ECONOMIC RESEARCH REPORTS

Occupational and Industry Mobility in the United States, 1969-1992

By

Eric Parrado
&
Edward Wolff

RR# 99-20 **November 1999**

C.V. STARR CENTER FOR APPLIED ECONOMICS

NEW YORK UNIVERSITY
FACULTY OF ARTS AND SCIENCE
DEPARTMENT OF ECONOMICS
WASHINGTON SQUARE
NEW YORK, NY 10003-6687

OCCUPATIONAL AND INDUSTRY MOBILITY IN THE UNITED STATES, 1969-1992*

Eric Parrado
New York University

Edward Wolff
New York University

November 1999

Abstract

Using the Panel Study of Income Dynamics, we investigate occupational and industrial mobility of individuals over the 1969-1980 and 1981-1992 periods in the U.S. We find that workers changed both occupation and industry more frequently in the later period. Workers, on average, shifted occupation 1.8 times in the earlier period and 2.1 times in the later, and shifted industry 0.8 and 1.2 times, respectively. We also find that occupational and industry changes are associated with lower earnings, though this effect has lessened over time (from a 13 percent earnings reduction per occupational change for men in 1972-74 to a 9 percent loss in 1990-92). Our results also indicate that older workers are less likely to shift occupation or industry, as are better paid men but not better paid women.

JEL classification: J24, J31, J62.
Keywords: Occupation, Industry, Mobility, and Earnings.

* We would like to gratefully acknowledge the financial support of the C.V. Starr Center for Applied Economics at NYU and the Russell Sage Foundation. Correspondence to: Department of Economics, New York University, 269 Mercer Street, 7th floor, New York, NY 10003. Emails: ecp200@is4.nyu.edu, ew1@is.nyu.edu.

1. Introduction

The U.S. economy has witnessed substantial structural change over the last three decades. First, employment has shifted from goods-producing industries to services. Second, since the 1970s, there has occurred a rapid increase in the introduction of new information-based technologies. Third, this has been accompanied by substantial adjustments in operations and organizational re-structuring of firms. Fourth, concomitant with these changes has occurred increasing competition from imports and greater orientation toward exports.

One indicator of the degree of structural change is the shift in the (gross) composition of employment both among industries and among occupations. Using the 1970, 1980, and 1990 U.S. Census of Population Public use Samples, we calculated total employment in each of those years by 267 occupations and 64 industries (see Wolff, 1996, for details on the classification schemes). Using the Duncan and Duncan index (the absolute values of the change in the percentage of employment in each category summed across all occupations or all industries), we found evidence of rising turbulence in the labor market in the 1980s relative to the 1970s. The Duncan and Duncan index increased from 20.1 for the 1970s to 26.3 for the 1980s on the basis of employment by occupation and from 10.6 to 12.4 on the basis of employment by industry.

Another popular argument is that with the shift to services, corporate restructuring, downsizing, and outsourcing, job shifts have resulted in lower wages for displaced workers. The anecdotal example is that high wage manufacturing workers have become "hamburger flippers" in fast-food establishments.

In this paper, we investigate whether the increased change in employment composition that characterized the 1980s relative to the 1970s was also accompanied by greater mobility in terms of both occupation and industry of employment on the micro level. Moreover, we are also interested in whether job changes are associated with earnings losses and whether this has become more likely over time. To study these issues, we use data drawn from the Panel Study of Income Dynamics.

Previous research has focused primarily on mobility between jobs (employers) and the relationship between job seniority and earnings and worker-firm matching. Only a

few studies have investigated occupational and industrial mobility. Furthermore, this literature has focused mainly on occupational choice and occupational attainment. Models of occupational choice have concentrated on new entrants to the labor markets in which education and family antecedents play a key role, such as Robertson and Symons (1990), Orazem and Mattila (1986), Shaw (1986), Miller (1984), and Rosen (1972). These studies argue that the intensity of human capital investment in occupational skills varies across occupations and individuals, and their results generally show that individuals do appear to change occupations to maximize the present value of their investment.

However, there are some recent exceptions that consider the determinants of occupational and industrial changes. Sicherman and Galor (1990) analyze theoretically and empirically occupational mobility in the U.S. by focusing on individual careers. They conclude that education helps increase the probability of occupational upgrading. Harper (1995) focuses on occupational quits in Britain as opposed to occupational upgrading. He finds, as we do, that young and more educated individuals are more likely to change occupations.

Our main focus here is to explore differences in occupational and industrial changes both over time and by gender.[1] We consider the traditional wage-tenure relationship as well as the relationship between earnings and changes in occupation and industry.

For this purpose, we estimate the probability that workers change occupation (or industry) and we also estimate a standard earnings equation. The first round of estimation includes a dummy variable that reflects whether a worker remains in the same occupation (or industry) for 3 or more years, while the second round includes a variable measuring the actual number of changes in a four-year period.

Theoretical and empirical studies of wage determination growing out of job-matching models have established that job changes slow down over time with job tenure.[2] These models deduce a positive correlation between wages and job tenure even if wages

[1] In the study we select a sample of men (heads of households in the PSID) and women (heads of households and wives in the PSID) with continuous work histories.

[2] See Jovanovic (1979) for a formal model of job matching and Light and McGarry (1998), Garen (1989), Abraham and Farber (1987), and Altonji and Shakotko (1987) for empirical tests of the job-matching model.

do not grow as seniority increases. This is explained if match quality is job specific; in other words, individuals are less likely to quit and less likely to be laid off or fired as job seniority increases. Thus, job tenure and wages are positively associated with one another even with no increase in wage offers. Specifically, the disturbance term in the basic wage equation is positively correlated with job tenure. As Abraham and Farber (1987) point out, this could be explained by the correlation of tenure with an omitted variable representing the quality of the worker- job or worker-employer match.

Likewise, human capital models (for example, Becker (1962)) predict a negative relation between job mobility and tenure. In this regard, Borjas (1981) and Mincer and Jovanovic (1981) analyze of the relationships among job tenure, wages, and inter-firm labor mobility that depend on investment in job specific human capital. They find a strong association between job tenure and wages, a result they attribute to the firm-specific component of wages rising over time within the firm.

Like Borjas (1981) and Mincer and Jovanovic (1981), we find a strong positive relation between tenure and wages, and tenure is associated with a higher probability of staying in the same occupation (industry). We also find:

i) Greater variability in labor markets between the 1970s and 1980s. Workers changed both occupation and industry of employment more frequently in the latter period compared to the earlier one.

ii) Men tended to change occupation and/or industry more frequently than women did.

iii) Male workers who earn more are less likely to change occupation or industry. On the other hand, women who earn more have a higher tendency to change occupations and industry over time.

iv) Changers enjoyed higher earnings growth than stayers in all periods.

v) Younger and more educated workers change occupations and industry more frequently and this tendency has risen over time.

vi) On average, workers who change occupation and industry do so twice per decade.

The paper is organized as follows. Section 2 contains a description of our data and the methodology. Section 3 presents descriptive statistics. Section 4 presents the model

specification and discusses estimation issues. The final section summarizes the results and their implications for models of occupational and industrial changes.

2. Data Source and Methodology

The data for this study have been drawn from the Panel Study of Income Dynamics (PSID), which has also been used in a wide range of tenure related studies. The Panel contains data for 25 years, from 1968 to 1992, the last year of data available at the time this study was started.

This paper examines and compares occupational and industrial changes in the U.S. over two decades. We make two divisions of the panel. In the first, we divide the panel into two periods, 1969 to 1980 and 1981 to 1992. In the second, we divide the panel into four three-year periods, 1972-74, 1978-80, 1984-86, and 1990-92.

The samples are restricted to individuals who meet the following criteria: (1) heads of households or wives over 25 years of age at the beginning of each period; (2) those who were employed or on temporary layoff at the time of the interview; and (3) those who worked at least 1,000 or more hours per year and reported being employed in an assigned occupation and industry. People who were self-employed in any year of the survey are excluded to focus the analysis on wage and salary workers. We also discard from the sample workers employed in the government. Based on these criteria the original sample was reduced to 508 individuals for the 1969-80 sample, and 635 individuals for the 1981-1992 sample. For the 1972-74, 1978-80, 1984-86, and 1990-92 sub-samples, the sample sizes are 1,761, 2,057, 2,143, and 2,409 individuals, respectively.

Variables collected for all samples include occupation of employment, industry of employment, real wages (hourly labor income per year), experience, tenure, marital status, years of schooling, race and age. Wages in each year were deflated by the Consumer Price Index (using 1990 as the base year).

The focus of the analysis is on whether the respondent changed occupation and/or industry within the sample periods. Specifically we want to analyze the number of changes of occupation and industry, using aggregate occupation and industry categories.

In order to do that, we define occupational and industrial changes as the worker's shift from one aggregate occupation and/or industry to another, without unemployment interruptions. Therefore we exclude exits from and entries into the labor force. Similarly to Sicherman and Galor (1990), we assume that occupational change will be observed if there is a dramatic shift in the tasks performed by the worker.

An individual can change occupation and/or industry for many reasons, either for pecuniary and non-pecuniary causes. Elements of an economic decision include the accumulation of new skills that brings future benefits, promotion or higher wages. Non-economic causes involve job satisfaction, responsibility, or greater status. There are also cases of involuntary job termination, such as being fired or laid off.

The following occupational categories are used in the study:[3]

1. Professional, Technical, and Kindred Workers
2. Managers and Administrators, Except Farm
3. Clerical, Sales Workers and Kindred Workers
4. Craftsmen, Foremen and Kindred Workers
5. Operatives, and Kindred Workers
6. Laborers and Service Workers, Farm Labor
7. Farmers and Farm Managers
8. Miscellaneous (armed services, protective services, etc.)

Industry categories are as follows:[4]

1. Agriculture, Forestry, and Fisheries
2. Mining
3. Construction
4. Manufacturing
5. Transportation, Communications, and other
6. Wholesale and Retail Trade
7. Finance, Insurance, and Real Estate
8. Business and Repair Services
9. Personal Services
10. Entertainment and Recreation Services
11. Professional and Related Services
12. Public Administration

[3] In the 1981-92 PSID data the occupational variable is recorded at a 3-digit level, while for the 1969-75 and 1976-80 periods, it is recorded at the 1-digit and 2-digit level, respectively.
[4] The industry variable is first recorded in the PSID in 1971. From 1971 to 1980 this series appears at a 2-digit level, while from 1980 to 1992 it is at the 3-digit level.

A couple of caveats are in order. First, our research will focus on the total number of changes and we will not take into account differences between voluntary and non-voluntary changes, because the PSID data do not contain a specific question or a related question in which we can define this information. Second, we consider changes in occupation and industry without any consideration of changes in employment among firms or within firm.

3. Descriptive Statistics

3.1. *Occupational Change:*

Table 1 shows the distribution of the number of changes of occupation in the two periods, 1969-80 and 1981-92. The mean numbers of occupational changes increased between the two periods, from1.8 to 2.1. It rose for both men and women. The mode is 2 for both men and women and for each time period.[5] The distribution tails off very quickly, with very few workers experiencing more than three occupational changes over either of the 11-year periods. [6]

Table 1. Distribution of Occupational Changes

	Period	0	1	**2**	3	4	5	6	7	8	9	10	Mean
Men	1969-80	35.6	13.2	**17.9**	14.4	7.5	5.9	3.5	0.9	0.9	0.0	0.0	1.87
	1981-92	34.0	11.6	**17.1**	9.4	9.7	7.7	5.9	2.4	2.0	0.2	0.4	2.24
Women	1969-80	50.0	14.3	**16.7**	3.6	6.0	3.6	4.8	1.2	0.0	0.0	0.0	1.36
	1981-92	42.5	13.4	**13.4**	12.8	6.1	4.5	2.2	3.4	1.1	0.6	0.0	1.77
Total	1969-80	38.0	13.4	**17.7**	12.6	7.3	5.5	3.7	1.0	0.8	0.0	0.0	1.79
	1981-92	36.4	12.1	**16.1**	10.4	8.3	6.8	4.9	2.7	1.7	0.3	0.3	2.11

Table 1 shows slightly greater mobility of workers in the later period than the earlier one.[7] In the 1969-80 period, 38.0% of all workers experienced no change in occupation,[8] while for the1981-92 period the corresponding figure is 36.4%. This trend is

[5] In the three-year time periods, the mode is one, and this category accounts for between 18 and 23 percent of the total number of changes.

[6] Topel and Ward (1992) and Light and McGarry (1998) report similar results for job changes.

[7] These results are consistent with studies by Hall (1992), Ureta (1992), Swinnerton and Wial (1995), and Allen, Clark and McDermed (1993), who argue that jobs in the U.S are turning less stable and that long-term employment relationship are becoming less important.

[8] In the three-year time periods, between 32 and 47 percent of workers changed occupations at least once. Sommers and Eck (1977) report that 39% of adult men changed their 3-digit occupation at least once

clearer for women, in which 50% of women experienced no change in occupation between 1969 and 1980, but only 42% between 1981 and 1992.

If we compare rates of mobility between gender, men are considerable more mobile than women in both periods. In the case of the first period, male workers who never changed occupation account for almost 36% of all male workers, while for women the corresponding figure is 50%. For the 1981-92 period, the figures for men and women who never changed occupation are 34% and 42% respectively. Results are similar on the basis of the three-year periods (see table A in appendix 1).

3.2. *Industry Change:*

We now examine the number of changes by industry. Here the situation is quite different, since there is considerable less mobility among industries than among occupations or jobs. In table 2 we report the distribution of the number of changes in industry in the two periods, 1971-80 and 1981-92. Here, too, the average number of industry changes increased between the two periods, from 0.78 to1.18 among all workers. The mode, as with occupational changes is 2 (except among women in the 1971-80 period). Here, also, the distributions tail off very quickly, with very few workers shifting industries more than three times over the period.[9]

Table 2. Distribution of Industry Changes

	Period	0	1	**2**	3	4	5	6	7	8	9	10	Mean
Men	1971-80	67.9	8.5	**11.3**	5.9	4.0	1.7	0.7	0.0	0.0	0.0	-.-	0.77
	1981-92	57.0	7.2	**14.0**	6.6	7.7	3.1	2.2	1.3	0.7	0.2	0.0	1.31
Women	1971-80	61.9	**16.7**	10.7	3.6	3.6	2.4	1.2	0.0	0.0	0.0	-.-	0.80
	1981-92	68.7	7.8	**11.7**	3.9	3.9	0.6	1.7	0.6	1.1	0.0	0.0	0.84
Total	1971-80	66.9	9.8	**11.2**	5.5	3.9	1.8	0.8	0.0	0.0	0.0	-.-	0.78
	1981-92	60.3	7.4	**13.4**	5.8	6.6	2.4	2.0	1.1	0.8	0.2	0.0	1.18

Industry mobility, like occupational mobility, increased between the 1971-80 and 1981-92 periods, with 33% of all workers during the first and 40% during the second period experiencing one or more changes in industry. If we look at the figures by gender,

between 1965 and 1970. We find in our sample that 45% of adult males changed 1-digit occupation between 1972 and 1974.

[9] In the three-year time periods, the mode number of industry changes is one, and this category accounts for between 13 and 19 percent of the total number of industry changes.

we find that men had greater industry mobility in the 1980s, while the reverse is true for the 1970s.

It is also interesting to note that changes, either between occupations or industries, tend to occur between similar occupations (such as professionals to mangers) or industries (for example, from one service sector to another). Almost 90% of these changes were between related occupations or industries. This observation suggests that general and specific human capital play an important role in determining the pursuit of a new kind of work.

3.3. *Labor Earnings:*

Table 3 presents means and standard deviations of real labor income[10] in the 1969-80 and 1981-92 periods. Results are reported separately for individuals who stayed in the same occupation and/or industry in each period and for those who changed occupation and/or industry at least one time.

Table 3. Percentage change in real labor earnings by changes in occupation and industry

Variable	Situation	Men		Women	
		1969-1980	1981-1992	1969-1980	1981-1992
Occupation	Change (1)	33.7 (64.7)	28.1 (69.1)	39.6 (62.9)	36.8 (63.8)
	No Change	25.5 (57.2)	23.7 (54.6)	22.6 (38.6)	32.7 (48.9)
Industry	Change (1)	33.1 (79.4)	31.5 (72.0)	35.8 (67.7)	39.6 (70.6)
	No Change	29.7 (52.2)	23.0 (58.1)	28.2 (41.1)	33.0 (51.2)

Note: Standard deviations are in parentheses.
(1) At least one change.

Several points are worth noting. First, the growth of hourly earnings has been substantially larger for changers than for stayers. This is true for both men and women and for both periods. These results suggest that pecuniary motives are the main reason behind occupational or industry change. These findings are also in accord with those reported by Wilson and Green (1990), who conclude that there exists a strong positive

[10] Income figures are converted to 1990 dollars using the standard consumer price index (CPI-All).

correlation between occupational mobility and changes in real labor earnings, even after controlling for personal characteristics and firm-specific human capital.

Second, earnings grew faster for men during the 1969-80 period than during the 1981-92 period. This is true for both changers and stayers. On the other hand, for women, earnings increased faster in the second period, except for women who changed occupation.

Third, another significant difference between men and women is the fact that during the 1981-92 period, women registered higher increases in real labor income than men did. This observation is partially consistent with the finding of Becker and Lindsay (1994) that women experience more rapid on the job earnings growth than men do.[11]

Fourth, not only are there striking differences in average hourly between changers and stayers, but also in their volatility. The variance in hourly income has been much greater for changers than for stayers. The question thus arises whether the volatility is merely a reflection of the possible risk of changing occupation and/or industry, or of something else.

Results from the three-year periods are highly consistent with those based on the eleven-year periods. The only major difference is that in the 1990-92 period, earnings grew slightly faster for stayers than for changers and earnings volatility for stayers was somewhat larger (see Table C in appendix 1).

3.4. *Age:*

Are younger people inclined to change occupation and/or industry more frequently than older people do? The results from Table 4 generally confirm this by showing that changers are, on average, younger than stayers (except for women during the 1981-1992 period).[12] This result is consistent with the three-year period samples, in which younger workers, both male and female, tend to change occupation and industry more frequently than older workers (see table D in appendix 1). In terms of volatility we do not observe a clear pattern.

[11] They used ordinary least squares to estimate earnings equations over the period 1981 through 1987.

Table 4. Average age at beginning of period by changes in occupation and industry

Variable	Situation	Men		Women	
		1969-1980	1981-1992	1969-1980	1981-1992
Occupation	Change (1)	37.9 (8.3)	33.8 (7.5)	38.9 (7.6)	35.2 (8.1)
	No Change	38.9 (8.1)	35.1 (7.7)	40.2 (8.0)	36.5 (8.2)
Industry	Change (1)	38.2 (8.4)	33.8 (7.3)	39.7 (6.9)	36.7 (8.2)
	No Change	39.3 (7.6)	35.9 (8.1)	39.7 (8.8)	35.3 (8.2)

Note: Standard deviations are in parentheses.
(1) At least one change.

Results from Tables F through I in Appendix 1 also indicate that young workers have higher mobility rates than middle age and older workers. As shown in Table F, during the 1969-80 period, the number of occupational changes is highest within the 40-44 age group, while in the 1981-92 period it is highest for the 30-34 years old range.

Results for industry change are similar: younger people tend to change industry more frequently than older ones.[13]

One reasonable explanation for this set of results is the existence of more job opportunities for younger people, which diminishes the risk of changing occupation or industry. Another possible reason emanates from the fact that education and job training are received while a person is young. General human capital makes it possible for workers to switch occupation or industry.

3.5. *Education:*

Table 5 reveals some important differences by educational attainment. First, average schooling among workers is higher in the later period than the earlier one, while the variance of years of schooling is lower. Second, male workers have, on average more years of schooling than female workers in the later period among both changers and stayers but this holds only for stayers in the earlier period.

[12] Markey and Parks II (1989), using the January 1987 Current Population Survey (CPS), finds that age is the principal factor in determining occupational mobility. They conclude that high mobility rates of young workers contrast with low rates among middle age and older workers.

Table 5. Average years of education at end of period by changes in occupation and industry

Variable	Situation	Men		Women	
		1969-1980	1981-1992	1969-1980	1981-1992
Occupation	Change (1)	11.0 (3.3)	13.1 (2.8)	11.2 (2.0)	12.1 (1.7)
	No Change	11.3 (3.1)	12.7 (2.6)	11.0 (2.6)	12.5 (1.7)
Industry	Change (1)	10.9 (3.2)	13.0 (2.4)	11.4 (2.1)	12.3 (1.7)
	No Change	11.8 (3.0)	12.6 (3.2)	10.8 (2.6)	12.3 (1.7)

Note: Standard deviations are in parentheses.
(1) At least one change.

Third, there is clear evidence from Table 5 and from Tables J through M in Appendix 1 that more educated workers change occupation and industry more frequently throughout their working life. During the 1969-80 period, mode for both occupational and industry changes is for workers with 9 to 12 years of education, while in the later period the mode falls in the 12 to 15 years of education range. Fourth, in the three-year samples, results are similar, with male changers generally more educated than male stayers and female changers more educated than female stayers in every period (see Table E in Appendix 1).

The explanation for this set of results is similar to that for age differences. In particular, more educated workers change occupation or industry more frequently because their greater human capital (including general training) opens up a greater number of new job opportunities. This relation may be stronger in more recent years, with the advent of Information Technology (IT), because of the more rapid restructuring of jobs that IT has induced.

[13] However, this result should be interpreted cautiously, because workers in the earlier sample have an average age of 38 at the start of the period, while they have an average starting age of 34 in the later sample (see table 6).

4. Model Specification and Estimation Issues

Our estimation proceeds in two stages. The first is concerned with the determinants of occupational and industry change. For this we use a logit regression whose dependent variable is a dummy variable with a value of one if a worker remains in the same occupation (or industry) for 3 or more years. The second stage examines the effects of occupational (or industry) change on earnings growth. For this we use a standard earnings function together with a variable (or variables) reflecting whether the worker changed occupation (or industry).

The variables are shown in Table 6.

Table 6. Descriptive Statistics by Sex

Variable	Men				Women			
	1972-74	1978-80	1984-86	1990-92	1972-74	1978-80	1984-86	1990-92
Education	11.054 (3.422)	11.791 (2.857)	12.719 (2.517)	12.992 (2.378)	11.596 (2.570)	11.782 (2.160)	12.400 (2.043)	12.758 (1.979)
Experience	23.803 (11.656)	15.263 (11.457)	14.102 (10.483)	14.070 (9.654)	24.833 (11.736)	10.405 (9.091)	11.444 (9.047)	11.671 (9.241)
Tenure	3.848 (1.505)	5.665 (7.002)	8.887 (8.165)	10.126 (8.352)	NA	4.885 (5.297)	7.612 (6.409)	8.986 (7.136)
Age (at start)	40.878 (10.350)	37.888 (11.652)	35.992 (10.068)	39.367 (8.798)	42.429 (10.754)	38.250 (11.732)	37.545 (10.819)	40.841 (9.550)
Married	0.921 (0.270)	0.887 (0.318)	0.818 (0.386)	0.875 (0.331)	0.665 (0.472)	0.682 (0.469)	0.747 (0.435)	0.704 (0.456)
Race	1.380 (0.769)	1.384 (0.710)	1.320 (0.692)	1.301 (0.630)	NA	NA	1.378 (0.669)	1.368 (0.646)
Number of Changes Occupation	0.698 (0.884)	0.611 (0.841)	0.771 (0.936)	0.695 (0.938)	0.574 (0.839)	0.483 (0.794)	0.586 (0.829)	0.497 (0.818)
Number of Changes Industry	0.592 (0.907)	0.338 (0.679)	0.566 (0.873)	0.474 (0.826)	0.538 (0.840)	0.414 (0.717)	0.432 (0.731)	0.306 (0.666)
ln(wages)	2.598 (0.540)	2.613 (0.498)	2.633 (0.515)	2.620 (0.556)	2.134 (0.524)	2.136 (0.468)	2.216 (0.498)	2.295 (0.513)

Note: Wages are at the end of the period. Standard deviations are reported in parentheses.

One striking result from this table is that the gender wage gap (in logs) has diminished over time. Women 's wages rose from 82% of men's wages in the 1972-74 period to 88% in the 1990-92 period.

4.1. *Logit Estimation:*

In this section we present our first set of estimates. At each period an individual may be in one of two states. Let no change of occupation (industry) be denoted by a value of 1, and one or more changes by a value 0. Let the value of being in state j be given by

$$V^j = I^j + \vartheta^j X_i + M^j \qquad j = 0, 1. \tag{1}$$

where matrix X_i includes real wages, age, years of education, marital status and race.

Table 7 reports the estimation results of the logit regression with changes in occupation as the dependent variable. The probability of remaining in the same occupation is affected by several characteristics. First, men with higher wages are significantly more likely to stay in the same occupation than men with lower wages. The reverse is true for women (except for the first sample, 1972-74).

Table 7. Logit Estimates of the Probability of Remaining in the Same Occupation over the 3-Year Period (Dependent Variable: No Change = 1, Change = 0)

Variable	Men				Women			
	1972-74	1978-80	1984-86	1990-92	1972-74	1978-80	1984-86	1990-92
Constant	-0.958 (0.003)	-2.822 (0.000)	-3.267 (0.000)	-0.957 (0.001)	-0.881 (0.014)	1.245 (0.002)	0.130 (0.742)	-0.320 (0.446)
Ln(Real Wage)	0.489 (0.000)	0.488 (0.000)	0.348 (0.000)	0.328 (0.000)	0.384 (0.000)	-0.195 (0.089)	-0.037 (0.694)	-0.062 (0.501)
Age (at start)	-0.005 (0.285)	0.034 (0.000)	0.040 (0.000)	0.019 (0.000)	0.017 (0.000)	0.024 (0.000)	0.010 (0.019)	0.015 (0.001)
Completed Education	-0.024 (0.000)	0.034 (0.013)	0.047 (0.002)	-0.029 (0.058)	0.000 (0.987)	-0.085 (0.001)	-0.038 (0.107)	0.001 (0.954)
Married	0.443 (0.000)	0.217 (0.034)	0.293 (0.001)	0.254 (0.006)	-0.231 (0.025)	0.012 (0.910)	0.251 (0.010)	0.218 (0.018)
Race	0.007 (0.967)	0.035 (0.475)	0.136 (0.006)	-0.094 (0.060)	NA	NA	0.213 (0.004)	0.331 (0.000)
Chi-Square	292.09	235.31	244.79	85.995	36.168	65.583	25.435	32.190
N	3,287	4,128	4,034	4,434	1,974	2,042	2,389	2,795

Note: Probability values are reported in parentheses.

Second, older workers are significantly more likely to remain in the same occupation than younger workers. This result is consistent with those reported by Harper (1995) for Britain and with Shaw's (1986) model, which predicts that younger people are

more likely to change occupations and this probability will decline over time. Third, marriage increases the probability of staying (except for women in the 1972-74 period).[14]

Fourth, there is no clear effect from schooling. In the 1972-74 and 1990-92 periods, more educated men are less likely to stay in the same occupation (Harper, 1995, obtains the same result for Britain). However, in the two middle periods (1978-80 and 1984-86), more educated men are more likely to stay in the same occupation This result could be explained by two opposite effects of education on occupational mobility. More educated workers may have a greater chance of finding the "right" occupation at the beginning of their working career and thus be less likely to change later on. On the other hand, more educated workers have a larger stock of human capital (including general training) and therefore a wider range of tasks that they can perform, and may thus have greater opportunity to switch occupation (or industry).

Table 8 presents the logit estimates for industry change. The results are remarkably similar to the occupational change regressions, with one exception. In particular, more education for men significantly increases the likelihood of changing industry in the last three periods, while for women this is true in the first three periods.

Table 8. Logit Estimates of the Probability of Remaining in the Same Industry over the 3-Year Period (Dependent Variable: Change = 1, No Change = 0)

Variable	Men				Women			
	1972-74	1978-80	1984-86	1990-92	1972-74	1978-80	1984-86	1990-92
Constant	-3.106 (0.000)	-2.868 (0.000)	-2.141 (0.000)	0.532 (0.075)	-1.631 (0.000)	-0.322 (0.425)	-0.531 (0.207)	-0.101 (0.834)
Ln(Real Wage)	0.629 (0.000)	1.231 (0.000)	0.728 (0.000)	0.410 (0.000)	0.421 (0.000)	0.473 (0.000)	0.267 (0.008)	-0.178 (0.097)
Age (at start)	0.007 (0.080)	0.027 (0.000)	0.036 (0.000)	0.012 (0.003)	0.035 (0.000)	0.035 (0.000)	0.038 (0.000)	0.035 (0.000)
Completed Education	0.028 (0.029)	-0.058 (0.000)	-0.050 (0.002)	-0.080 (0.000)	-0.019 (0.399)	-0.076 (0.006)	-0.084 (0.001)	0.003 (0.920)
Married	0.303 (0.000)	0.424 (0.000)	0.124 (0.158)	-0.150 (0.149)	0.204 (0.052)	-0.343 (0.002)	0.383 (0.000)	0.395 (0.000)
Race	-0.102 (0.459)	0.195 (0.003)	0.091 (0.082)	0.001 (0.983)	NA	NA	0.089 (0.232)	0.114 (0.162)
Chi-Square	300.16	343.44	263.23	60.178	70.313	104.78	103.62	54.224
N	3,287	4,128	4,034	4,434	1,974	2,042	2,389	2,795

Note: Probability values are reported in parentheses.

[14] The age and marriage effects found here are consistent with results on job mobility. Reported by Becker and Lindsay (1994), among others.

4.2. *Earnings Regressions:*

Our basic model derives from the standard human capital model and is given by:

$$\mathbf{ln(w_{it}) = I + \vartheta_1 X_{it} + \vartheta_2 N_{it} + O_i + M_{it}} \qquad \mathbf{(2)}$$

where $\ln(w_{it})$ is the log of the hourly wages deflated by CPI for individual i in time t and X_{it} is a standard set of regressors, years of education, experience, tenure, marital status, and race. Experience and tenure squared are also included in the model. The experience terms are incorporated to capture wage growth due to investment in general human capital, while the tenure terms capture wage growth due to investment in specific human capital. The variable N_{it} is the number of changes in occupation or industry over the time period. A similar variable was used by Light and McGarry (1997) to measure job mobility.

The residual structure in the equation includes an unobserved time-invariant individual characteristic term (O_i) and a white noise term (M_{it}) that captures all other unobserved variables. Each component of the residual is assumed to be independently distributed with zero mean and variance equal to σ_O^2 and σ_M^2, respectively. This structure is consistent with the mover-stayer model (the argument is that personal characteristics induce high productivity workers to avoid job change and low productivity workers to undergo persistent job change).

The tenure variable refers to a position with an employer (firm) rather than to an occupational position with the same employer. As many others point out (e.g. Altonji and Shakotko, 1987, and Lindsay and McGarry, 1997), tenure is correlated with the error in the earnings equations. For example, tenure is likely to be correlated with O_i because high productivity workers would receive higher wages and thus be less likely to quit.

To avoid this problem we use an instrumental variables feasible generalized least square estimator (IV/FGLS). The instrumental variables for the tenure variables T_{it} and T_{it}^2 are the deviations of the tenure variables around their means for the sample

observations.[15] These IV are uncorrelated by construction with the error component of the earnings equation.

We estimate equation (2) both by OLS and by IV/FGLS. If the error component is specified as M_{it}, the model should be estimated by OLS, while if the error structure is specified as $O_i + M_{it}$, the model should be estimated by IV/FGLS.

Tables 9 and 10 show the two sets of estimates for the earnings equation including a term for the number of occupational changes. The results are very similar. Schooling has the expected positive coefficient and is highly significant. The return to education is generally higher for women than men (except for the 1984-86 period). Moreover, as found in other studies, the return to education rose over the four periods for both men and women.

Table 9. Estimates of Earnings Equations including Changes in Occupation (OLS)

Variable	Men				Women			
	1972-74	1978-80	1984-86	1990-92	1972-74	1978-80	1984-86	1990-92
Constant	1.184 (20.030)	1.390 (31.498)	1.061 (23.097)	0.825 (15.528)	1.066 (19.867)	0.773 (18.778)	0.714 (14.091)	0.427 (8.140)
Education	0.073 (32.060)	0.078 (32.729)	0.100 (38.761)	0.117 (39.358)	0.099 (32.581)	0.097 (31.890)	0.100 (30.223)	0.130 (37.771)
Experience	0.037 (15.176)	0.033 (15.622)	0.015 (9.618)	0.010 (6.502)	-0.008 (-2.989)	0.018 (8.476)	0.024 (9.720)	0.011 (7.807)
$Exper^2/10$	-0.007 (-15.18)	-0.006 (-12.38)	-0.002 (-5.741)	-0.001 (-4.232)	0.002 (3.226)	-0.004 (-6.745)	-0.007 (-10.15)	-0.001 (-6.465)
Tenure	0.050 (2.655)	0.009 (3.947)	0.025 (11.125)	0.035 (15.611)	NA	0.022 (8.250)	0.033 (11.330)	0.032 (12.761)
$Tenure^2/10$	-0.001 (-0.054)	-0.001 (-1.455)	-0.004 (-5.605)	-0.007 (-9.119)	NA	-0.005 (-4.577)	-0.005 (-4.511)	-0.006 (-6.800)
Married	0.181 (7.562)	0.150 (7.541)	0.104 (6.238)	0.112 (5.474)	0.017 (1.075)	0.035 (2.519)	0.031 (1.928)	0.022 (1.630)
Race	-0.068 (-7.944)	-0.078 (-8.626)	-0.091 (-9.937)	-0.110 (-10.27)	NA	NA	-0.088 (-9.311)	-0.075 (-7.623)
Number of Changes Occupation	-0.084 (-10.70)	-0.048 (-6.195)	-0.023 (-3.300)	-0.025 (-3.503)	-0.037 (-4.498)	0.023 (2.933)	0.030 (3.820)	0.0207 (2.596)
Error Struct.								
$[_M^2$	0.188	0.172	0.167	0.199	0.206	0.170	0.175	0.180
N	3,287	4,093	3,976	4,371	1,974	2,014	2,345	2,736

Note: t-statistics are reported in parentheses.

[15] If T_{it}^{m} is the mean of tenure for individual i over the sample observations, we can define the Instrumental Variable T_{it}^{V} to be the deviation of T_{it} from the job mean -- that is, $T_{it}^{V} = T_{it} - T_{it}^{m}$ and $(T_{it}^{V})^2 = T_{it}^{2} - (T_{it}^{m})^2$.

.

Experience and tenure have the expected quadratic shape in almost all regressions (with the exception of the 1972-74 regression for women, for which information on job tenure is lacking). In all cases (with the same exception) these variables are highly significant. On the other hand, it is well known in the labor economics literature, that tenure is positively correlated with individual and job characteristics and that, therefore, OLS tenure estimates might be biased upward relative to estimates that take into account these characteristics. After we account for the correlation between tenure and the error component (individual effects) by using IV/FGLS, the coefficients for tenure decrease in all cases, though they remain statistically significant. Another interesting result is that in both sets of regressions, the slope of the wage-tenure curve is steeper or women than for met but the difference in slope diminishes over time.[16]

It is worth noting, as Becker and Lindsay (1994) argue, that high wages jobs tend to be more permanent, creating a spurious positive relationship between tenure and wages. However, they justify the use of OLS in estimating the earning equation for three reasons. First, they argue that the bias is small, even for the large and heterogeneous samples. Second, comparisons between groups with similar tenure status, should give little scope for the bias to affect the coefficients associated with tenure. Third, there is no a priori reason to expect these biases to enter with sex-specific effects; hence such a bias should not affect any kind of gender tests.

According to the OLS results, married men earn about 10 percent more than unmarried men, while the differential is only about 6 percent in the IV/FGLS regressions. However, this variable is highly significant in all cases. The results also show that married women generally earn more than unmarried ones. Racial differences in earnings are highly significant both among men and women. Among men, the racial differential has widened from about 7 percent in the early 1970s to 11 percent in the early 1990s.

Both sets of results show that our key variable, the number of occupational changes over the period, is negatively related to wages for men. This means that men who change occupations more often have lower wages than men with fewer changes. For

[16] Becker and Lindsay (1994) also find that the tenure slope is steeper for women than for men among workers who remain in the same job.

women, the coefficient is generally positive with OLS but generally negative with the preferred from, IV/FGLS. This shows the importance of correcting for the correlation between tenure and the error component (individual effects) by using IV/FGLS

Another critical result is that with the preferred from, IV/FGLS, the absolute value of the coefficient of the number of occupational changes declines between the 1972-74 and the 1990-92 period. For men, occupation changers earned 13 percent less in the earlier period and 9 percent less in the later period, while for women the corresponding figures are 31 percent less (though without a tenure variable included) in the early 1970s and 5 percent less in the early 1990s. The results also show that for men the earnings losses associated with occupational shifts actually rose between the early 1970s and the late 1970s (from 13 to 16 percent) before declining in the mid-1980s.

Table 10. Estimates of Earnings Equations including Changes in Occupation (IV/FGLS)

Variable	Men				Women			
	1972-74	1978-80	1984-86	1990-92	1972-74	1978-80	1984-86	1990-92
Constant	1.395 (42.414)	1.640 (59.287)	1.575 (58.852)	1.092 (30.653)	1.294 (29.341)	0.885 (33.809)	1.240 (43.826)	0.471 (13.015)
Education	0.074 (47.400)	0.072 (45.833)	0.076 (50.903)	0.110 (53.269)	0.094 (38.439)	0.094 (50.238)	0.061 (34.951)	0.126 (52.441)
Experience	0.040 (26.174)	0.032 (22.888)	0.017 (17.922)	0.012 (11.644)	-0.005 (-2.336)	0.021 (15.800)	0.032 (21.027)	0.016 (17.725)
$Exper^2/10$	-0.007 (-24.08)	-0.006 (-18.35)	-0.002 (-11.01)	-0.001 (-7.366)	0.001 (1.269)	-0.005 (-12.28)	-0.009 (-21.27)	-0.002 (-12.67)
Tenure	0.025 (3.937)	0.003 (4.045)	0.015 (13.726)	0.019 (17.583)	NA	0.008 (9.931)	0.025 (19.939)	0.022 (20.048)
$Tenure^2/10$	-0.029 (-2.775)	-0.001 (-3.062)	-0.002 (-6.669)	-0.003 (-9.346)	NA	-0.003 (-7.084)	-0.005 (-10.43)	-0.005 (-12.53)
Married	0.059 (5.323)	0.092 (10.755)	0.045 (5.770)	0.052 (5.129)	-0.006 (-0.476)	0.092 (11.476)	0.028 (2.570)	0.121 (13.760)
Race	-0.071 (-11.98)	-0.082 (-13.44)	-0.112 (-18.43)	-0.109 (-14.20)	NA	NA	-0.102 (-16.03)	-0.071 (-10.27)
Number of Changes Occupation	-0.130 (-14.27)	-0.162 (-18.09)	-0.118 (-14.67)	-0.092 (-10.11)	-0.314 (-15.33)	-0.072 (-8.281)	0.001 (0.084)	-0.0542 (-5.584)
Error Struct.								
$[_O^2$	0.047	0.041	0.042	0.048	0.054	0.053	0.043	0.034
$[_M^2$	0.141	0.130	0.125	0.150	0.152	0.117	0.132	0.146
N	3,287	4,093	3,976	4,371	1,974	2,014	2,345	2,736

Note: t-statistics are reported in parentheses.

The results for industry changes are shown in Tables 11 and 12. Coefficient estimates and significance levels on the control variables in these regressions are

remarkably similar to those for the occupation change regressions. Moreover, as in the occupation change regressions, when we use IV/FGLS instead of OLS, the coefficient of the tenure variable drops in all regressions (typically, by about half).

When we use the preferred IV/FGLS estimation procedure, we find that for men, industry shifts are associated with a 13 percent earnings drop in the 1972-74 period. The earnings loss rises to 31 percent in the late 1970s and then falls to virtually zero by the early 1990s. For women, the earnings loss associated with industry changes also rises between the early 1970s and late 1970s (from 15 to 20 percent) and then falls to 13 percent in the early 1990s.

Table 11. Estimates of Earnings Equations including Changes in Industry (OLS)

Variable	Men				Women			
	1972-74	1978-80	1984-86	1990-92	1972-74	1978-80	1984-86	1990-92
Constant	1.136 (19.155)	1.456 (33.701)	1.067 (23.671)	0.789 (14.958)	1.066 (19.867)	0.795 (19.146)	0.717 (14.198)	0.412 (7.895)
Education	0.076 (33.428)	0.078 (33.184)	0.101 (39.105)	0.117 (39.326)	0.099 (32.581)	0.098 (32.404)	0.100 (29.928)	0.129 (37.825)
Experience	0.036 (14.747)	0.031 (14.888)	0.015 (9.576)	0.010 (6.824)	-0.008 (-2.989)	0.017 (8.310)	0.024 (9.925)	0.010 (7.515)
$Exper^2/10$	-0.007 (-14.63)	-0.006 (-11.89)	-0.002 (-5.658)	-0.001 (-4.454)	0.002 (3.226)	-0.004 (-6.770)	-0.007 (-10.41)	-0.001 (-6.257)
Tenure	0.053 (2.790)	0.007 (2.952)	0.024 (10.309)	0.036 (15.957)	NA	0.019 (7.199)	0.035 (11.565)	0.034 (13.525)
$Tenure^2/10$	-0.004 (-0.141)	-0.001 (-0.764)	-0.004 (-5.078)	-0.007 (-9.506)	NA	-0.005 (-3.938)	-0.005 (-4.751)	-0.007 (-7.340)
Married	0.176 (7.286)	0.132 (6.730)	0.107 (6.428)	0.115 (5.635)	0.017 (1.075)	0.040 (2.857)	0.032 (1.988)	0.025 (1.845)
Race	-0.070 (-8.165)	-0.082 (-9.205)	-0.091 (-9.875)	-0.111 (-10.35)	NA	NA	-0.091 (-9.640)	-0.077 (-7.819)
Number of Changes Industry	-0.062 (-8.067)	-0.126 (-13.39)	-0.038 (-5.074)	0.011 (1.294)	-0.037 (-4.498)	-0.032 (-3.534)	0.037 (4.078)	0.060 (6.062)
Error Struct.								
$[_M^2$	0.191	0.167	0.167	0.199	0.206	0.170	0.175	0.179
N	3,287	4,093	3,976	4,371	1,974	2,014	2,345	2,736

Note: t-statistics are reported in parentheses.

Table 12. Estimates of Earnings Equations including Changes in Industry (IV/FGLS)

Variable	Men				Women			
	1972-74	1978-80	1984-86	1990-92	1972-74	1978-80	1984-86	1990-92
Constant	1.382	1.701	1.497	0.995	1.110	0.946	1.307	0.481
	(39.486)	(63.484)	(57.932)	(28.247)	(28.684)	(36.603)	(44.115)	(13.030)
Education	0.077	0.073	0.078	0.110	0.099	0.092	0.065	0.127
	(49.221)	(47.522)	(53.486)	(53.775)	(44.331)	(48.401)	(35.093)	(51.730)
Experience	0.037	0.027	0.018	0.014	-0.003	0.016	0.030	0.016
	(23.191)	(19.856)	(18.752)	(13.432)	(-1.917)	(12.184)	(18.540)	(17.813)
$Exper^2/10$	-0.006	-0.005	-0.002	-0.002	0.001	-0.004	-0.008	-0.002
	(-21.75)	(-16.01)	(-11.37)	(-8.609)	(1.889)	(-9.909)	(-18.20)	(-12.73)
Tenure	0.019	0.002	0.014	0.021	NA	0.006	0.018	0.020
	(3.186)	(3.103)	(13.003)	(18.548)		(7.475)	(13.523)	(17.490)
$Tenure^2/10$	-0.003	-0.001	-0.002	-0.004	NA	-0.002	-0.003	-0.005
	(-0.269)	(-2.451)	(-6.228)	(-10.43)		(-5.562)	(-6.769)	(-11.28)
Married	0.051	0.074	0.052	0.059	0.007	0.102	0.024	0.113
	(4.556)	(8.809)	(6.857)	(5.831)	(0.585)	(12.492)	(2.113)	(12.551)
Race	-0.074	-0.092	-0.107	-0.113	NA	NA	-0.100	-0.068
	(-12.36)	(-15.26)	(-17.93)	(-14.78)			(-14.89)	(-9.674)
Number of Changes Industry	-0.126	-0.306	-0.0971	0.006	-0.152	-0.201	-0.169	-0.133
	(-13.43)	(-28.00)	(-11.25)	(0.563)	(-14.39)	(-19.80)	(-14.53)	(-10.53)
Error Struct.								
$[_O^2$	0.047	0.041	0.042	0.049	0.054	0.052	0.043	0.034
$[_M^2$	0.143	0.126	0.125	0.151	0.152	0.117	0.132	0.145
N	3,287	4,093	3,976	4,371	1,974	2,014	2,345	2,736

Note: t-statistics are reported in parentheses.

5. Concluding Remarks

Two main findings come out of this study, First, the greater turbulence we found for the aggregate economy in the 1980s relative tot he 1970s, as evidenced by the larger change in the (gross) distribution of employment both by occupation and industry, is echoed on the micro level. In particular, workers changed both occupation and industry more frequently in the 1981-92 period in comparison to the 1969-80 period, with the mean number of occupational changes rising from 1.8 to 2.1 and the mean number of industry changes from 0.8 to 1.2.

Second, the descriptive statistics indicate that occupation and industry changers had, on average, greater growth in earnings over these two decades than non-changers. Despite this, we find that workers who shift occupation or industry generally have lower earnings than non-changers, once personal characteristics, such as schooling, work experience, job tenure, marital status, and race are controlled for. Moreover, despite all the horror stories in the press that manufacturing workers are turning into hamburger flippers, both occupational and industry change has become generally less traumatic over time for both men and women. For men, in particular, the earnings loss associated with occupational change diminished from 13 percent in the 1972-74 period to 9 percent in the 1990-92 period, and that associated with industry change from 13 percent to zero. For both occupational and industry changes, the peak loss occurred in the late 1970s.

There are several other noteworthy findings. First, men tended to change occupation and/or industry more frequently than women did over the entire 1969-92 period. Second, the logit regression results indicate that older workers are less likely to change occupation or industry than younger ones. Third, the regressions show that better paid men are less likely to shift occupation or industry than lower paid ones but the reverse is generally true for women.

6. References

Abraham, Katherine G., and Henry S. Farber (1987), "Job Duration, Seniority, and Earnings," *The American Economic Review*, Vol. 77, pp. 278-297.

Allen, Steven G., Robert L. Clark, and Ann A. McDermed (1993), "Pensions, Bonding, and Lifetime Jobs," *The Journal of Human Resources*, Vol. 28, No. 3, pp. 463-481.

Altman, Morris, and Louise Lamontagne (1996), "Gender Pay Inequality and Occupational Change in Canada, 1900-1930," *Journal of Socio-Economics*, Vol. 25, No. 3, pp. 285-309.

Altonji, Joseph G., and Robert Shajotko (1987), "Do Wages Rise with Job Seniority," *Review of Economic Studies*, Vol. 54, pp. 437-459.

Becker, Gary S., "Investment in Human Capital: A Theoretical Analysis," *Journal of Political Economy*, Vol. 70, pp. 9-49.

Becker, Elizabeth, and Cotton M. Lindsay (1994), "Sex Differences in Tenure Profiles: Effects of Shared Firm-Specific Investment," *Journal of Labor Economics*, Vol. 12, No. 1., pp. 98-118.

Borjas, George (1981), "Job Mobility and Earnings over the Life Cycle," *Industrial and Labor Relations Review*, Vol. 34, pp. 377-388.

Brown, James N. (1989), "Why Do Wages Increase with Tenure? On-the-Job Training and Life-Cycle Wage Growth Observed within Firms," *The American Economic Review*, Vol. 79, pp. 971-991.

--------, and Audrey Light (1992), "Interpreting Panel Data on Job Tenure," *Journal of Labor Economics*, Vol. 10, No. 3., pp. 219-257.

Corcoran, Mary, and Greg J. Duncan (1979), "Work History, Labor Force Attachment, and Earnings Differences between the Races and the Sexes," *The Journal of Human Resources*, Vol. 14, No. 1, pp. 3-20.

Garen, John E. (1989), "Job-Match Quality as an Error Component and the Wage-Tenure Profile: A Comparison and Test of Alternative Estimators," *Journal of Business & Economic Statistics*, Vol. 7, No. 2, pp. 245-252.

Hall, Robert (1982), "The importance of Lifetime Jobs in the U.S. Economy," *American Economic Review*, Vol. 72, No. 4, pp. 716-724.

Jovanovic, Boyan (1979), "Job Matching and the Theory of Turnover," *Journal of Political Economy*, Vol. 87, pp. 972-990.

Krieg, Randall G. (1997), "Occupational Change, Employer Change, Internal Migration, and Earnings," *Regional Science and Urban Economics*, Volume 27, No. 1, pp. 1-15.

Krieg, Randall G. (1996), "Occupational Change and Differing Returns to Migration by Gender," *Journal of Socio-Economics*, Volume 25, No. 5, pp. 591-599.

Light, Audrey, and Kathleen McGarry (1998), "Job Change Patterns and the Wages of Young Men," The Review of Economics and Statistics, Vol. 80, No.2, pp. 276-286.

Markey, James P., and William Parks II (1989), "Occupational Change: Pursuing a different kind of Work," *Monthly Labor Review*, September.

Miller, Robert A. (1984), "Job Matching and Occupational Choice," *The Journal of Political Economy*, Vol. 92, No. 6. (Dec.), pp. 1086-1120.

Mincer, Jacob, and Boyan Jovanovic (1981), "Labor Mobility and Wages," in *Studies in Labor Markets*, ed. S. Rosen, Chicago: University of Chicago Press, pp. 21-63.

Orazem, Peter F., and J. Peter Mattila (1986), "Occupational Entry and Uncertainty: Males Leaving High School," *The Review of Economics and Statistics*, Vol. 68, No. 2. (May), pp. 265-273.

Robertson, D. and Symons, J. (1990), "The Occupational Choice of British Children," *Economic Journal*, Vol. 100, pp. 828-41

Rosen, Sherwin (1972), "Learning and Experience in the Labor Market," *The Journal of Human Resources*, No. 7, pp. 326-342.

Shaw, Kathryn L. (1986), "Occupational Change, Employer Change, and the Transferability of Skills," *Southern Economic Journal*, Vol. 53, pp. 702-719.

Sommers, Dixie and Alan Eck (1977), "Occupational Mobility in the Labor Force," *Monthly Labor Review*, January, pp. 3-26.

Swinnerton, Kenneth A. and Howard Wial (1995), "Is Job Declining in the U.S. Economy?," *Industrial and Labor Relations Review*, Vol. 48, No. 2, pp. 293-304.

Ureta, Manuelita (1992), "The Importance of Lifetime Jobs in the U.S. Economy, Revisited," *American Economic Review*, Vol. 82, No. 1, pp. 322-335.

Wellington Alison J., “Changes in the Male/Female Wage Gap, 1976-85,” *The Journal of Human Resources*, Vol. 28, No. 2, pp. 381-411.

Wilson, R. Mark and Carole Green (1990), “Occupation, Occupational Change and Movement within the Income Distribution,” *Eastern Economic Journal*, Vol. 16, No. 3, pp. 209-220.

Wolff, Edward N. "Technology and the Demand for Skills", *OECD Science, Technology and Industry Review*, No. 18, 1996, pp. 96-123.

7. Appendix 1: Detailed Tables

Table A. Distribution of Occupational Changes

	Period	0	**1**	2	3	Mean
Men	1972-74	54.6	**25.0**	16.3	4.1	0.70
	1978-80	59.0	**24.3**	13.3	3.4	0.61
	1984-86	52.6	**22.9**	19.2	5.3	0.77
	1990-92	58.7	**18.5**	17.5	5.3	0.69
Women	1972-74	62.5	**20.7**	13.8	3.0	0.57
	1978-80	67.8	**19.0**	10.2	2.9	0.48
	1984-86	60.3	**23.9**	12.5	3.2	0.59
	1990-92	68.0	**17.6**	11.2	3.3	0.50
Total	1972-74	57.5	**23.4**	15.4	3.7	0.65
	1978-80	61.9	**22.6**	12.3	3.2	0.57
	1984-86	55.5	**23.3**	16.7	4.5	0.70
	1990-92	62.3	**18.2**	15.1	4.5	0.62

Table B. Distribution of Industry Changes

	Period	0	**1**	2	3	Mean
Men	1972-74	65.2	**14.9**	15.2	4.6	0.59
	1978-80	76.6	**14.6**	7.3	1.5	0.34
	1984-86	64.9	**18.0**	12.7	4.4	0.57
	1990-92	70.9	**14.1**	11.7	3.3	0.47
Women	1972-74	65.7	**18.2**	12.8	3.3	0.54
	1978-80	70.3	**19.9**	7.9	1.9	0.41
	1984-86	68.8	**21.4**	7.4	2.4	0.43
	1990-92	79.5	**12.1**	6.8	1.6	0.31
Total	1972-74	65.4	**16.2**	14.3	4.1	0.57
	1978-80	74.5	**16.4**	7.5	1.6	0.36
	1984-86	66.3	**19.3**	10.7	3.6	0.52
	1990-92	74.2	**13.3**	9.8	2.6	0.41

Table C. Percentage change in real labor income by changes in occupation and industry

Variable	Situation	Men				Women			
		1972-74	1978-80	1984-86	1990-92	1972-74	1978-80	1984-86	1990-92
Occupation	Change[1]	2.0 (26.2)	5.1 (27.5)	4.7 (17.8)	1.0 (20.2)	5.5 (27.5)	3.2 (51.7)	6.1 (19.2)	2.2 (13.7)
	No Change	1.3 (15.3)	1.5 (12.8)	2.9 (13.0)	1.3 (13.8)	0.1 (43.0)	4.1 (26.7)	2.8 (16.8)	1.6 (13.4)
Industry	Change[1]	2.1 (26.6)	5.9 (30.0)	5.0 (20.1)	0.9 (19.5)	4.8 (21.1)	3.1 (54.2)	6.7 (23.5)	1.9 (17.3)
	No Change	1.3 (17.3)	2.1 (16.0)	3.2 (12.2)	1.3 (15.5)	0.8 (44.3)	4.0 (26.0)	2.9 (14.5)	1.8 (12.4)

Note: Standard deviations are in parentheses.
(1) At least one change.

Table D. Average age at beginning of period by changes in occupation and industry

Variable	Situation	Men				Women			
		1972-74	1978-80	1984-86	1990-92	1972-74	1978-80	1984-86	1990-92
Occupation	Change[1]	38.6 (10.4)	34.2 (10.9)	32.8 (9.4)	37.4 (8.4)	40.2 (10.4)	34.7 (10.9)	35.9 (11.1)	39.0 (9.5)
	No Change	40.9 (10.1)	38.8 (11.7)	37.0 (10.2)	39.1 (8.9)	42.1 (10.8)	38.5 (11.9)	37.0 (10.5)	40.2 (9.5)
Industry	Change[1]	38.4 (10.6)	33.3 (10.9)	32.1 (9.1)	37.4 (8.4)	39.1 (10.0)	33.7 (10.7)	33.8 (10.6)	37.9 (9.0)
	No Change	40.7 (10.1)	38.0 (11.6)	36.5 (10.2)	38.8 (8.9)	42.7 (10.9)	38.8 (11.8)	37.8 (10.6)	40.3 (9.6)

Note: Standard deviations are in parentheses.
(1) At least one change.

Table E. Average years of education at end of period by changes in occupation and industry

Variable	Situation	Men				Women			
		1972-74	1978-80	1984-86	1990-92	1972-74	1978-80	1984-86	1990-92
Occupation	Change[1]	10.7 (3.3)	11.6 (2.8)	12.7 (2.3)	13.0 (2.2)	11.6 (2.0)	12.2 (2.0)	12.6 (2.1)	12.9 (1.8)
	No Change	11.3 (3.5)	11.9 (2.9)	12.9 (2.7)	13.0 (2.5)	11.6 (2.8)	11.6 (2.2)	12.4 (2.0)	12.7 (2.1)
Industry	Change[1]	11.0 (3.3)	11.8 (2.7)	12.9 (2.4)	13.1 (2.4)	11.7 (2.3)	12.0 (2.0)	12.8 (2.1)	12.9 (1.9)
	No Change	11.1 (3.5)	11.8 (2.9)	12.8 (2.6)	12.9 (2.4)	11.6 (2.7)	11.7 (2.2)	12.3 (2.0)	12.7 (2.0)

Note: Standard deviations are in parentheses.
(1) At least one change.

Table F. Number of Occupational Changes by Age (Total, 1969-1980)

Number of Changes	25-29	30-34	35-39	**40-44**	45-49	50-54	55-59	60-64	Total	Age (at start, average)
0	28	24	44	**40**	38	15	3	1	193	40
1	14	15	9	**20**	6	3	1	0	68	37
2	**15**	**16**	**10**	**19**	**19**	**6**	**4**	**2**	**91**	**40**
3	14	14	10	**10**	9	6	0	0	63	37
4	5	9	6	**10**	7	0	0	0	37	38
5	6	1	6	**7**	6	2	0	0	28	39
6	3	3	2	**7**	2	1	1	0	19	39
7	0	0	1	**1**	3	0	0	0	5	44
8	3	0	0	**0**	1	0	0	0	4	32
Total	88	82	88	**114**	91	33	9	3	508	39
Changes(avg.)	2.0	1.8	1.5	**1.9**	1.9	1.5	1.7	1.3	1.8	

Table G. Number of Occupational Changes by Age (Total, 1981-1992)

Number of Changes	25-29	**30-34**	35-39	40-44	45-49	50-54	55-59	Total	Age (start, avg.)
0	67	**56**	41	27	20	17	3	231	36
1	24	**28**	9	10	4	2	0	77	34
2	**30**	**31**	**15**	**7**	**10**	**8**	**1**	**102**	**35**
3	19	**22**	9	8	5	3	0	66	35
4	22	**15**	7	6	2	1	0	53	33
5	13	**16**	6	4	2	2	0	43	34
6	6	**10**	6	4	2	2	1	31	36
7	6	**3**	5	1	1	1	0	17	34
8	3	**1**	0	1	1	3	2	11	43
9	0	**0**	0	1	0	1	0	2	47
10	2	**0**	0	0	0	0	0	2	27
Total	192	**182**	98	69	47	40	7	635	35
Changes(avg.)	2.2	**2.1**	2.0	2.0	1.8	2.3	3.4	2.1	

Table H. Number of Industry Changes by Age (Total, 1971-1980)

Number of Changes	25-29	30-34	35-39	**40-44**	45-49	50-54	55-59	60-64	Total	Age (at start, average)
0	53	58	54	**80**	65	22	6	2	34	39
1	5	9	12	**11**	8	3	2	0	50	40
2	**11**	**5**	**10**	**12**	**12**	**6**	**1**	**0**	**57**	**40**
3	8	2	7	**8**	1	2	0	0	28	37
4	7	4	4	**3**	2	0	0	0	20	34
5	1	3	1	**0**	3	0	0	1	9	40
6	3	1	0	**0**	0	0	0	0	4	28
Total	88	82	88	**114**	91	33	9	3	508	39
Changes(avg.)	1.2	0.8	0.8	**0.6**	0.6	0.6	0.4	1.7	0.8	

Table I. Number of Industry Changes by Age (Total, 1981-1992)

Number of Changes	25-29	**30-34**	35-39	40-44	45-49	50-54	55-59	Total	Age (start, avg.)
0	106	**106**	62	48	32	22	7	383	36
1	16	**14**	5	8	4	0	0	47	34
2	**26**	**23**	**18**	6	**2**	**10**	**0**	**85**	**35**
3	14	**14**	6	2	0	1	0	37	32
4	20	**10**	2	3	4	3	0	42	33
5	5	**4**	1	1	2	2	0	15	36
6	3	**6**	2	0	1	1	0	13	34
7	1	**3**	2	0	1	0	0	7	35
8	1	**1**	0	1	1	1	0	5	40
9	0	**1**	0	0	0	0	0	1	32
Total	192	**182**	98	69	47	40	7	635	35
Changes(avg.)	1.3	**1.3**	1.0	0.7	1.2	1.5	0.0	1.2	

Table J. Number of Occupational Changes by years of Education (Total, 1969-1980)

Number of Changes	0-5 (1)	Grade School 6 yrs. (2)	**9-11 (3)**	**High School 12 yrs. (4)**	13-15 (5)	College 16 yrs. (6)	Total	Educ. (avg., col.)
0	4	32	**42**	**65**	14	36	193	4
1	2	7	**10**	**30**	5	13	67	4
2	**5**	**15**	**17**	**38**	**7**	**9**	**91**	**4**
3	5	10	**14**	**20**	10	4	63	4
4	2	7	**14**	**5**	6	3	37	3
5	4	4	**6**	**10**	3	1	28	3
6	1	3	**8**	**6**	0	1	19	3
7	0	3	**0**	**2**	0	0	5	3
8	1	1	**0**	**1**	1	0	4	3
Total	24	82	**111**	**177**	46	67	507	4
Changes(avg.)	2.9	2.0	**2.0**	**1.7**	2.1	1.0	1.8	

Table K. Number of Occupational Changes by Years of Education (Total, 1981-1992)

Number of Changes	0-5 (1)	Grade School 6 yrs. (2)	9-11 (3)	**High School 12 yrs. (4)**	**13-15 (5)**	College 16 yrs. (6)	Post-Grad. ≥17yrs. (7)	Total	Educ. (avg., col.)
0	3	17	35	**89**	**36**	30	21	231	4
1	0	1	4	**30**	**21**	17	4	77	5
2	**1**	**1**	**15**	**47**	**22**	**11**	**5**	**102**	**4**
3	1	2	6	**33**	**15**	5	4	66	4
4	0	2	4	**26**	**12**	7	2	53	4
5	0	1	1	**23**	**12**	3	3	43	5
6	0	1	5	**9**	**8**	6	2	31	5
7	1	0	1	**11**	**4**	0	0	17	4
8	0	0	0	**5**	**3**	1	1	10	5
9	0	1	0	**1**	**0**	0	0	2	3
10	0	0	0	**0**	**2**	0	0	2	5
Total	6	26	71	**274**	**135**	80	42	634	4
Changes(avg.)	2.0	1.4	1.5	**2.3**	**2.5**	1.8	1.6	2.1	

Table L. Number of Industry Changes by Years of Education (Total, 1971-1980)

Number of Changes	0-5 (1)	Grade School 6 yrs. (2)	9-11 (3)	**High School 12 yrs. (4)**	**13-15 (5)**	College 16 yrs. (6)	Total	Educ. (avg., col.)
0	15	52	**76**	**117**	33	46	339	4
1	3	9	**7**	**22**	2	7	50	4
2	**2**	**9**	**11**	**22**	**4**	**9**	**57**	**4**
3	1	7	**9**	**8**	2	1	28	3
4	1	3	**6**	**5**	4	1	20	4
5	2	1	**2**	**1**	1	2	9	3
6	0	1	**0**	**2**	0	1	4	4
7	0	0	**0**	**0**	0	0	0	0
8	0	0	**0**	**0**	0	0	0	0
Total	24	82	**111**	**177**	46	67	507	4
Changes(avg.)	1.0	0.9	**0.8**	**0.7**	0.8	0.7	0.8	

Table M. Number of Industry Changes by Years of Education (Total, 1981-1992)

Number of Changes	0-5 (1)	Grade School 6 yrs. (2)	9-11 (3)	**High School 12 yrs. (4)**	**13-15 (5)**	College 16 yrs. (6)	Post-Grad. ≥17yrs. (7)	Total	Educ. (avg., col.)
0	2	16	50	**167**	**85**	40	22	382	4
1	1	1	3	**21**	**7**	7	7	47	05
2	**0**	**2**	**12**	**30**	**16**	**20**	**5**	**85**	**5**
3	1	1	2	**22**	**6**	2	3	37	4
4	1	3	2	**15**	**12**	5	4	42	5
5	1	1	1	**6**	**4**	2	0	15	4
6	0	2	0	**7**	**3**	0	1	13	4
7	0	0	1	**3**	**1**	2	0	7	5
8	0	0	0	**3**	**1**	1	0	5	5
9	0	0	0	**0**	**0**	1	0	1	6
Total	6	26	71	**274**	**135**	80	42	634	4
Changes(avg.)	2.2	1.4	0.7	**1.2**	**1.2**	1.4	1.1	1.2	