is to spend the first part of life at job 1 and the second part in job 2. Here, workers are moving from a higher wage job to a lower wage job. This sequence of job choices is consistent with a strictly increasing lifetime consumption profile, i.e., consistent with (11). Note that the worker will change jobs only once; if the worker changed jobs more than once then the level of consumption associated with the second job change, given by (11), would be inconsistent with a strictly increasing lifetime consumption profile.

3.2 $r < \delta$

When $r < \delta$, (10) implies that the worker's lifetime consumption profile is strictly decreasing over his lifetime. Hence, it is not possible for the worker to change from job 1 to job 2 since, for this sequencing of job choices, (11) would not be consistent with a strictly decreasing consumption profile. The equilibrium job choice strategy for the worker is to spend the first part of life at job 2 and the second part of his life in job 1; these workers move from lower to higher paying jobs. This sequence of job choice is consistent with a strictly decreasing lifetime consumption profile, i.e., consistent with (11). The worker will change jobs only once.

3.3 $\delta = r$

When the discount rate equals the interest rate, (10) implies that the worker's lifetime consumption stream will be constant. Since the worker changes jobs at least once and his lifetime consumption is constant, it must be the case that $c(t) = \frac{w_1 - w_2}{A_2 - A_1}$.

The worker's initial job choice and the number of times he changes jobs will now be determined. The following notation is useful. Define $D \equiv \int_0^1 e^{-rt} dt$ and $d_{t_i}^{t_{i+1}} \equiv \int_{t_i}^{t_{i+1}} e^{-rt} dt$. One can interpret both D and $d_{t_i}^{t_{i+1}}$ in terms of "discounted time." That is, D represents the discounted value of one unit of time starting at $t = 0$; $d_{t_i}^{t_{i+1}}$ represents the discounted value of $t_{i+1} - t_i$ units of time t_i units of time from now. The present value of lifetime consumption when $c(t) = \frac{w_1 - w_2}{A_2 - A_1}$ for all $t \in [0, 1]$ is simply $\frac{w_1 - w_2}{A_2 - A_1} D$. If the worker's initial job choice is, say, job 1, and he changes job n times, where his last job is, say, job 2, then his lifetime income is

$$w_1 d_0^{t_1} + w_2 d_{t_1}^{t_2} + w_1 d_{t_2}^{t_3} + \cdots + w_2 d_{t_n}^{1}, \tag{14}$$

where $t_0 \equiv 0$ and $t_{n+1} \equiv 1$. Note that $\sum_{i=0}^{n+1} d_{t_i}^{t_{i+1}} = D$ and that for a given r, D is just a number.

The present value of lifetime income must equal the present value of lifetime consumption, i.e.,

$$w_1(d_0^{t_1} + \cdots + d_{t_{n-1}}^{t_n}) + w_2(d_{t_1}^{t_2} + \cdots + d_{t_n}^{1}) = \frac{w_1 - w_2}{A_2 - A_1} D. \tag{15}$$

The worker spends $D_1 = d_0^{t_1} + \cdots + d_{t_{n-1}}^{t_n}$ units of discounted time at job 1 and $D_2 = d_{t_1}^{t_2} + \cdots + d_{t_n}^{1}$ units of discounted time at job 2. But, since $D_1 = D - D_2$, equation (15) is simply an equation in one unknown, D_1. Call the solution D_1^*, i.e., $w_1 D_1^* + w_2(1 - D_1^*) = \frac{w_1 - w_2}{A_2 - A_1} D$.

Above, it has been assumed that the worker's initial job choice is job 1, he changes jobs n times and his last job is job 2. But there is nothing special about this sequencing of job choices. All that is required is that the worker spend D_1^* units of discounted time in job 1 and $D_2^* = D - D_1^*$ units of discounted time in job 2. It does not matter where the worker's initial job is, how many times he changes jobs or what his last job is; all that is required is that he spend the fraction D_1^*/D of discounted time in job 1 and the remainder in job 2.

In summary, the sign of $r - \delta$ determines whether the worker moves from a high paying job to a low paying one or from the low paying job to a higher paying one. When $r > \delta$, the worker changes jobs once and moves from the high to low paying job. When $r < \delta$, the worker also changes jobs once but moves from the low to high paying job. When $r = \delta$ the worker will change jobs at least once and he is indifferent between job 1 and job 2 as his first job.

3.4 Discussion

3.4.1 Initial Job Choice

The intuition behind the choice of an initial job is easiest to see by fixing the amount of time spent in the first job. Job 1, the higher wage job, provides higher lifetime income than job 2; and, the higher the interest rate, r, the greater will be the difference in lifetime incomes. So, as the interest

rate increases job 1 looks more and more attractive as a starting job. Conversely, job 2, as an intitial job choice, provides a higher lifetime amenity stream so that as the discount rate, δ, rises, job 2 looks more attractive as a starting job.

When $r > \delta$ the "interest rate" effect associated with taking job 1 first dominates the "discount rate" effect of taking job 1 first. So, lifetime utility is higher when job 1 is chosen first. When $r < \delta$ the "discount rate" effect dominates the "interest rate" effect, leading to higher lifetime utility by choosing job 2 first. When $r = \delta$, the "interest rate effect" associated with taking job 1 first exactly offsets the "discount rate effect" associated with taking job 2 first, implying that the worker is indifferent between choosing job 1 and job 2 at date $t = 0$.

3.4.2 Job Change

In order to gain some intuition as to *why* individuals change jobs, assume that a worker lives for only an instant of time. As a first approximation, this allows us to ignore discounting.[6] Imagine that in this instant unit of time the worker spends a fraction q in job 1 and $(1-q)$ in job 2. Over this instant of time financial markets permit the worker to smooth his consumption of the market good, c, i.e., the worker can consume approximately $\bar{w} = qw_1 + (1-q)w_2$. But, of course, the worker is unable to smooth the consumption of the amenity since the amenity is job specific. Hence, if the worker smooths his consumption of the market good, his utility over the instant of time is (approximately) equal to $qu(\bar{w}, A_1) + (1-q)u(\bar{w}, A_2)$. If the worker spends the entire instant of time in either job 1 or job 2, i.e., the worker does not change jobs, then his utility is equal to

[6]Discounting is important in terms of explaining *which* job the worker will initially take but is not that important in terms of explaining *why* workers change jobs. For example, when $r = \delta = 0$, although the worker is indifferent between which job to take at date $t = 0$, he is not indifferent between changing and not changing jobs; he strictly prefers to change jobs.

$u(w_1, A_1) = u(w_1, A_2)$. The worker will prefer changing jobs, compared to staying in the same job, if

$$\ln(\bar{w}) + \bar{A} > \ln(w_1) + A_1 = \ln(w_2) + A_2 = q\ln(w_1) + (1-q)\ln(w_2) + \bar{A}), \qquad (16)$$

where $\bar{A} = qA_1 + (1-q)A_2$. Since $\ln(\bar{w}) > q\ln(w_1) + (1-q)\ln(w_2)$, inequality (16) holds. Hence, workers want to change jobs because they effectively get to consume "the average" of bundles (w_1, A_1) and (w_2, A_2) and the only way that they can consume an average of the bundles is by changing jobs. [7]

3.5 Extensions

3.5.1 Worker Heterogeneity

In the data, some individuals move from lower to higher paying jobs and other individuals move from higher to lower paying jobs. The model can be made consistent with both of these observed facts if workers are heterogeneous. For example, one simple form of heterogeneity is that different workers have different discount rates. Let δ_i be the discount rate for worker i. One can imagine that there is a population of workers and a distribution of discount rates over this population. All workers i that have discount rates greater than the interest rate, i.e., $\delta_i > r$, will spend the first part of the life at the low paying job and the second part at the high paying job; all workers i characterized by $\delta_i < r$ will spend the first part of the life at the high paying job and the second part at the low paying job. Hence, heterogeneity along the worker discount rate dimension can generate flows of workers moving from low to high paying jobs and at the same time flows of

[7] Our specification of preferences are not the only ones that imply that the worker will want to change jobs. Preferences that are additively separable or CES will also imply that workers will want to change jobs. However, if the consumption good and the job amenity are perfect substitutes, i.e., $u(c, A) = v(c + A)$, where $v'' < 0$, the worker will not change jobs.

workers moving from high to low paying jobs.

It might be interesting to know which workers starting at, say job 1 (workers with relativey low discount rates), will be the first to change jobs; the higher discount rate workers or the lower? It turns out that it is not possible to get an analytical solution to this answer, however, numerical solutions are possible. To begin the numerical solutions it is necessary to assign values to the parameters w_1, w_2, A_1, r and δ. Note that A_2 can not be chosen independently of w_1, w_2 and A_1, and is detemined by (2).[8] The values chosen for the numerical solutions presented below are $w_1 = 10$, $w_2 = 7$, $A_1 = 5$, and then from (2), $A_2 = 5.36$. The interest rate, r is set equal to 0.05 and δ varies between 0.001 and 0.1. Qualitatively speaking, the numerical results for other parameter values are the same as those presented below as long as the difference in wages is not "too small" and δ is economically reasonable, i.e., values of δ corresponding to discount factors that are greater than 0.9. Roughly speaking this implies that $\delta \leq 0.1$.

Define q_{ij} as the fraction of time spent in the initial job where the initial job is i. For the parameters chosen, it turns out that, independent of the location of the starting job, workers with a higher discount rate will change jobs first, see Figures 1 and 2. In fact, for economically revelant values of δ and, as long as the difference between the wages is not "too small", numerical simulations indicate that the time spent in the first job is a strictly decreasing monotonic function of δ. For values of δ that are not economically relevant, i.e., $\delta > .1$, then q_{21} may display a non-monotonicity. Specifically, as δ increases, it is possible that in some region q_{21} may increase. However, after this increase, q_{21} is again a monotonically decreasing function of (higher) δ's. When the difference between the wages is "not big" q_{12} may display a similiar non-monotonicity over a range of δ's.

[8] Or more to the point, only three of the four job parameters can be chosen independently, the fourth being determined by (2)

3.5.2 Many Jobs

Except for the knife-edge case where $r = \delta$, workers will change jobs exactly once in their lifetimes. In reality, however, some workers may "never" change jobs or other workers may change jobs more than once over their lifetimes.

The model can be generalized along two dimensions. Suppose first that the instantaneous utilities associated with each job need not be equal. [9] Second, suppose that instead of facing two possible job choices each worker is randomly given $n > 2$ jobs to choose from over his lifetime. Without loss of generality, let job 1 be the "best" job and job n be the "worst" job in the following sense,

$$u(w_1, A_1) \geq u(w_2, A_2) \geq \cdots \geq u(w_n, A_n). \tag{17}$$

If it turns out that the instantaneous utility of job 1 is substantially higher than job 2, then the worker chooses job 1 at date $t = 0$ and will never change jobs. The case considered in the body of the paper can be interpreted by having the instantaneous utilities of job 1 and job 2 not being significantly different from one another, but the instantaneous utility of job 2 substantially larger than job 3. In this situation, the worker will change jobs once: which job the worker chooses first will depend upon the sign of $r - \delta_i$. In general, if the instantaneous utilities associated with the first k jobs are not significantly different from one another, but there is a significant difference between the k^{th} and $k + 1^{st}$ job, then the worker will change jobs k times. So by increasing the number of jobs available to workers and by relaxing the assumption that instantaneous utility of all jobs are equal, it is possible for the model to be consistent with observed outcomes in the data.

[9] Recall that $u(w_1, A_1) = u(w_2, A_2)$ has been assumed for analytical reasons. By continuity, all of our results will go through if $u(w_1, A_1) \neq u(w_2, A_2)$ but are "close" in value to one another. Clearly, if the instantaneous utility associated with one job is significantly higher than another then the worker will choose the "high" utility job and will not change jobs.

4 Conclusions

Individuals may rationally choose to move from high paying jobs to lower paying ones as part of an optimal lifetime plan. A key insight to this observation is that a job is more than just a wage; workers also care about non-wage dimensions of a job. In the data, the majority of workers who voluntarily change jobs, move to higher wages. Our model would identify these individual as having “relatively high” discount rates. The data also document that a large proportion of voluntary job changers move to lower paying jobs. Our model would identify these workers as patient, “relatively low” discount rate individuals.

Figure 1: Moving Time: Job 1 to Job 2

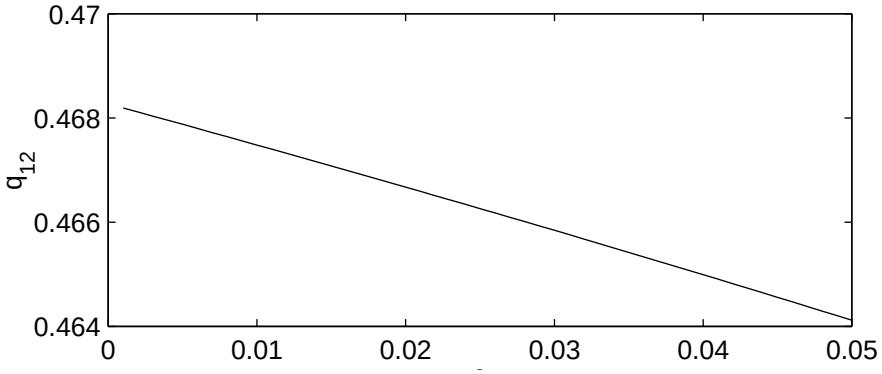
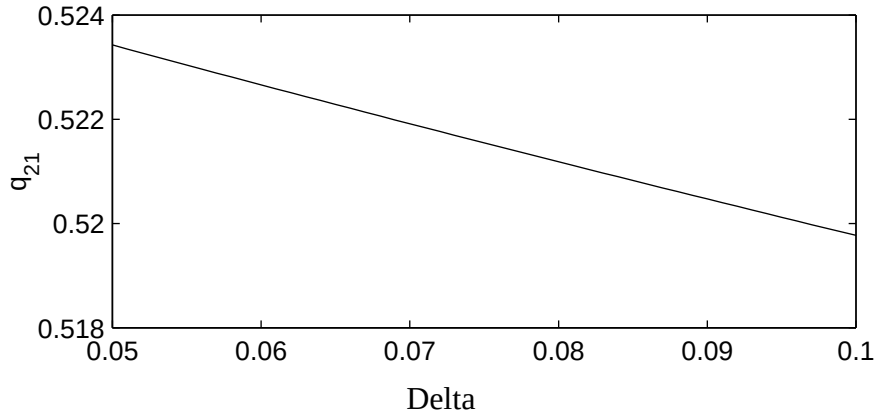


Figure 2: Moving Time: Job 2 to Job 1



References

AKERLOF, G. A., A. K. ROSE, AND J. L. YELLEN, "Job Switching and Job Satisfaction in the U.S. Labor Market," *Brookings Papers on Economic Activity* 495–594.

HWANG, H.-S., D. T. MORTENSEN, AND W. R. REED, "Hedonic Wages and Labor Market Search," *Journal of Labor Economics* 16 (1998), 815–847.

MATILLA, P. J., "Job Quitting and Frictional Unemployment," *American Economic Review* 64 (1974), 235–40.

Federal Reserve Bank
of Cleveland
Research Department
P.O. Box 6387
Cleveland, OH 44101

Address Correction Requested:
Please send corrected mailing label to the
Federal Reserve Bank of Cleveland,
Research Department,
P.O. Box 6387,
Cleveland, OH 44101

PRST STD
U.S. Postage Paid
Cleveland, OH
Permit No. 385