The Rise in Occupation Changing Rates in the United States 1979-2007

Evidence from Three National Data Sources*

Matissa Hollister

Department of Sociology

Dartmouth College

Running head: The Rise in Occupation Changing Rates 1979-2007

Word count: 10,948 including appendices, 7,942 without appendices

*Direct all correspondence to Matissa Hollister, Department of Sociology, HB6014, Dartmouth College, Hanover, NH 03755 (matissa.n.hollister@dartmouth.edu).

The Rise in Occupation Changing Rates in the United States 1979-2007

Evidence from Three National Data Sources

Biography

Matissa Hollister is an Assistant Professor of Sociology at Dartmouth College. Her research focuses on the causes and consequences of changing employment relations in the New Economy.

The Rise in Occupation Changing Rates in the United States 1979-2007

Evidence from Three National Data Sources

Abstract

Many people see job instability as a fundamental element of the New Economy. There is evidence that workers are changing employers more often than in the past. These findings raise questions regarding the role of occupations in the New Economy. On one hand, the Silicon Valley model of employment, often seen as the future of work, involves changing employers but not occupations. On the other hand, the New Economy may be leading to a more unpredictable labor market along all dimensions. Using data from the National Longitudinal Surveys, the Current Population Survey, and the Panel Study of Income Dynamics, this study finds consistent evidence that rates of occupation changing have increased over time. This trend persists even after controlling for changes in the demographic and occupational composition of the labor force. The increase in occupation changing was not confined to shifts between jobs with similar characteristics, but instead involved changes across most dimensions of occupational skill and working conditions. The increase in occupation changing was, however, particularly large among less-educated workers. Finally, the trends involve increases in both upward and downward occupational moves. The results, therefore, suggest a New Economy with widespread instability and particular disadvantages for less skilled workers.

The Rise in Occupation Changing Rates in the United States 1979-2007

Evidence from Three National Data Sources

"The times in which we live and work are changing dramatically. The workers of our parents' generation typically had one job, one skill, one career, often with one company that provided health care and a pension.... Today, workers change jobs, even careers, many times during their lives." -President George W. Bush, 2004 Republican National Convention, New York City

Introduction

There is a widespread sense in the United States that the nature of work and careers has changed fundamentally in recent decades. The traditional concept of a career, particularly a long-term career with a single employer, has been declared a thing of the past. This view has appeared in both the popular press and in the writings of academics. Strangleman (2007) refers to this literature as the 'end of work' debate, the belief that we are seeing the end of work as we know it.

In recent years a number of researchers have sought to verify these claims empirically. Most of this research has focused on the question of whether individuals are changing employers more frequently than in the past. After some initial contradictory findings, there is an emerging consensus that there has indeed been an increase in employer changing (Farber 2008; Neumark 2001).

A less explored question is what these developments mean for occupations. The 'end of work' literature rarely addresses this issue directly and seems to offer contradicting predictions. The New Economy, they tell us, is based upon flexibility and constant change. It is implied that occupations are no exception to this rule. The quote above by President Bush is an example of this view. On the other hand, the literature often points to the Silicon Valley as a model of the

future of work. In this model, workers move freely from employer to employer, constantly taking on new projects and ideas, yet they do not change occupations. In fact, it is their skills and knowledge of computer programming that facilitates their movements from one company to the next. Occupations, therefore, may be one of the few constants in the new employment model.

These contradictions point to the need to examine empirically if and how the role of occupations has changed over time. Two previous studies have provided initial explorations into this question but with contradictory findings and different data sources. In this paper, I seek to answer this question more comprehensively by examining trends in occupation changing across three nationally representative data sources. I find evidence of an increase in occupation changing among both men and women in all three data sources. I then explore these trends in more depth.

This research provides us with a better picture of the nature of work in the New Economy, but it also has broader implications. As I will argue in the following section, occupations are an important sociological concept. If people are changing occupations more frequently, then this may call into question theories that assume that occupations are relatively stable characteristics. In addition, occupations are important in sociology partly because we believe that they are important to individuals, providing meaning and identity. The rise in occupation changing, therefore, may have broader individual and societal effects.

Background

Why care about occupations?

"The backbone of the class structure, and indeed of the entire reward system of modern Western society, is the occupational order" (Parkin 1971: 18)

Occupations have always been a focus of sociological research, in particular playing a central role in the concept of social class. Most measurements of class are based upon occupations, whether it is "big" classes such as the Goldthorpe's class schema (Goldthorpe and McKnight 2006) or "micro" classes based upon detailed occupations (Grusky and Sørensen 2001; Grusky and Weeden 2001). Status attainment models also use occupation-based prestige and socioeconomic status (SES) measures as their primary outcome.

This extensive interest and use of occupations in sociology often baffles economists, who see occupations as vague concepts that are poorly measured. There are several different arguments within sociology about why occupations are important. The first argument is that there are occupation-based rewards not captured by income. For example, prestige and SES scales were created to take into account the fact that certain occupations (e.g. a priest) may have higher social standing than indicated by earnings. A second argument is that occupations involve different working conditions that can lead to different behaviors and life outcomes. For instance, Goldthorpe contrasts occupations with long-term versus short-term employment contracts, arguing that working under short-term contracts makes it difficult to undertake behaviors that require long-term planning such as investing in education (Goldthorpe and McKnight 2006). A third argument is that occupations are an important source of identity for individuals, providing them with a sense of a place within society and membership in a group with shared values (Bauman 2005). A final argument is that occupations define groups (either at the big class level or individual occupations) that undertake actions to preserve or improve their positions in society through closure (Weeden 2002) or exploitation (Wright 2005).

Most of these arguments in favor of occupations rest, explicitly or implicitly, on the assumption that occupations are relatively stable characteristics. There is certainly

acknowledgement that people change occupations, particularly at younger ages, but widespread occupation changing would be a challenge to occupation-based theories. For instance, closure and exploitation require membership that is stable enough to recognize common interests and act upon them. Differential life chances can only occur if people are in occupations long enough for differences to accumulate to a significant effect. Even status attainment studies become difficult if attainment is ephemeral.

Beyond these challenges to sociological theories, we might also be concerned about the impact of occupation changing on individuals themselves. If work is a central source of social identity, when happens when this identity is no longer stable? Sennett (1998; 2006) has argued particularly strongly about the negative individual and societal impacts of a labor market with unstable work patterns.

There are multiple reasons, therefore, to care about the role of occupations in the New Economy and trends in occupation changing over time. In the following sections I review the current research and thinking on this topic.

Changing employers

As mentioned in the introduction, most of the research on the nature of careers in the New Economy has focused on trends in employer changing. This research reflects the central claim of the 'end of work' literature, that the traditional long-term commitment between employer and worker is gone. Initial attempts to document this trend empirically, however, led to mixed results. Neumark (2001) edited a volume that brought together research across several datasets in an attempt to resolve the issue. The results generally find mixed evidence on short-term job churning (the proportion of workers with less than one year of tenure), but consistent evidence of a decline in the proportion of workers with long-term job tenure (8 years or more,

primarily among men). More recent work by Farber (2008) confirms that there has been a decline in long-term tenure since the 1970s, particularly among men. He hypothesizes that women saw a similar underlying pattern that was offset by increasing labor force attachment over the same period. Farber also finds an increase in short-term churning. The evidence, therefore, confirms at least some decline in employment stability. The question then is if and how these trends are related to occupation changing.

Predictions about occupations

A variety of terms have been suggested to describe careers in the New Economy including "boundaryless careers" (Arthur and Rousseau 1996), "protean careers" (Hall 2002), and "portfolio careers" (Handy 1989). All of these career descriptions incorporate the idea that workers will change employers more often, but they are less clear about what this means for occupation changes. On the one hand, they all incorporate a certain sense of individuality and nonconformity, which suggests that all types of boundaries, including occupational boundaries, are now less relevant. On the other hand, these descriptions often use the example of a skilled worker who is able put together a portfolio of work across multiple employers precisely because he or she has a specific, marketable skill (such as the Silicon Valley workers discussed earlier).

A handful of people have discussed the impact on occupations more concretely with predictions on both sides. One side is best summarized by Tolbert (1996: 332):

> boundarylessness should not necessarily be interpreted to mean patternlessness. The central premise of this chapter is that, as organizations become less important in defining career pathways, occupations will become increasingly *more* important.

Tolbert argues that the widespread use of contracting and contingent employment will require increasing codification of occupations so that workers can be hired from the external labor market with a commonly-understood set of skills. This process will result in a hardening, rather than loosening, of boundaries between occupations. Bernhardt et al (2001: 10) make a similar prediction:

> the externalization of work may produce more similarity in jobs within an given occupation than within a firm or an industry. As a result, the practices that govern hiring, screening, training and labor supply—the labor market—also become occupation based.

Several years ago, Althauser and Kalleberg (1981) identified two types of internal labor markets: firm internal labor markets (FILMs) and occupational internal labor markets (OILMs). Predictions on this side of the debate are arguing, in effect, that the New Economy is causing a decline of FILMs but that this is accompanied by an increase in OILMs. In other words, occupations, rather than employers, are becoming the new "backbone" of careers.

On the other hand, some people argue that the factors that caused the decline in employer tenure should also reduce occupational tenure. The primary culprits, they argue, are technology and the need for flexibility in a competitive market, which cause skills to become outdated very rapidly. As Bauman (2005: 28) commented: "Nothing truly lasting could be reasonably hoped to be erected on this kind of shifting sand." The constant outdating of skills means that there is no incentive for employers to develop structures to hold on to their employees, leading to increased employer changing. Similarly, there is no reason for workers to develop expertise in a single occupation. If they have to learn new skills every few years to keep ahead, does it matter whether they stick to the same occupation? From this perspective, "the 'flexible labour market' neither

offers nor permits commitment and dedication to any currently performed occupation" (Bauman 2005: 35).

The contrast between these two sets of predictions points to the necessity to examine trends in occupation changing in addition to the employer-based research that has already been conducted.

Differential impacts

In addition to examining broad trends in occupation changing, the existing literature points to the possibility that any trends, if they do exist, may vary by social group. These differential impacts may fall along several different group lines:

Gender. There are two reasons to think that men and women may have experienced different trends in occupation changing. First, the stable, long-term careers that we think are disappearing may have primarily been held by men. A second factor is women's increasing participation in the labor force over the last few decades. This increasing involvement may have led to more stable employment patterns among women. Both of these factors suggest that women should see less of an increase in occupation changing than men.

Education. Educational attainment is a central factor in determining labor market outcomes. We might see differential trends by education because of an increasing reliance on educational credentials in external hiring, because of increasing demand for the skills provided by education, or because education is a proxy for other traits (e.g. socioeconomic background, innate ability) that affect labor market outcomes.

Occupation groups. Occupations differ greatly in the nature of their employment relations (Goldthorpe and McKnight 2006). There is little reason to believe, therefore, that any changes from the New Economy would affect all types of occupations similarly. Furthermore,

the mix of occupations has been changing over time. If some occupations are intrinsically less stable than others, then this change in the mix of occupations may affect the overall trend.

A final, related consideration is private versus public employees. Farber (2008) found that employer changing increased among private workers but that government-employed workers actually saw increased stability. Kambourov and Manovskii (2008) found similar results in occupation changing, as discussed below. It appears, therefore, that there may be different forces at work in public versus private employment, which should be kept in mind for this analysis.

Results from previous studies

Two previous studies have sought to examine trends in occupation changing in the United States. The first study, by Kamborouv and Manovskii (2008), used the Panel Study of Income Dynamics (PSID). Their key measure was the percent of individuals who have changed their occupation since the last reported occupation. They found a significant increase in occupation changing over time among private workers (but a decline among government workers). These trends were similar when occupations were measured at the 3-digit (detailed) and 1-digit (large group) levels. They found that the increase in occupation changing occurred across most age and education groups.

The second study was conducted by Moscarini and Vella (2003) using the March Current Population Survey (CPS). Their measure is the proportion of individuals who say that their current job is different from their "longest job last year." They find no trend in occupation changing over time, although they note that if one excludes workers younger than age 22 and government workers they find a moderate rise in occupation changing.

In light of these earlier findings, there are several goals for this study. The first is to undertake a more comprehensive examination of trends in occupation changing by exploring

results across three datasets (the PSID, the CPS Outgoing Rotation Groups, and the National Longitudinal Surveys), and by creating measures that are more comparable across all three data sources. The second goal is to examine these trends in more depth. For instance, Kamborouv and Monovskii (2008: 77-78) comment that

> there may exist subsets of the three-digit occupational classification such that no human capital is destroyed when switching occupations within such a subset…it appears interesting but difficult to construct a metric of how transferable occupational experience is between two given occupations.

I address this question by using Dictionary of Occupational Titles data to identify occupations that share similar skill requirements and work tasks. A final question to explore is whether a trend in occupation changing is a particularly positive or negative development. In order to get at this question, I examine how trends in occupation changing are associated with upward versus downward moves as measured by both prestige and earnings.

Data

Unfortunately, there is no perfect dataset for studying trends in occupation changing over time. Instead of relying on one dataset to provide a perfect answer I examine three major data sources, each with its own flaws. The strength of the results therefore comes from the consistency of the findings across these different datasets rather than the accuracy of any given dataset.

In analyzing each of these datasets, my emphasis is on creating measures that are comparable over time rather than correct in a specific year. So, for instance, I am more interested in using samples of individuals that are consistent over time even if this means they are not as nationally representative in a given year. In addition, there is evidence that a considerable portion

of occupation "changing" from year to year is really due to coding errors (Kambourov and Manovskii 2004; Mathiowetz 1992). In most surveys, including the three used here, the interviews collect verbatim descriptions of an individual's job, which trained coders then use assign occupation codes. Apparently, a number of what appear to be occupation changes are really coders making different coding decisions (and/or respondents giving different descriptions) year-to-year for what is really the same position. In the context of this study, however, the fact that occupation changing is measured with error is not as much of a concern as long as this error rate is similar over time.

This need for consistent measures over time, though, is challenged by changes in occupation codes and coding systems. I use a number of strategies to address this issue including multiple measures of occupation changing and statistical approaches. See the methods section below for more details. The methods section below provides details on the multiple measures and appendix E discusses the statistical approaches.

For the remainder of this section, I will briefly discuss each of the three data sources. See appendix A for a more detailed discussion of the strengths and weaknesses of each data source and the specific adjustments I made to create consistent measures of occupation changing.

The first data source I used was the National Longitudinal Surveys (NLS). The NLS has conducted a series of longitudinal studies of nationally representative cohorts in the United States. For this study I focus on three of the NLS cohorts. The first is the "Young Men" survey (1966 Men), a sample of men who were ages 14-24 in 1966 and were interviewed on an annual or biannual basis through 1981. The second is the "Young Women" survey (1968 Women), which was similar to the Young Men but was started in 1968 and the respondents continue to be interviewed today. The final cohort is the "National Longitudinal Survey of Youth 1979" (1979

Men & 1979 Women), a study of young men and women who were ages 14-22 in 1979 and continue to be interviewed today. The analysis of change over time comes from comparing the 1966 Men to the 1979 Men and the 1968 Women to the 1979 Women. See appendices A and B for sample sizes and a more detailed discussion of the strengths and weaknesses of the NLS data.

The second data source for this study is the Panel Study of Income Dynamics (PSID). The PSID began in 1968 with a nationally representative sample of 4,800 families. The survey is designed to follow the individuals in these families, as well as the experiences of additional individuals who join these original families through birth, marriage, etc. In later years the PSID has added new samples of families, primarily immigrant families, but I focus solely on individuals who are tied into these original "core" families in an effort to compare similar individuals over time. The PSID sample, therefore, does not include new immigrants to the US since 1968. See appendices A and C for more details on the PSID and sample sizes.

The final data source for this study is the Current Population Survey (CPS). The CPS is a monthly survey conducted since the mid-1960s of a nationally representative sample of 60,000 to 90,000 individuals. The CPS is typically treated as a cross-sectional dataset, but in fact it includes a short panel structure where households are interviewed for four months and then interviewed one year later for another four months. The CPS, therefore, can be used to measure one-year changes in labor market status.

I use the data from the CPS Outgoing Rotation Groups (ORG) supplements because these surveys include information on earnings from the respondent's current job. The earnings measure I use from the ORG is reported average weekly earnings from the individual's main job. This weekly measure considers both wages and work hours in comparing the earnings between

two jobs. See appendices A and D for more information about the CPS, sample sizes, and the matching process to create the panel data.

Measures and Methods

Outcome measures

The primary outcome measure for this study is the proportion of individuals in a given year (time 1) who are in that same occupation a certain number of years later (time 2). I calculated two- and five-year measures of change with the NLS, [1] and one-, two- and five-year measures for the PSID. The CPS panel only extends one year therefore only one-year measures are possible. I report here the two-year measures for the NLS and PSID and one-year measures for the CPS. The results using the other time frames were similar.

In all three datasets the sample is limited to individuals ages 22 to 61 (22 to 35 in the NLS). The sample is further restricted to individuals with a reported occupation at time 1 and available interview data at time 2. One question was how to treat individuals who are not working at time 2. Kambourov and Manovskii (2004) compare a person's current occupation to the last reported occupation, skipping any periods of nonwork or noninterviews. This measure becomes problematic, however, when applied to the NLS and the later years of the PSID, which have skipped survey years, and when applied to the CPS, which doesn't have a long enough panel to follow people until they are reemployed. I therefore took two approaches. One approach was to count a move from any occupation to non-work as an occupation change. The second

[1] The Young Men and Young Women cohorts of the NLS had an unusual interview skip pattern that is more conducive to two- (and five-) year measures than one-year measures of change (Bernhardt, Morris, Handcock, and Scott 2001).

approach was to limit the sample to individuals who were employed in both time periods. These two approaches lead to very similar results. I primarily report results for the sample of individuals employed in both time periods and note when the results differ using the other approach.

As noted earlier, occupations are known for their difficult and error-prone coding process. In response to this concern, I used several different occupation measures. First, I examine occupations at both the "three-digit" level (detailed occupations) and at the "one-digit" level (major occupation groups)[2]. The one-digit level captures the most dramatic major changes in occupations, will be the least error prone, and provides categories that are more consistent across coding schemes. These larger groups, however, may miss some of the action at the detailed level and so the detailed measures are important to examine as well. The analysis revealed that the one-digit and three-digit measures yielded very similar results. In this paper, therefore, I only report the one-digit major occupation results.

The detailed and major occupation groups provide a somewhat crude measure of occupation change; either the person changed occupations or did not change. One might want to use a metric that compares the skills and work tasks of the occupations to examine whether the changes are occurring between pairs of occupations that are similar or different. In addition, perhaps the increase in occupation changing has occurred across some dimensions of work tasks and skills and not others. For instance, perhaps the increase in occupation changing is mainly due

[2] Weeden et al (2007) refer to these major occupation groups as the Featherman-Hauser class schema. Their research found that the Featherman-Hauser codes do a better job at capturing variation in key outcome variables than the Erikson-Goldthorpe class schema.

to increased movement between low-skill manual and low-skill service jobs, with the barriers between high- and low-skill jobs remaining intact.

To address this question, I used the Dictionary of Occupational Titles (National Academy of Sciences 2001) to provide a measure occupational skills and work conditions. I only report the DOT results for the PSID because the PSID uses constant occupation codes. I calculated similar, but less reliable measures for the NLS with similar results. The DOT includes a large number of variables measuring occupational characteristics. To reduce these variables to a reasonable number, I used principal component analysis to create two measures of training/cognitive skill and four measures of work tasks and conditions. Table 1 provides a description of these measures. For each of these DOT components, I created a dummy variable equal to one if the individual had changed between two occupations with large differences in this DOT measure.[3] Individuals who did not change occupations or who changed between two occupations with similar values for this DOT measure were given a zero. These variables, therefore, are designed to capture occupation changes that involved significant changes in the required skills or in working conditions.

Finally, a goal of this study is to try to discern upward from downward mobility. I use two metrics for this: prestige and earnings. I report prestige results for the NLS and PSID and earnings results from the CPS. For each dataset, I created three dummy variables indicating

[3] I calculated the absolute value of the difference in the DOT characteristics of the occupations held at the two time periods. I then calculated the mean and standard deviation of this difference across the first five years of the PSID survey (1968-1972). An individual was marked as having a large change in the DOT characteristic if the change was larger than one standard deviation above the mean from these first five years.

three outcomes: 1) a change in occupations with a large increase in prestige[4] or earnings[5], 2) a change in occupations with a large decrease in prestige/earnings, and 3) a change in occupations with little or no change in prestige/earnings. Individuals who did not change occupations had a zero for all three outcome measures. These measures allow me to track separately trends in upward, downward, and lateral occupation changes.

Methods

For the NLS cohorts, the analysis involves calculating the weighted proportion of individuals changing occupations (using the various measures of occupation changing described above) at each age from 22 to 33. Change over time is assessed by comparing these proportions in the earlier (1966 and 1968) and later (1979) cohorts. One complication is that the earlier and later NLS cohorts used different occupation coding schemes (1960 census codes in the earlier cohorts, 1970 codes in the later cohorts), but these coding schemes are generally similar and I created a concordance between the two to allow for comparability.[6]

---

[4] A large change in prestige was measured as a change of more than three points.

[5] A challenge with earnings is how to deal with inflation, since there are disagreements about the appropriate inflation measure. In this case, I was mainly concerned with whether occupation changes led to changes in earnings that were better or worse than the overall increase in wages year-to-year. I therefore used a simple measure of wage inflation (the percent increase in mean earnings each year) to deflate the weekly wage values. An individual was counted as having an upward or downward occupation change if he/she both changed three-digit occupations and saw more than a five percent increase or decrease in these deflated earnings.

[6] I used a cross-classification of t individuals under the 1960 and 1970 occupation codes provided by the Census (Priebe, Heinkel, and Greene 1972) to code 1970 codes back to their 1960 counterparts.

The PSID and CPS data provide both more challenges and more opportunities. The challenge is that both datasets involve major changes in occupation coding schemes or systems (see appendices A and E). On the other hand, these datasets provide an opportunity due to their large numbers of observations and continuous measures of change over time. In response to both these challenges and opportunities, I ran a probit regression with the following basic model:

$$\Pr(OccChange = 1) = \Phi(\beta_0 + \beta_1 year + \beta_2 coding) \quad (1)$$

OccChange is a dummy variable indicating a change in occupations using one of the several measures of change described above. *Year* is a linear measure of time and therefore tests for a statistically significant trend over time in occupation changing rates. *Coding* is a set of dummy variables that represent the different occupation coding periods. The *coding* variables allow the probability of an occupation change to increase or decrease by a constant amount under each of the coding periods. The probit models, therefore, account for the fact that the *OccChange* variables measure occupation change with a certain amount of error (false changes), and that this error rate may vary by coding period.

For the analysis, I added several additional variables to this basic model:

$$\Pr(OccChange = 1) = \Phi(\beta_0 + \beta_1 year + \beta_2 coding + \beta_3 X + \beta_4 occ + \beta_5 occ * year + \beta_6 occ * coding) \quad (2)$$

X is a set of control variables that might influence the probability of changing occupations: age, education level, and the national unemployment rate for that year.[7] *Occ* is a set of dummy variables indicating ten major occupation groups. The *occ* variables are interacted with year to allow trends in occupation changing to vary by major occupation group. In addition,

[7] Specifically, the controls are a quadratic of age, a set of dummy variables for four education groups, and the unemployment rate. I include the interactions between these three variables as well as their base effects, allowing the effect of the unemployment rate to vary by age and education level.

I interacted the *occ* indicators with the coding periods in recognition of the fact that occupation coding schemes may affect the error rates in certain occupation groups more than others.

I use the results of these probit models in three ways. One use is to assess the statistical significance of the trends in occupation changing over time. I do not report the detailed results of these probits, but it should be noted that the coefficients for the *year* variable (β_1) in equation 1 are statistically significant in all cases. In addition, the coefficients for the *occ*year* interaction (β_5) in equation 2 allow me to assess trends in occupation changing separately by occupation group, as will be discussed in the results section. The second use of the probit model is to control for the impact of changing demographics and occupational structures over time. To do this, I used the estimated probit coefficients to generate predicted occupation changing rates while fixing the demographic and occupational structure to the levels of the initial year of the survey (1968 for the PSID and 1979 for the CPS). See appendix F for more details on this process. Finally, I used the probit models to provide an estimate of the error levels under different coding schemes. The results for the PSID and CPS in this paper are presented as graphs of occupation changing rates. These graphs show the estimated proportion of individuals changing occupations in a given year. The proportions in these graphs are adjusted using the coding period coefficients from the probit models. This process allows me account for variations in error levels and set the values to common baseline, avoiding breaks in the lines when the coding schemes change. See appendix E for details on this adjustment process.[8]

[8] The basic concepts of using a probit model to adjust for error rates and to measure the impact of changing demographics were adopted from Kambourov and Manovskii (2008). Their model, however, did not include interactions between the occupation groups and year, and between occupation groups and coding period.

Results

Overall trends

Figure 1 compares the two-year occupation changing rates for private workers by age for the NLS cohorts. In the figures for the NLS cohorts, the x-axis measures age and each cohort is represented by a separate line. Change over time, therefore, is indicated by the differences between the two lines. The results show that, as we might expect, occupation changing generally declines with age. The results for the 1968 women, however, do not follow this pattern. This difference seems to be due to the labor force patterns of women during this period. Figure 1 presents results where the sample is limited to individuals who were employed in both time 1 and time 2. If one broadens the sample to include everyone who was employed in time 1 and counts those who were not employed in time 2 as an occupation change (a change from work to nonwork), then the pattern for the 1968 women shows more of a typical decline with age (not shown). For the 1968 Women, therefore, their early 20's may have been less about exploring different occupational options and more about settling into either work or non-work. The women who did remain working in this earlier cohort did not change occupations as much at younger ages, either because they were more stable or because they had fewer occupational opportunities.

In terms of time trends, both men and women show higher rates of occupation changing at all ages in the later 1979 cohorts. For comparison, Figure 2 shows the rates of employer changing for the NLS cohorts. Figure 2 shows a moderate increase in employer changing for men and no clear difference for women. The increase in occupation changing, therefore, is more dramatic than the increase in employer changing. In addition, I found that occupation changing rates increased even among individuals staying with the same employer (not shown). The

increase in occupation changing, therefore, is not just an echo of the increase in employer changing.

Figure 3 and Figure 4 show the trends in occupation changing for the PSID and CPS respectively for privately employed workers. These figures present the information in a different way from the previous figures. Since the NLS has only two cohorts for each gender, in the previous figures the x-axis measured age and change over time was represented by the difference between the two lines. The PSID and CPS have more continuous information over time, and so time is represented on the x-axis of these figures with the solid lines indicating the proportion of individuals across all ages who changed occupations in a given year. The solid lines show the "adjusted" rate, accounting for differences by coding period as described in the previous section and in appendix E.

Both the PSID and the CPS show an increase in occupation changing rates over time. The PSID shows a particularly steep increase in changing among women, although this result was not replicated in the CPS. The dashed lines in the figures show the estimated trend if age, education, and occupation mixes had stayed constant. These results show that the trend is basically unchanged when these factors are held constant. Additional analysis (not shown) found that the increase in occupation changing in the PSID and CPS occurred across all age groups.

In summary, all three datasets show evidence of an increase in occupation changing over time for privately employed workers. The results for government workers (not shown) are less conclusive. The remainder of the paper, therefore, will focus on privately employed workers.

DOT characteristics

Figure 5 explores whether the increase in occupation changing occurred across certain types of skills or work tasks more than others. As discussed earlier, I examined six dimensions of

DOT characteristics of occupations and created measures indicating whether an individual saw a large change in a given DOT dimension. The raw results of these DOT measures were quite variable year-to-year. Figure 5 therefore displays the weighted means of the fitted (predicted) values from the probit estimates, which smooth some of the year-to-year variation. Each line represents the trend in occupation changing across a specific job dimension (DOT measure) over time. The lines all start at similar levels because they are all "standardized" to the level of change in the first five years of the survey (see footnote 3). In other words, the lines indicate an increase or decrease in changing within the DOT measure compared to the baseline level of changing in the 1968-1972 period. The standardization causes the lines to all start at a similar point, but the fact that most of the lines increase over time at the same rate is not due to the standardization. The consistent upward trend across most DOT measures indicates that the increase in occupation changing across most dimensions of work characteristics. Perhaps the only exception is levels of repetitiveness among men, which remained quite flat over time (the only value without a statistically significant increase).[9] There was therefore little change in the extent to which men switched between repetitive and non-repetitive jobs.

In general, though, the results suggest that increase in occupation changing occurred across most types of skills levels and work tasks. In other words, the increase in occupation changing was not limited to people changing back and forth between similar types of occupations. Instead the trend indicates increasing changing across all types of occupations.

---

[9] Statistical significance here is measured through the β_1 coefficient from equation 1. The results come from separate probit estimates for each of the DOT measures with the outcome measure set to one if the individual changed between occupations that were very different on this DOT characteristic and set to zero if the individual either did not change occupations or changed between occupations that were similar along this DOT characteristic.

Results by occupation

Figure 6 and Figure 7 show the occupation changing rates separately by major occupation group in time 1 for the PSID and CPS respectively. [10,11] Again these figures show the fitted values to smooth out year-to-year variation. It should also be noted that most of the differences in slopes between the occupations are not statistically significant[12] due to both year-to-year volatility and the smaller samples sizes when divided into occupation groups. A comparison of the two datasets provides some evidence of reliability to the extent that the two datasets provide similar results, but caution should be used in reading too much into these figures.

The PSID and CPS show only moderate agreement on the levels and trends of occupation changing by occupation group. For men (Figure 6), both datasets show high levels of occupation changing for laborers and clerical workers, and low levels of changing for professionals. Both datasets also show small to moderate increases in occupation changing across most occupation groups for men, but downward trends in service and sales occupations (in the CPS these trends are significantly different). The PSID shows an increase in occupation changing among laborers, while the CPS shows a flat or even slightly declining trend.

For women (Figure 7), both datasets show high change rates for laborers and craftsmen and low rates for professionals. Both datasets show an increase in occupation changing within

---

[10] The NLS does not have a large enough sample size to support this detailed analysis.

[11] The analysis was based upon ten occupation groups, but the figures only display results for eight groups. The remaining two groups, farm occupations and the military, had such small sample sizes that the results were very volatile.

[12] The coefficients for β_5 in equation two, the interactions between year and dummy variables for occupation group, are generally not significant.

operative, clerical, and service workers, although the PSID shows much steeper increases for operatives and service workers than the CPS. The two datasets appear to disagree on whether occupation changing has increased or decreased over time for laborer and professional groups. For the remaining occupations (craftsmen, managers, sales), the PSID shows increases in occupation changing in the 1970's before the coverage of the CPS and then both data sources show flat trends after 1980.

In summary, the results by occupation group are mixed. There is some evidence that the increase in occupation changing differed by type of occupations. Interestingly, the groups with increasing or decreasing trends are quite different between men and women. For instance, occupation changing appears to have declined among men in service occupations, but increased among women in service occupations. These differences may reflect differences in the types of occupations held by men versus women even when they are in the same major occupation group.

Results by education

Figures 8 though 12 examine whether the trends in occupation changing differed by educational attainment. Figure 8 and Figure 9 show the results from the NLS for men and women respectively. Both figures indicate that there was an increase in occupation changing in all education groups, but that for individuals with a high school degree or more this increase primarily occurred at younger ages, with rates roughly similar by age 30 for these more educated groups.

Figure 10 and Figure 11 show the results from the PSID and CPS respectively.[13] These figures indicate that the increase in occupation changing was concentrated among less-educated groups, with the college-educated seeing little or no increase in occupation changing over time. Interestingly, the figures indicate that college-educated women started with particularly high levels of occupation changing, but that this rate has stayed level over time while the rates for less-educated women have surpassed it. These results suggest that some of the initial low levels of occupation changing among women may have been due to a lack of opportunities, with less-educated women being particularly restricted to a limited set of occupations. These results point to a final question: does the increase in occupation changing indicate an increase in opportunities or simply an increase in instability?

Upward vs. downward moves

The results so far have shown that American workers are changing occupations more frequently than in the past, but it is not clear whether these trends are particularly good or bad. To get at this question, I examined the extent to which occupation changing was accompanied by increases or decreases in two types of labor market rewards: occupational prestige and earnings.

Figure 12 shows the proportion of private workers employed both years who changed occupations in the NLS, dividing these changes into upward, downward and lateral movements in terms of prestige. The results show that all three types of moves increased in the 1979 cohorts (the solid lines vs. the dashed lines), although there was perhaps a greater increase in both up and down moves compared to lateral moves at younger ages. Figure 13 shows the results on the same

[13] Unlike the previous figures 5-7, which used fitted values, these figures present the raw "adjusted" rates: the original values adjusted only for differences in coding periods.

measure over time using the PSID. The figure shows that the increase in occupation changing in the PSID occurred through increases in both upward and downward changes, with lateral changes staying fairly constant over time. For men, there was slightly larger increase in upward compared to downward changes.[14]

Finally, Figure 14 shows upward, downward and lateral movements in terms of earnings using the CPS. These results tell a slightly different story for the men, showing a slight decline in upward changes and a larger increase in downward changes. The differences between the prestige and earnings results suggest that the economic returns to occupation changing may be declining for men, even when the change appears to be to a better type of work according to prestige. Women, on the other hand, showed increases in both upward and downward changes. Their pattern, therefore, is one of general instability rather than specifically positive or negative changes.

Conclusions

The results presented above show consistent evidence across all three datasets of an increase in occupation changing over time among workers in the private sector. This trend is not simply an echo of the increase in employer changing. The results indicate that the increase in occupation changing was larger than the increase in employer changing and occurred even among individuals staying with the same employer. Contrary to expectations, this increase in occupation changing was just as high if not higher among women compared to men. This trend

[14] Trend for upward moves is statistically significant for both men and women. The increasing trend in downward moves is statistically significant for women but only marginally significant for men. For both men and women there is no significant trend in lateral moves.

for women may reflect an opening up of occupational opportunities for women as well as a more economy-wide increase in occupation changing.

The relationship between the increase in occupation changing and skill levels reveals some interesting and slightly puzzling results. There is fairly strong evidence that the increase in occupation changing occurred primarily among workers with less than a college education. This result seems to contradict much of the imagery of the 'end of work' literature. The "protean career," for instance, is a story of the pursuit of self-fulfillment by highly skilled workers (Hall 2002). The results here seem to tell more of a story about the disappearance of stable, lower-skilled work.

The results by occupation group and DOT characteristics, however, do not fit neatly into a purely skill-based story. The trends by occupation group show some variation by occupation type, but this variation does not seem to occur along skill lines. For instance, there was an increase in occupation changing among male professionals but a decline in occupation changing among male service and sales occupations. The DOT results, meanwhile, show that there has been an increase in occupation changing across most measures of work skills and tasks, including measures of cognitive skills and training. The results, therefore, are not necessarily telling a story of an increasingly segmented labor market of stable, high-skill jobs separated from unstable, low-skill jobs.

The general pattern seems to show that the increase in occupation changing involved an increase in both upward and downward moves; in other words, a general increase in instability rather than specifically upward or downward mobility. Male workers, however, do show an interesting pattern of a slightly larger increase in upward prestige moves, coupled with an

increase in downward earnings moves. These results may be due to a declining economic value of what have traditionally been more prestigious male jobs.

Should we be concerned about a rise in occupational instability beyond this increase in downward earnings moves for men? Is increased occupation changing in itself a good or bad thing? Sennett (2006: 5) clearly believes that increased instability is harmful and that many people are having difficulty adapting to the New Economy: "Most people are not like this; they need a sustaining life narrative, they take pride in being good at something specific, and they value the experiences they've lived through." From Sennett's point of view, therefore, the increase in occupation changing could have societal ramifications that extend well beyond the labor market. Yet Strangleman (2007) warns against falling into the trap of nostalgia for the past. There is certainly evidence that stable work can have negative aspects (e.g. Milkman 1997: Ch. 2; Whyte 1956). The low rates of occupation changing among less-educated women in earlier years, for instance, may have been due more to the limited number of occupations open to women rather than any sort of voluntary stability. Furthermore, Strangelman (2007) suggests that perhaps our current period is not all that unusual, that it is in fact the unusually stable post-WWII period that should be viewed as the exception. Perhaps the New Economy is not so new, but is rather a return to pre-war employment patterns. Even if this is the case, though, it is clear that the post-WWII career model has become the normative standard, whether logical or not, and the current departure from this model has caused real anxiety.

Finally, the results of this study have implications for sociological theory, in particular theories of social class. If people are changing occupations more frequently than in the past, one might expect a reduction in the identification with and consequences of these positions. Kingston (2000) has argued that class identification has disappeared and Bauman (2005) suggests that we

are now defined more by consumption patterns than by work patterns. Further research, however, would be useful on this topic. Have we seen increased variation in cultural patterns and/or life outcomes by occupational group (defined either at the detailed or large group level)? In other words, are occupations becoming less cohesive, less of a homogenizing force over time? Research into these types of questions would provide further insights into the social consequences of these labor market trends.

References

Althauser, Robert P. and Arne L. Kalleberg. 1981. "Firms, Occupations, and the Structure of Labor Markets: A Conceptual Analysis." Pp. 119-148 in *Sociological Perspsectives on Labor Markets*, edited by I. Berg. New York: Academic Press.

Arthur, Michael B. and Denise M. Rousseau. 1996. "The Boundaryless Career: A New Employment Principle for a New Organizational Era." Pp. 408. New York: Oxford University Press.

Bauman, Zygmunt. 2005. *Work, Consumerism and the New Poor*. New York, NY: Open University Press.

Bernhardt, Annette, Martina Morris, Mark S. Handcock, and Marc A. Scott. 2001. *Divergent Paths: Economic Mobility in the New American Labor Market*. New York: Russell Sage Foundation.

Farber, Henry S. 2008. "Employment Insecurity: The Decline in Worker-Firm Attachment in the United States." Working Paper No. 530, Princeton University Industrial Relations Section, Princeton, NJ.

Fitzgerald, John, Peter Gottschalk, and Robert Moffitt. 1998. "An Analysis of Sample Attrition in Panel Data." *Journal of Human Resources* 33:251-299.

Goldthorpe, John H. and Abigail McKnight. 2006. "The Economic Basis of Social Class." Pp. 109-136 in *Mobility and Inequality*, *Frontiers of Reserach in Sociology and Economics*, edited by S. Morgan, D. B. Grusky, and G. S. Fields. Stanford, California: Stanford University Press.

Grusky, David B. and Jesper B. Sørensen. 2001. "Are There Big Social Classes?" Pp. 183-194 in *Social Stratification: Class, Race, and Gender in Sociological Perspective*, edited by D. B. Grusky. Boulder, CO: Westview Press.

Grusky, David B. and Kim A. Weeden. 2001. "Decomposition without Death: A Research Agenda for a New Class Analysis." *Acta Sociologica* 44:202-218.

Hall, Douglas T. 2002. *Careers in and out of Organizations*. Thousand Oaks, CA: Sage Publications.

Handy, Charles B. 1989. *The Age of Unreason*. Boston, Mass.: Harvard Business School Press.

Kambourov, Gueorgui and Iouri Manovskii. 2004. "Rising Occupational and Industry Mobility in the United States: 1968-1993." Working Paper No. 04-012, Penn Institute for Economic Research, Philadelphia.

Kambourov, Gueorgui and Iourii Manovskii. 2008. "Rising Occupational and Industry Mobility in the United States: 1968-97." *International Economic Review* 49:41-79.

Kingston, Paul W. 2000. *The Classless Society*. Stanford, Calif.: Stanford University Press.

Mathiowetz, Nancy A. 1992. "Errors in Reports of Occupation." *Public Opinion Quarterly* 56:352-355.

Milkman, Ruth. 1997. *Farewell to the Factory : Auto Workers in the Late Twentieth Century*. Berkeley: University of California Press.

Moscarini, Guiseppe and Francis Vella. 2003. "Aggregate Worker Reallocation and Occupational Mobility in the United States 1976-2000." Mimeo, Yale University, New Haven, CT.

National Academy of Sciences. 2001. "Dictionary of Occupational Titles (Dot): Part I- Current Population Survey, April 1971 Augmented with Dot Characteristics." Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor]. Washington, DC: U.S. Dept of Commerce, Bureau of the Census [producer].

Neumark, David. 2001. "On the Job: Is Long-Term Employment a Thing of the Past?". New York: Russell Sage Foundation.

Parkin, Frank. 1971. *Class Inequality and Political Order: Social Stratificationin Capitalist and Communist Societies*. London: MacGibbon & Kee.

Priebe, J.A., J. Heinkel, and S. Greene. 1972. "1970 Occupation and Industry Classifications in Terms of Their 1960 Occupation and Industry Elements." Technical Paper No. 26, U.S. Government Printing Office, Washington, D.C.

Sennett, Richard. 1998. *The Corrosion of Character : The Personal Consequences of Work in the New Capitalism*. New York: Norton.

—. 2006. *The Culture of the New Capitalism*. New Haven: Yale University Press.

Strangleman, Tim. 2007. "The Nostalgia for Permanence at Work? The End of Work and Its Commentators." *The Sociological Review* 55:81-103.

Tolbert, Pamela S. 1996. "Occupations, Organizations, and Boundaryless Careers." Pp. 331-349 in *The Boundaryless Career: A New Employment Principle for a New Organizational Era*, edited by M. B. Arthur and D. M. Rousseau. New York: Oxford University Press.

Weeden, Kim A. 2002. "Why Do Some Occupations Pay More Than Others? Social Closure and Earnings Inequality in the United States." *The American Journal of Sociology* 108:55-101.

—. 2005. "Stata Algorithm for Backcoding 1980 Census Occupation Codes into 1970 Census Occupation Codes." Department of Sociology, Cornell University.

Weeden, Kim A., Young-Mi Kim, Matthew Di Carlo, and David B. Grusky. 2007. "Social Class and Earnings Inequality." *American Behavioral Scientist* 50:702-736.

Whyte, William Hollingsworth. 1956. *The Organization Man*. New York,: Simon and Schuster.

Wright, Erik Olin. 2005. "Foundations of a Neo-Marxist Class Analysis." Pp. 4-39 in *Approaches to Class Analysis*, edited by E. O. Wright. New York, NY: Cambridge University Press.

Zabel, Jeffrey E. 1998. "An Analysis of Attrition in the Panel Study of Income Dynamics and the Survey of Income and Program Participation with an Application to a Model of Labor Market Behavior." *The Journal of Human Resources* 33:479.

Table 1. Description of DOT measures.

Code	Description	Sample Occupations: High	Sample Occupations: Low
Cognitive skills & training			
skill	High values on all skill measures and training measure	physicist, geologist, professor	bootblack, laborer in tobacco manufacturing, private laundress
training	Moderate to low levels on skill measures but long training required	brickmason, professional nurse, jeweler/watchmaker	real estate agent, bank teller, bookkeeper
Remaining DOT Measures			
manual	Manual work with some precision vs. nonmanual work	roofer/slater, carpenter's helper, millwright	clergyman, lawyer, professor
repetitive	Repetitive low-autonomy work vs. abstract work with data & decision-making	bootblack, shipbuilding laborer, laborer	physicist, doctor, veterinarian
clerical	Precise low autonomy clerical indoors vs. outdoor work requiring decision-making	bank teller, stenographer, secretary	fireman, farmer, construction inspector, sailor
people vs. technical	Working with people and under stress vs. working with techniques and precision	sheriff, fireman, professional nurse	accountant, mathematician, statistician

Figure 1. Overall trends in occupation changing, NLS.

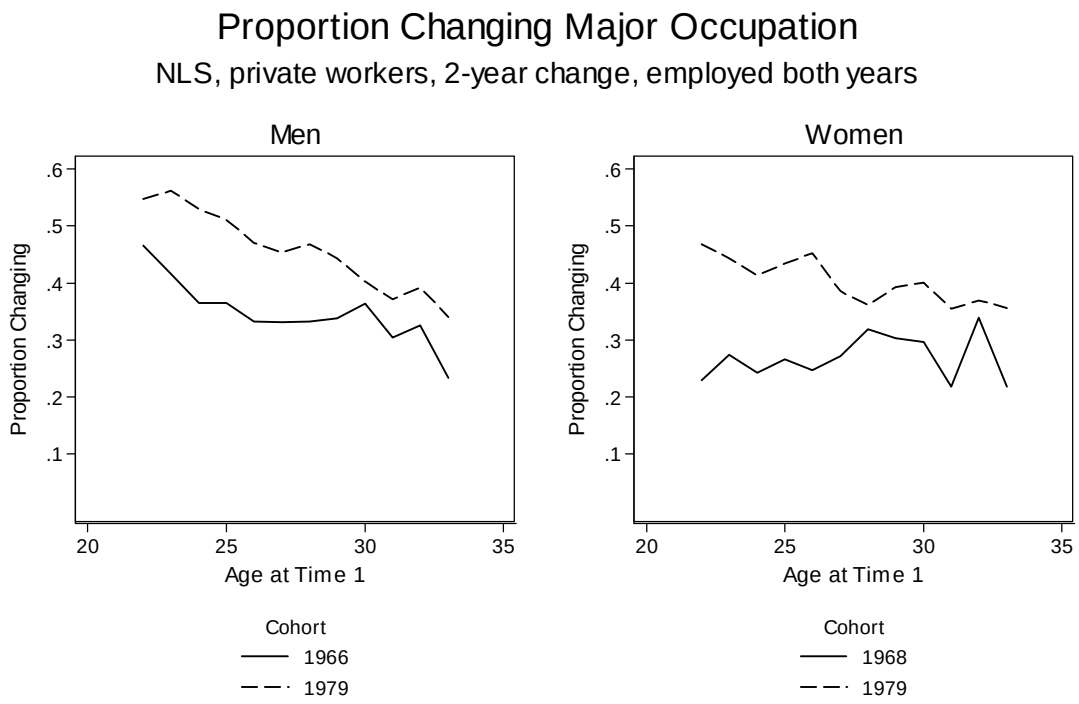


Figure 2. Trends in employer changing, NLS.

Figure 3. Overall trends in occupation changing, PSID.

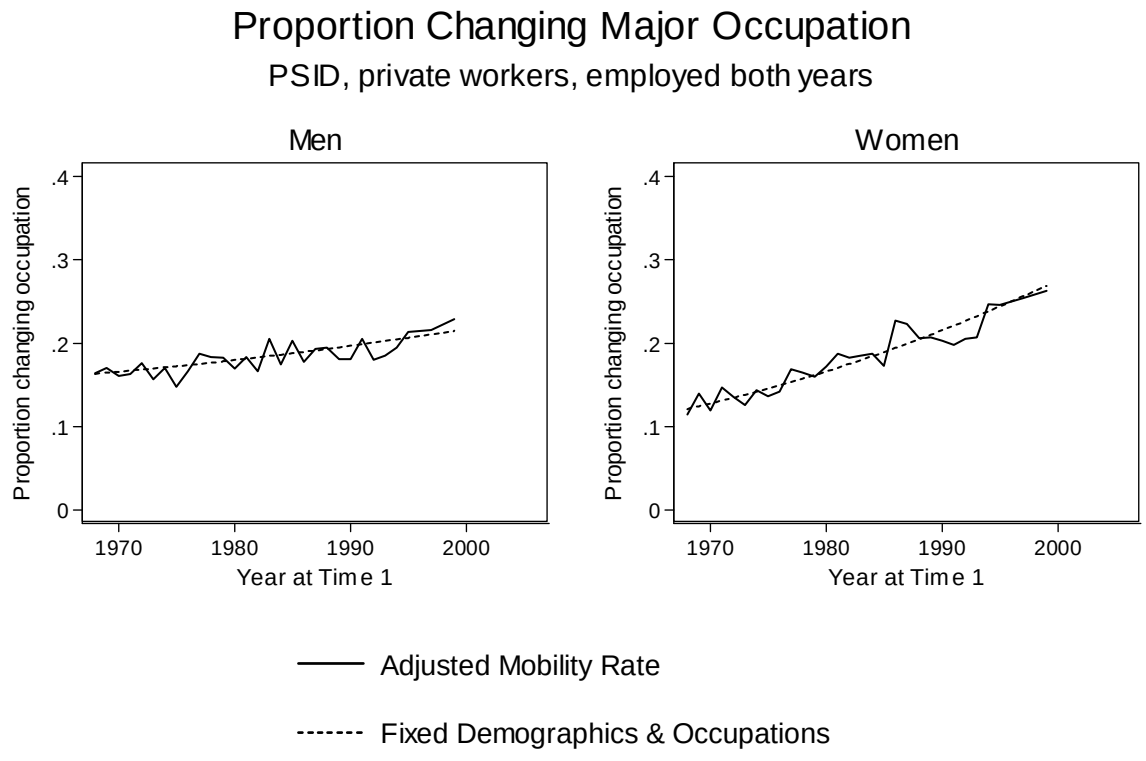


Figure 4. Overall trends in occupation changing, CPS ORG.

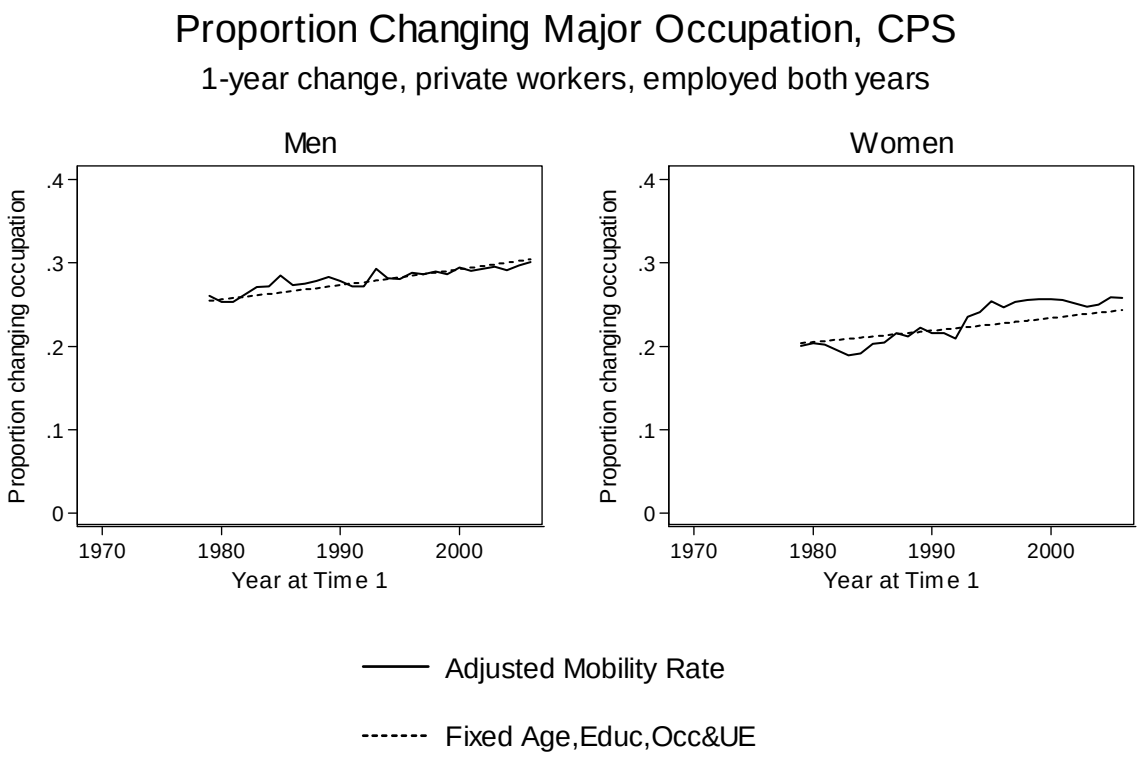


Figure 5. Trends in occupation changes accompanied by large changes in DOT characteristics.

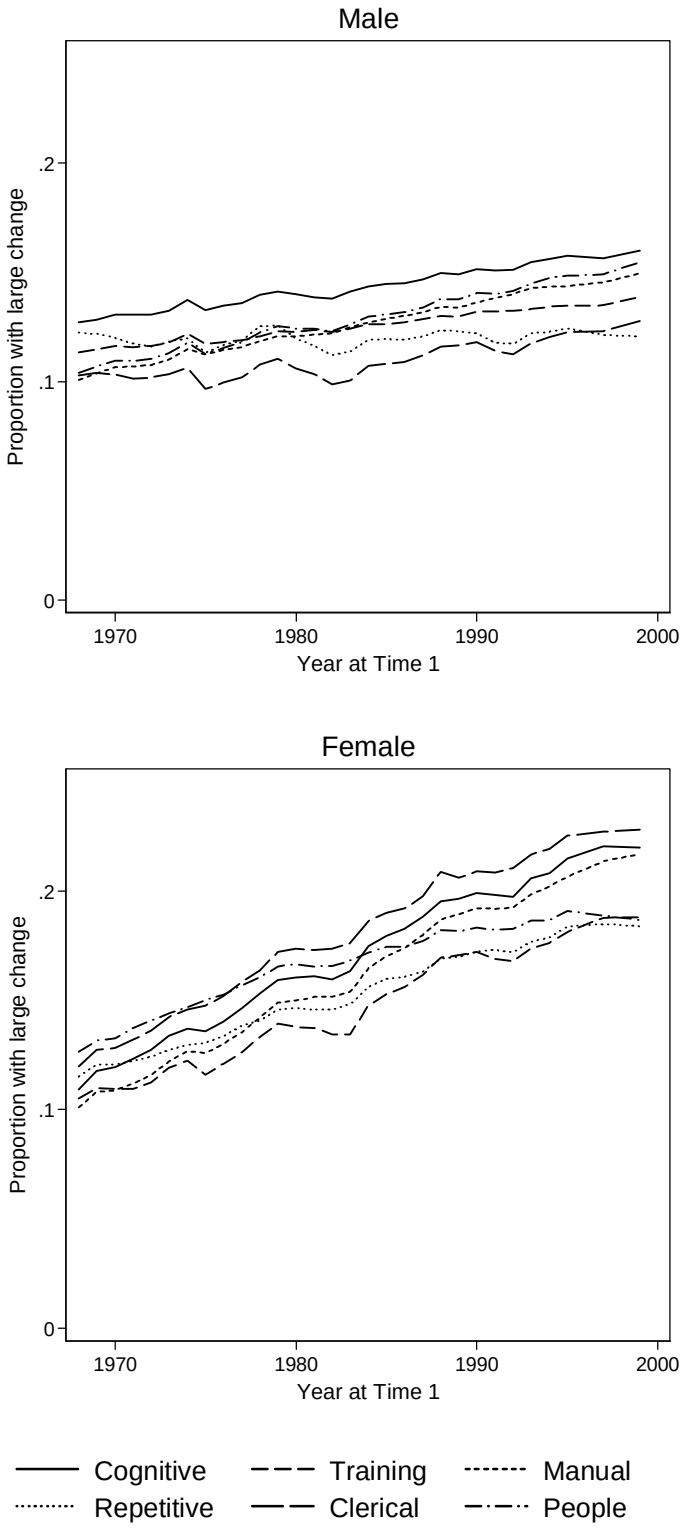


Figure 6. Trends by occupation groups, men.

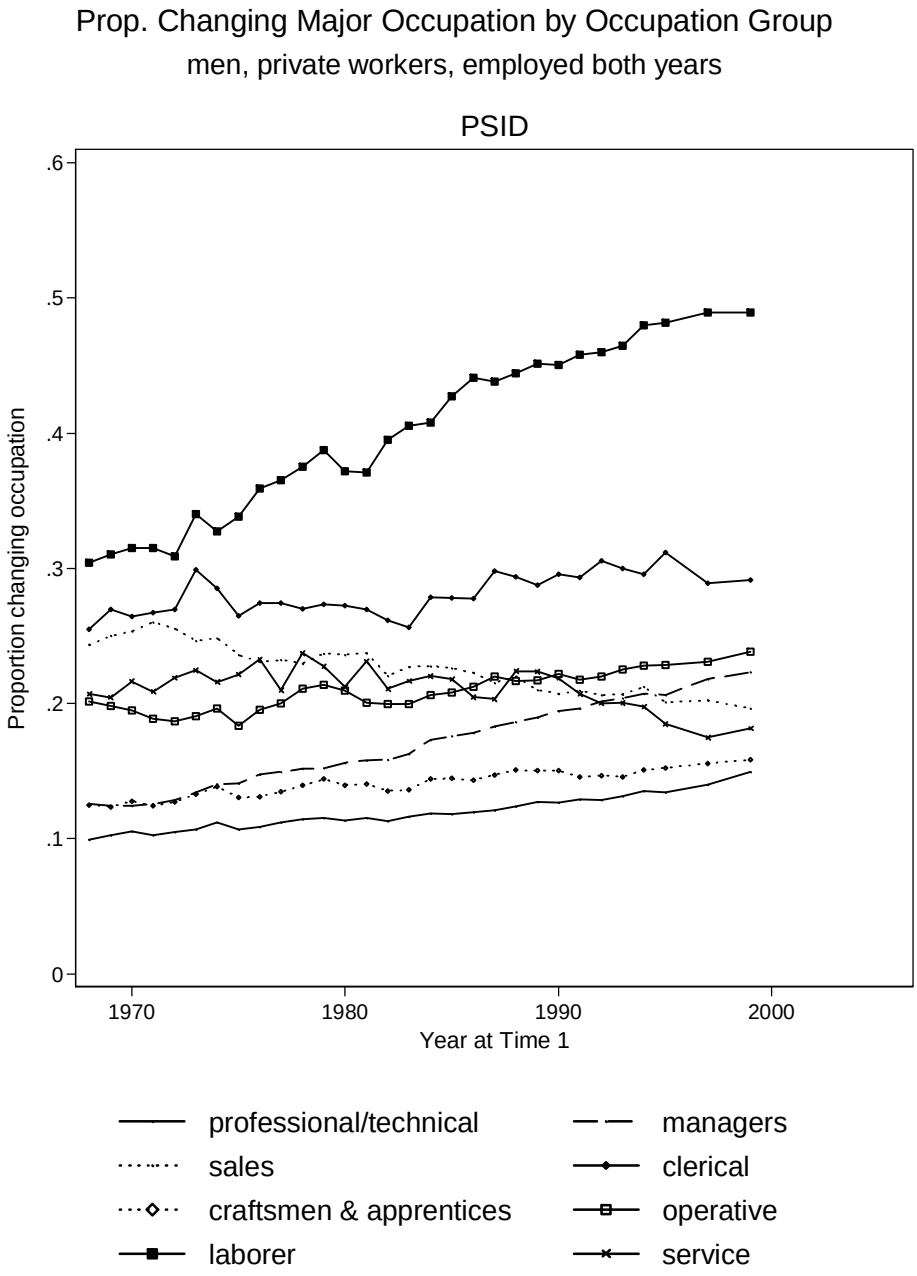


Figure 6 (cont.)

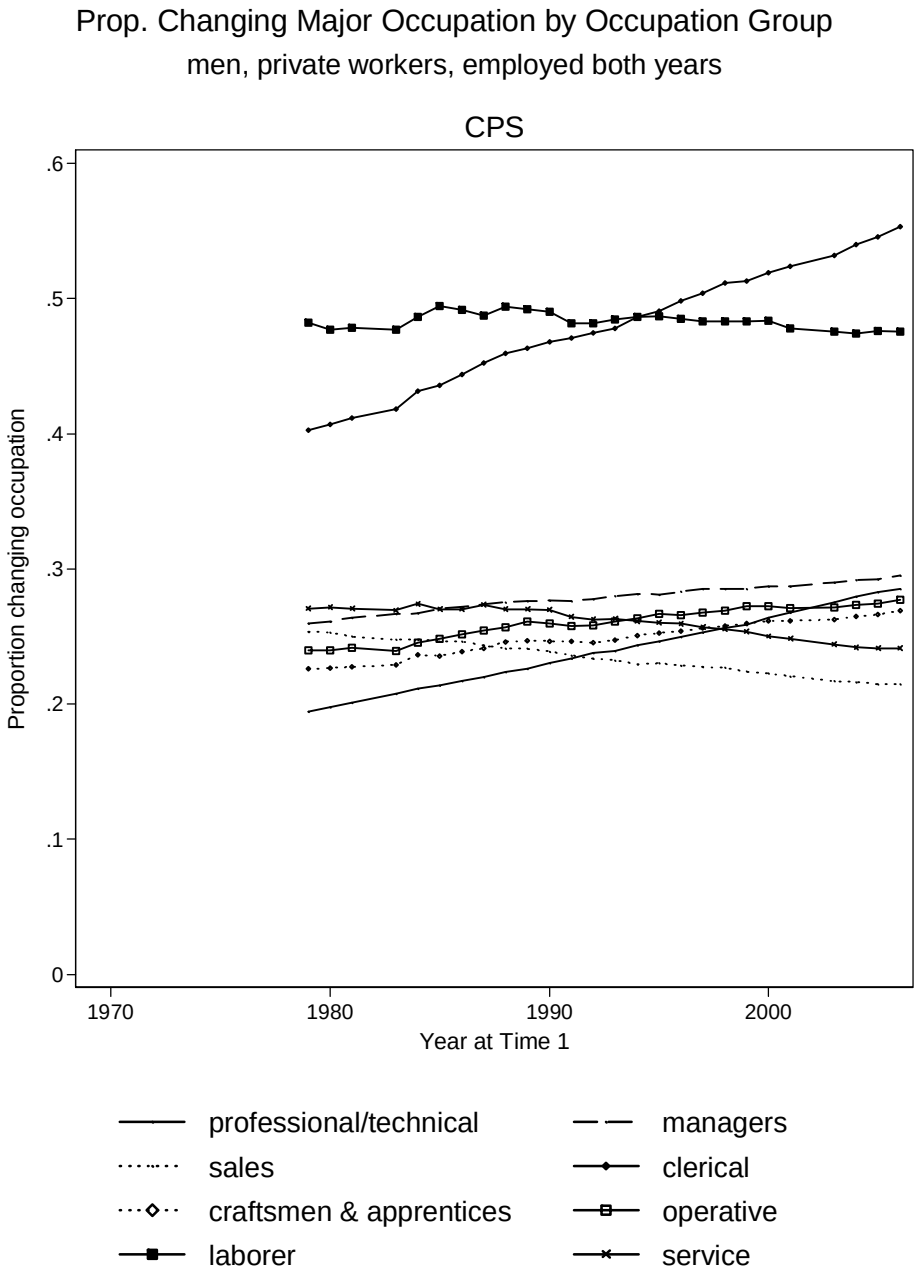


Figure 7. Trends by occupation group, women.

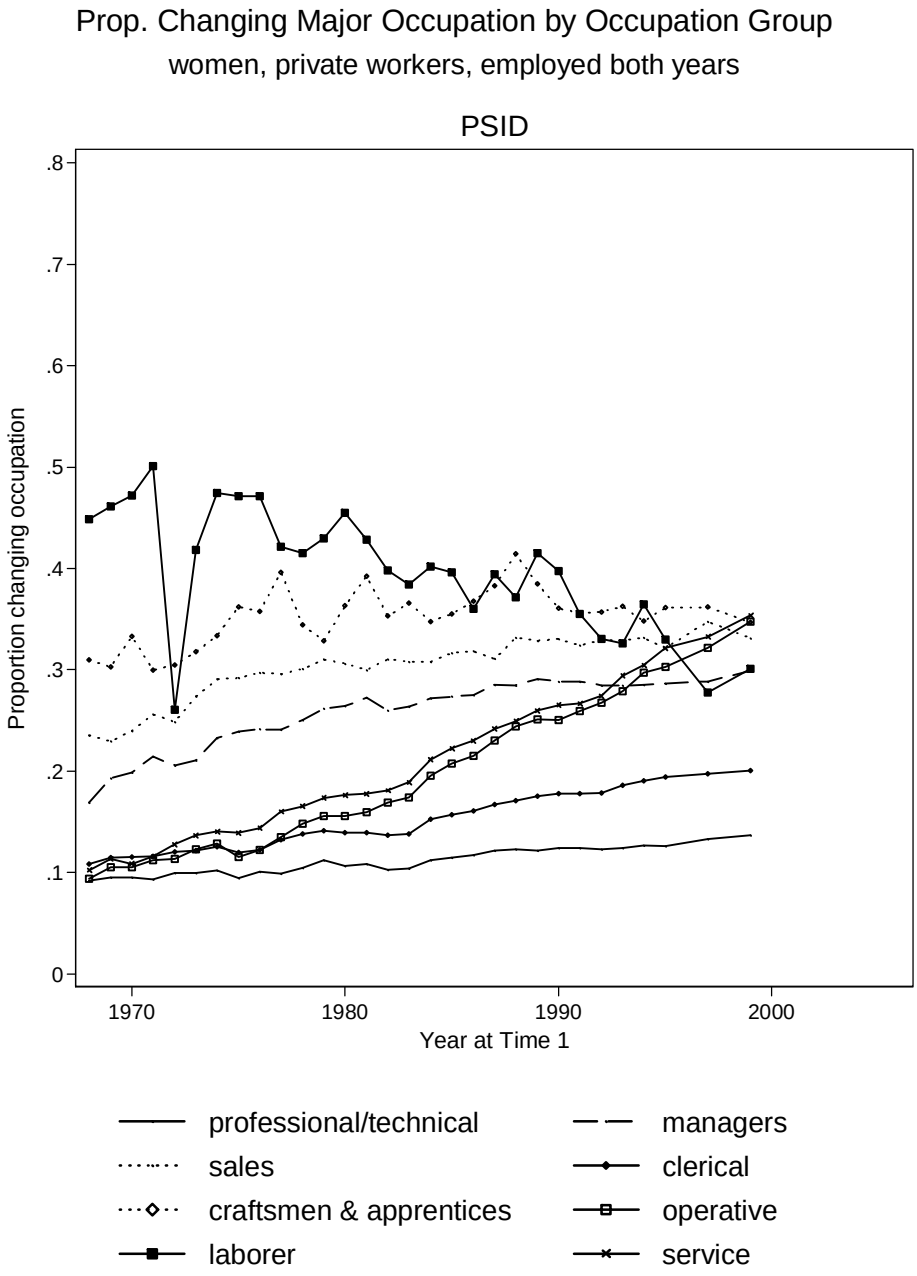


Figure 7 (cont.)

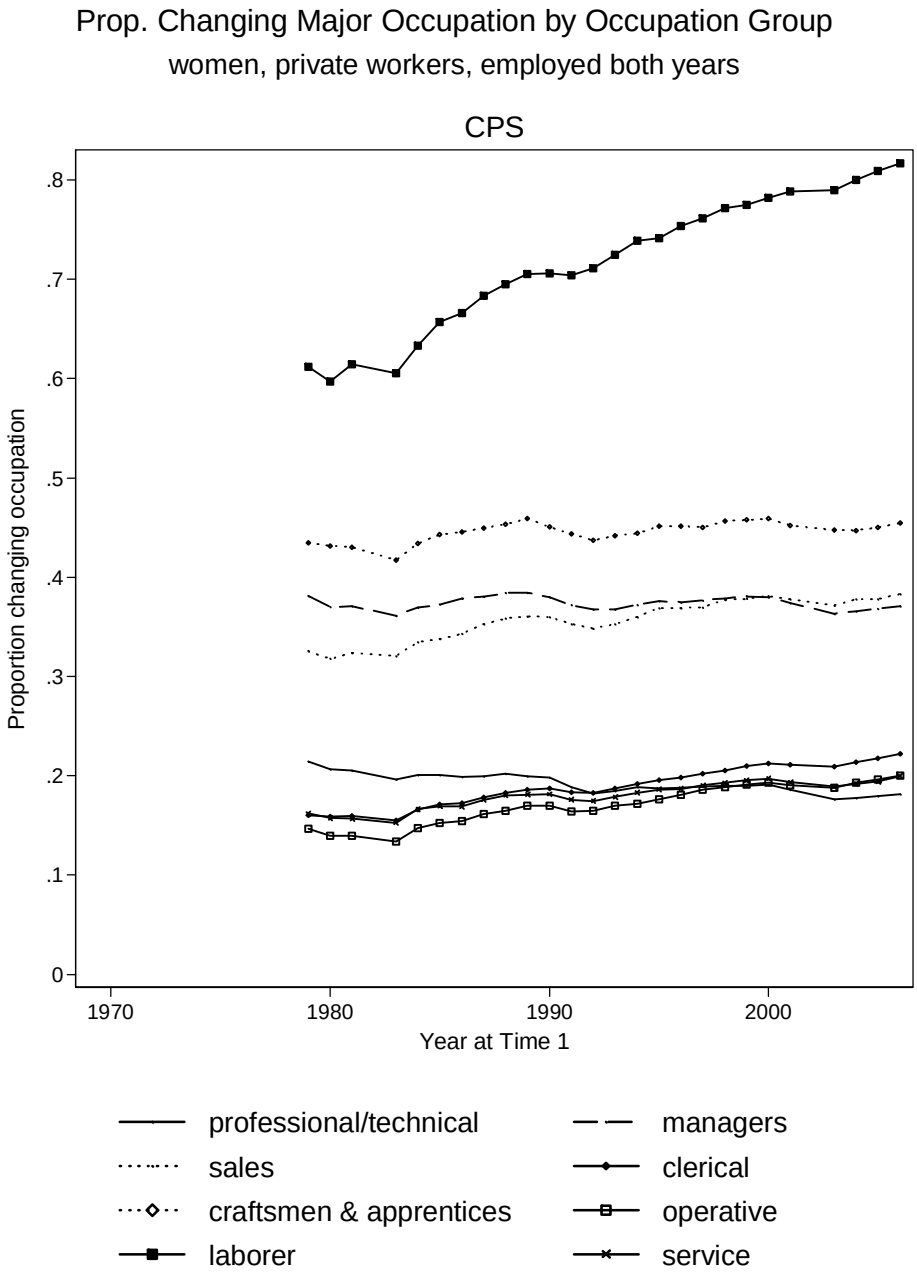


Figure 8. NLS Results by Education, men.

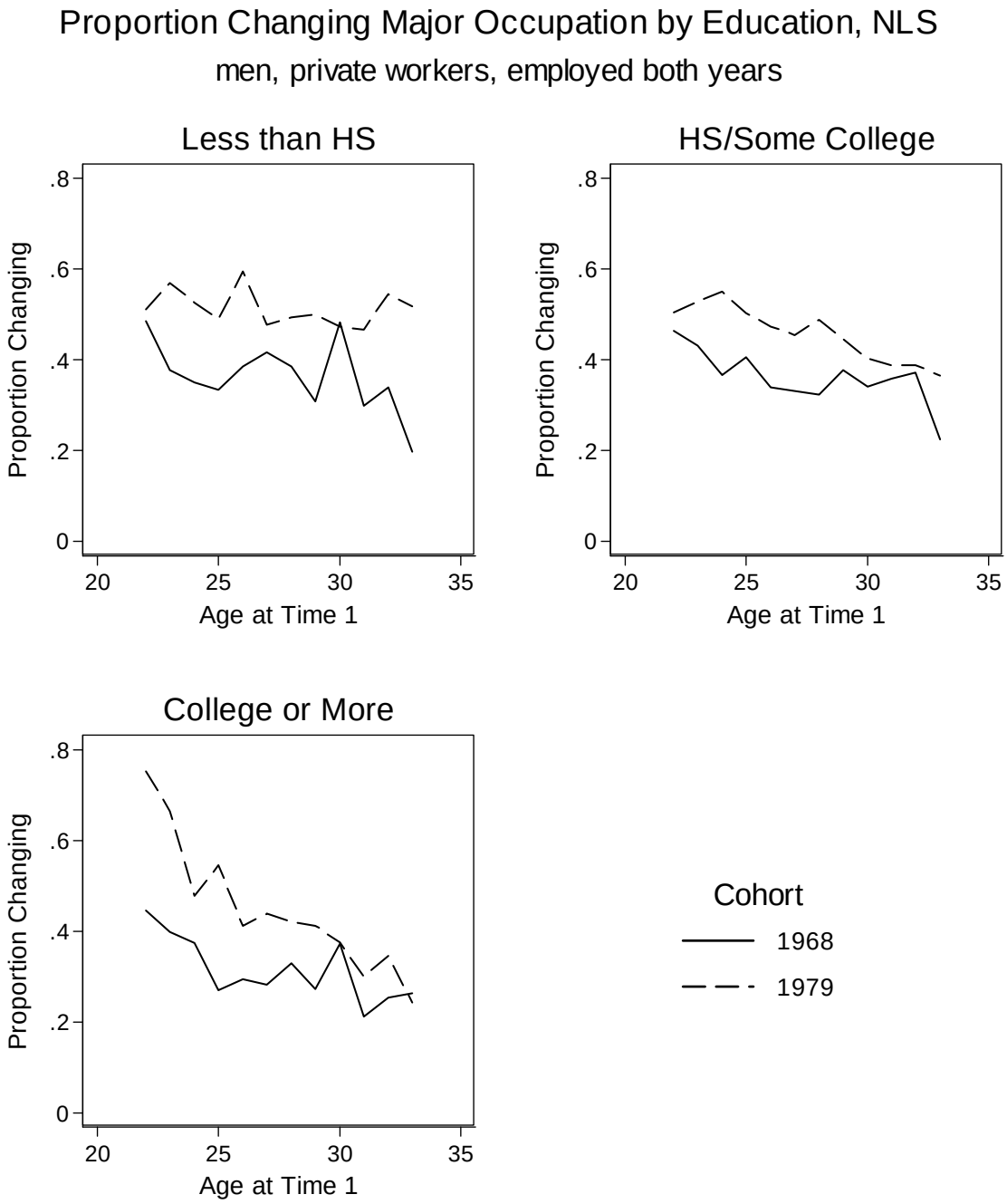


Figure 9. NLS Results by Education, women.

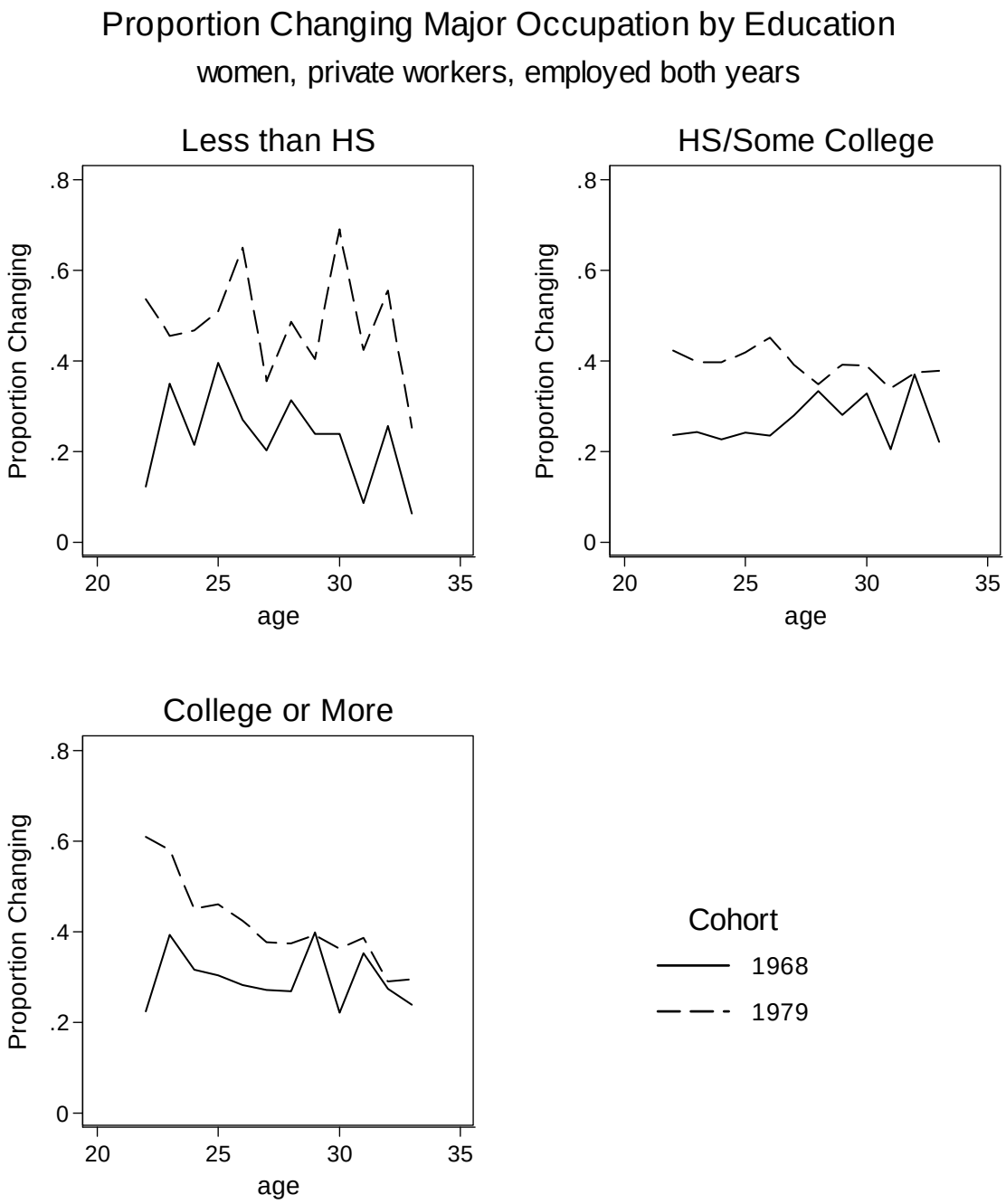


Figure 10. PSID Results by Education.

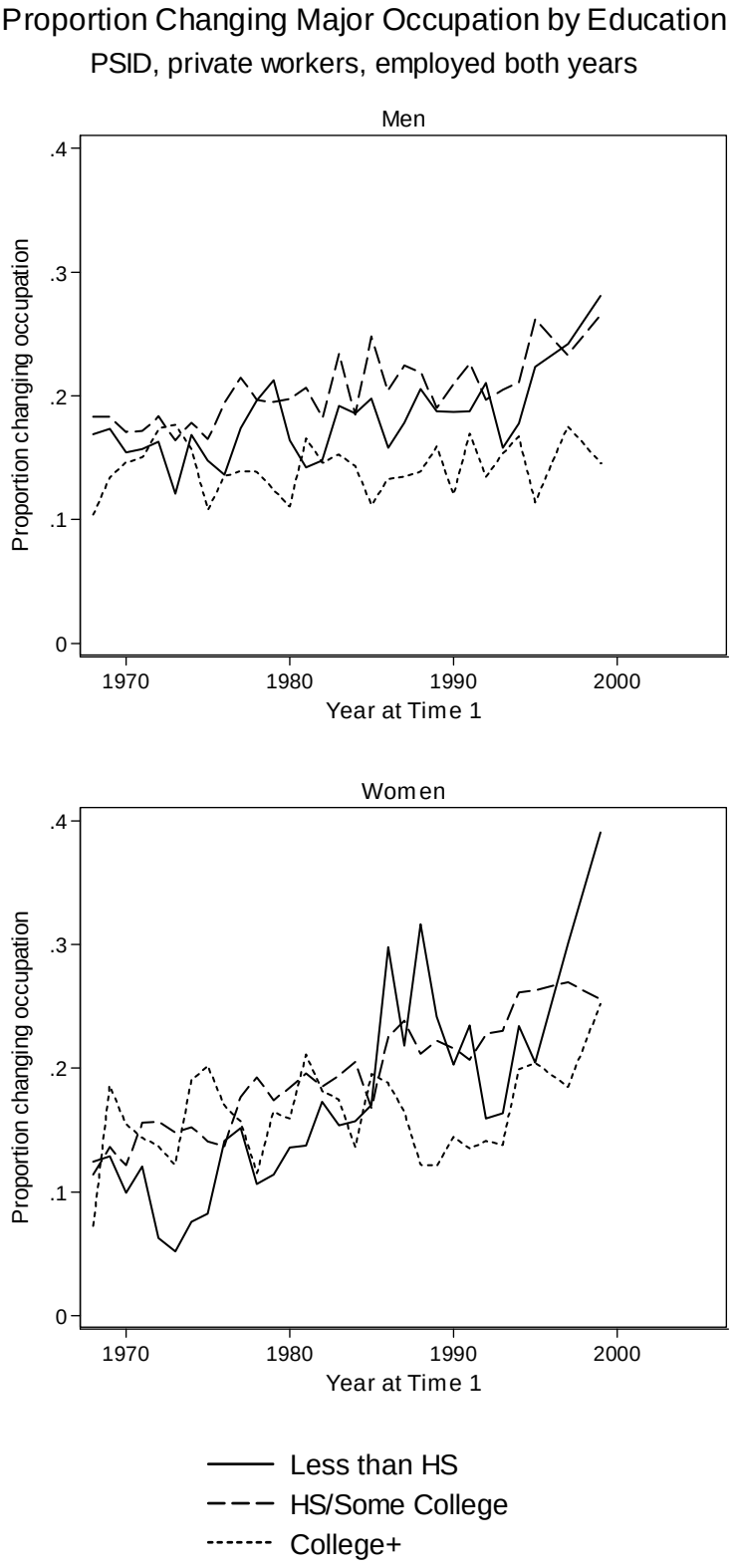


Figure 11. CPS Results by Education.

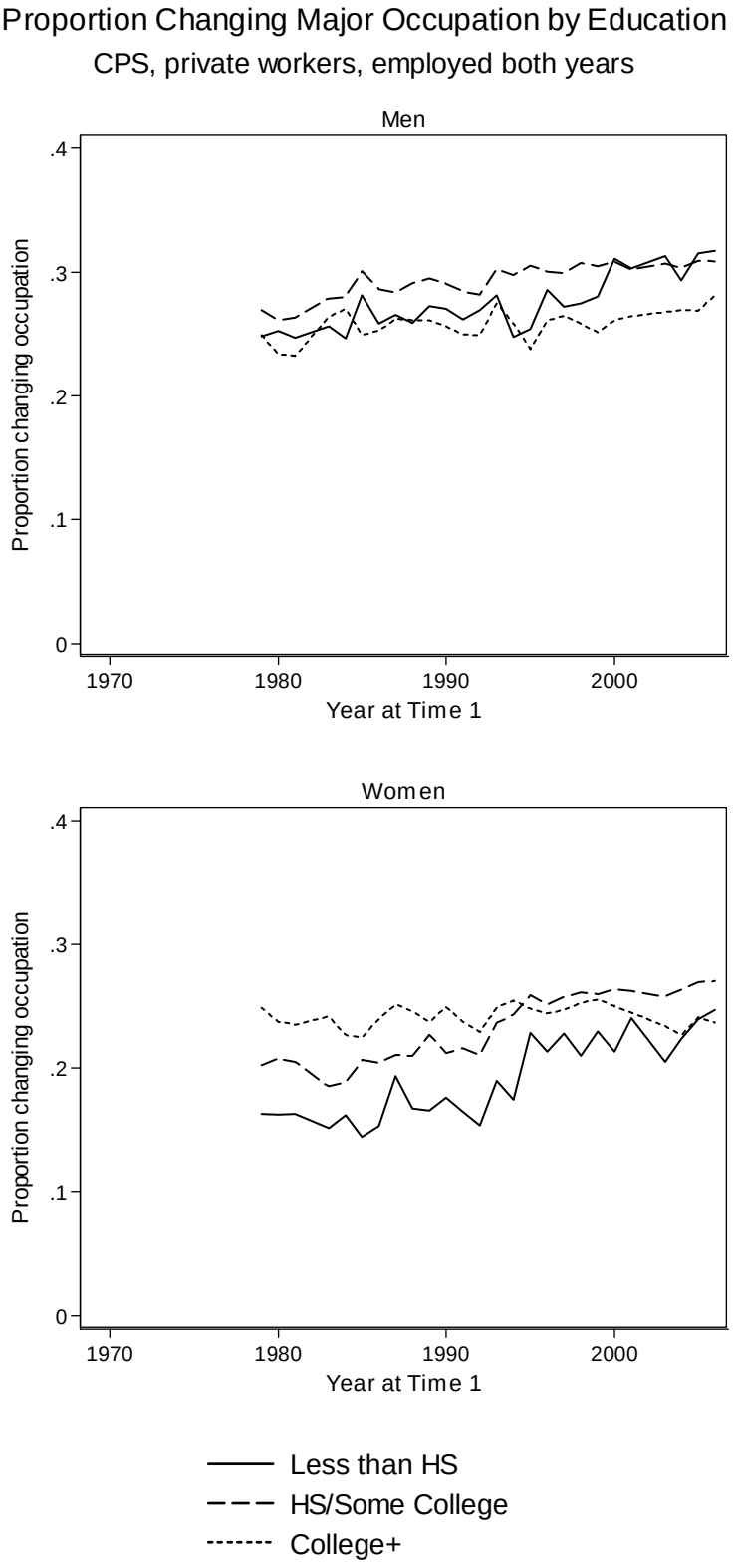


Figure 12. NLS Upward and Downward Prestige Changes.

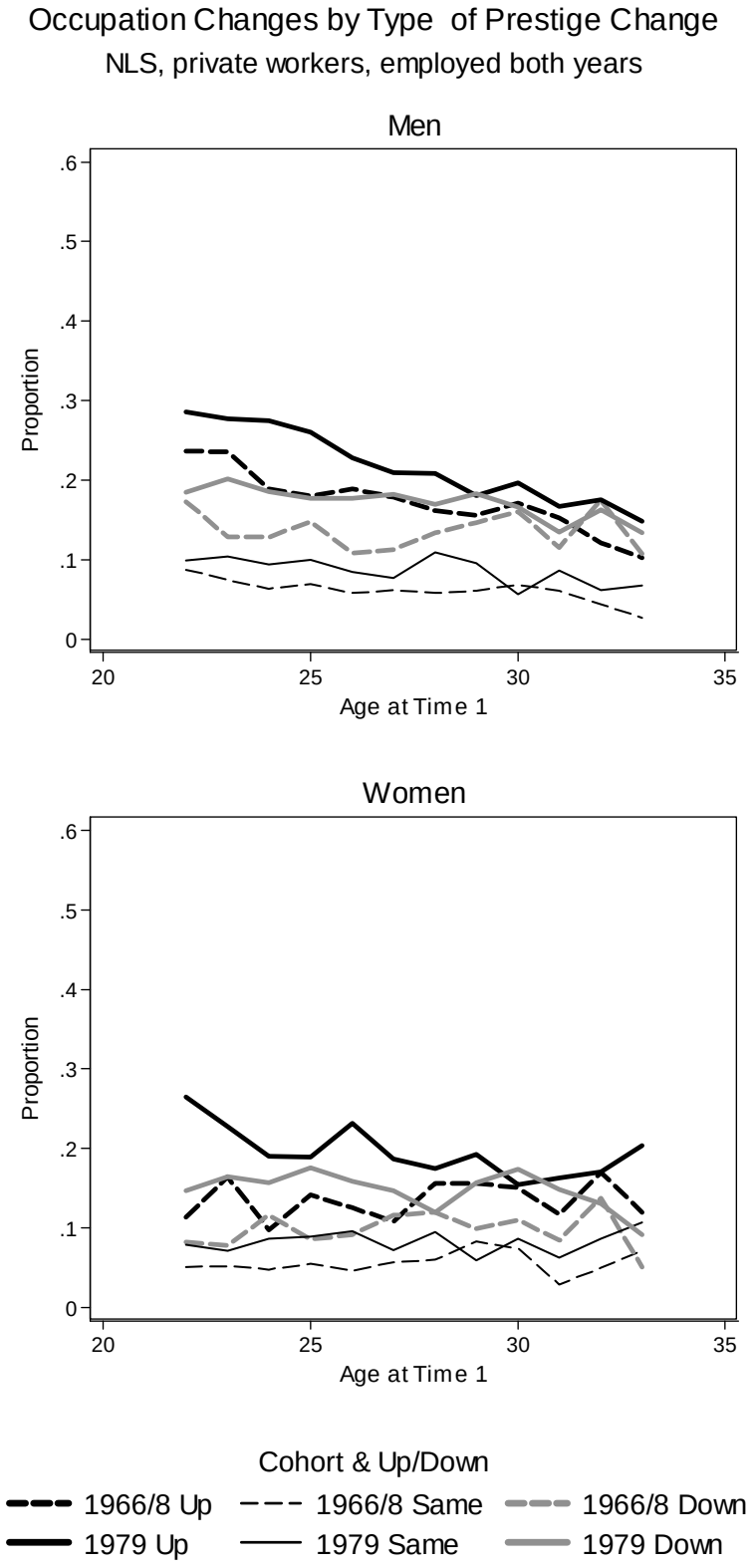


Figure 13. PSID Upward and Downward Prestige Changes.

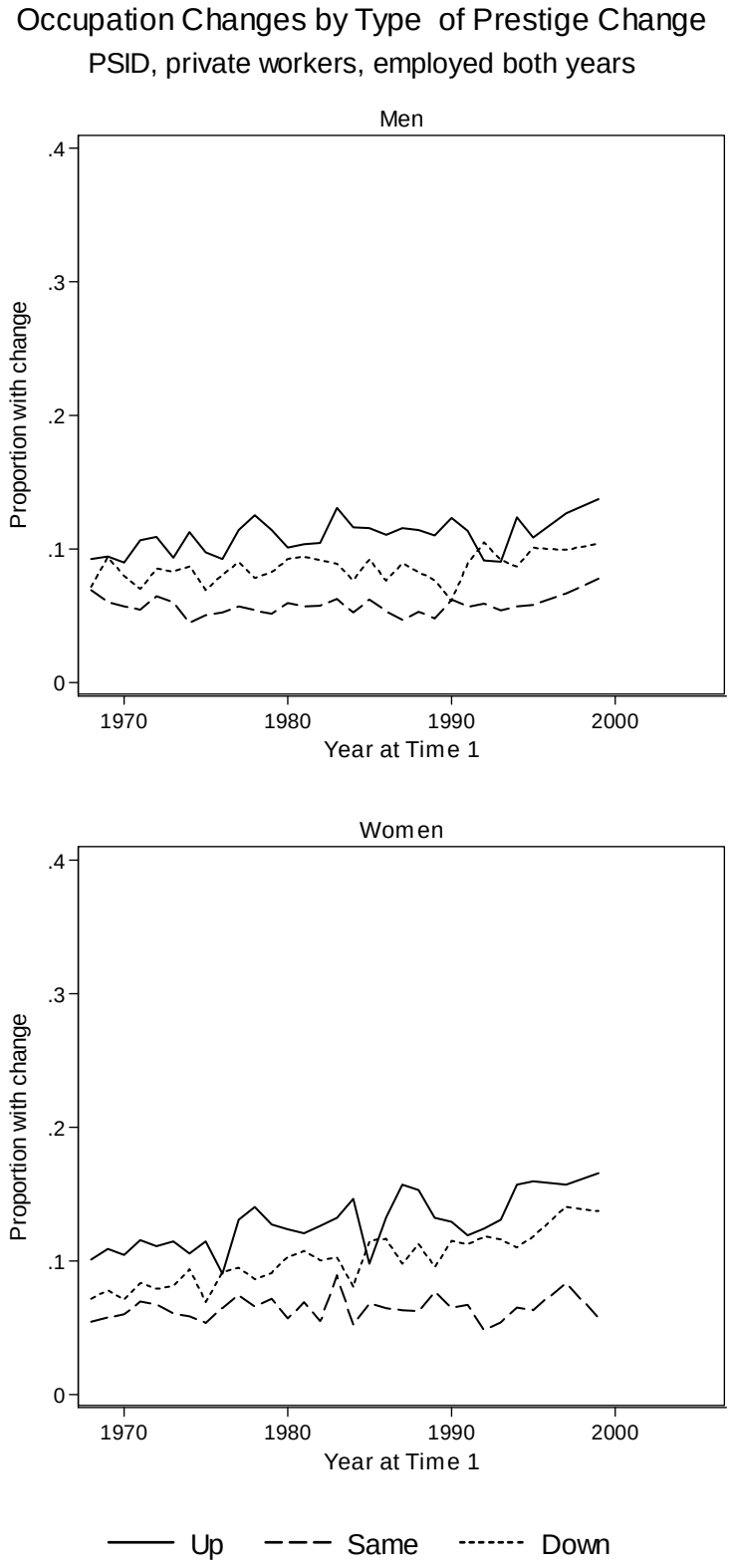
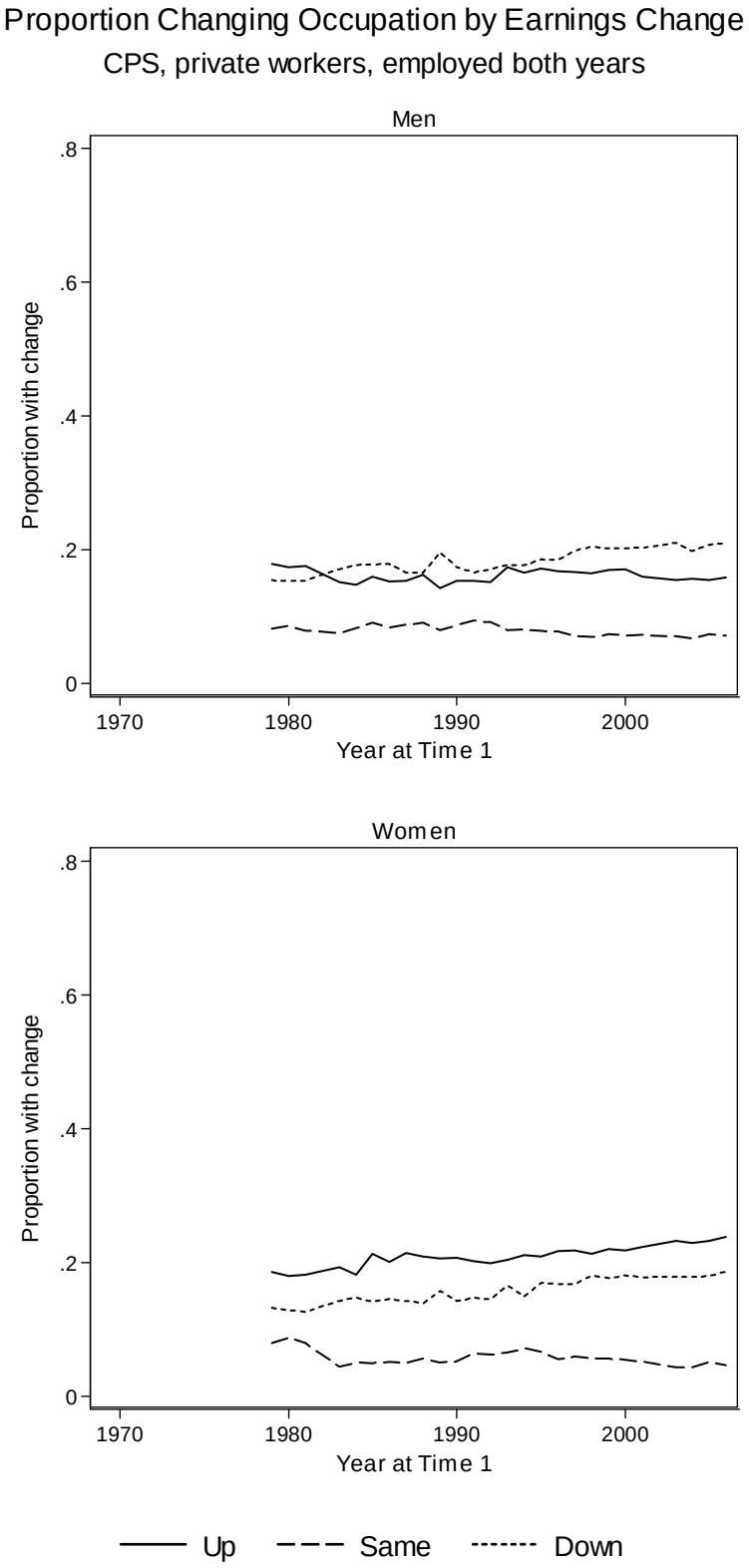


Figure 14. CPS Occupation Changes by Earnings Change.



Appendix A: The strengths and weaknesses of the three datasets

NLS

The advantages of using the NLS cohorts are that they provide moderately large samples for the specific ages and cohorts they represent (see appendix B for NLS sample size information), they provide longitudinal data for long-term change measures, and they provide very good data for tracking employer changes as well as occupation changes.

There are two major concerns in using the NLS data. The first concern is differential attrition rates. The 1979 survey involved numerous efforts and resources aimed at maintaining a high response rate. Unfortunately, the earlier cohorts did not apply the same level of effort and had considerably higher attrition rates. A direct comparison of the earlier and later cohorts, therefore, would be misleading because the attrition in the earlier cohorts was likely non-random and correlated with key characteristics such as employment stability. Since it is impossible to recover the lost observations in the earlier cohort, I chose instead to make the 1979 cohort essentially as bad as the earlier cohorts. For instance, the 1979 cohort includes a variable indicating the number of contacts that were required before obtaining the interview, which allowed me to identify individuals who probably would not have been interviewed under the earlier cohort standards. Using this information and a number of other steps documented in appendix B, I was able to closely mirror the attrition rates of the earlier cohorts. Due to this treatment of attrition, for all years of the analysis I use the sampling weights assigned to respondents in the initial year of the survey rather than the annual weights that attempt to adjust for attrition.

The second concern with the NLS data is that it relies on a comparison of just two cohorts (for each gender) to infer trends over time. It is possible that any differences identified in

this comparison are due to cohort-specific factors rather than broad economic changes. The most obvious cohort-specific factor is that over a quarter of the 1966 Men served in the military during the Vietnam War. One might expect that this high rate of military service would disrupt the labor market entry process of this cohort, prolonging the period of early career exploration. If this were the case, though, then comparing the 1966 Men to the 1979 Men should underestimate the extent to which occupation changing has increased over time, giving a lower bound to the estimate. On the other hand, one could make the argument that the Vietnam War actually increased the stability of the 1966 cohort, in particular through increased educational attainment as individuals tried to avoid the draft. As we will see, though, occupation changing increased between the two cohorts even within education groups.

In many ways the 1979 cohort presents problems that are less obvious but more problematic for this study. I have shown in another study (citation removed for anonymity) that individuals from the birth years of the 1979 cohort show particularly poor labor market outcomes. For instance, they were less likely to be employed in professional occupations at age 30 than the cohorts both before and after them. I hypothesize that these poor outcomes may be due to either demographic pressures (being at the end of the baby boom) or the long-term effects of entering the labor market during the poor economy of the early-1980s. If the 1979 cohort was particularly unstable, then comparing the earlier cohorts to the 1979 cohort may overstate the extent of the increase in occupation changing. This problem is difficult to directly address, thus the reliance on additional datasets to confirm the results.

PSID

The greatest advantage of the PSID for this study is that they have 1980 census occupation codes available for the entire survey. In the mid-1980s the PSID retrospectively

coded the verbatim descriptions from the 1968 to 1980 interviews to 1980 codes. When creating this retrospective file, coders were given the entire work history of a respondent for these years and coded the occupations together. As a result, the false changes usually created by coding year-by-year are greatly reduced. The retrospective file does pose its own problems, however, since the occupation changing rates jump considerably after 1980 when occupations are once again coded year-by-year. This jump provides a unique opportunity to measure the extent of coding errors in year-by-year data (Kambourov and Manovskii 2004), but it also poses an issue similar to changes in the occupation codes in that one has to adjust for the different rates of pre- and post-1980 occupation changes.

Like the NLSY, the PSID also suffers from problems with attrition rates. This problem is not readily apparent because the sample size is always growing as new individuals join the families in the sample. However, by 1989 only 49 percent of the individuals in the original sample were still being interviewed and the new individuals are those joining these remaining families. There is some evidence that this attrition does not create large biases in typical economic and social outcome variables (Fitzgerald, Gottschalk, and Moffitt 1998; Zabel 1998), but biases may be stronger in this case when the outcome variable is itself a measure of stability.

Unlike the NLS surveys, there is no way to completely account for this attrition and ensure that we are comparing similar individuals over time. Most of the evidence suggests, however, that individuals with lower incomes and less stable work histories are more likely to attrit from the sample (Fitzgerald, Gottschalk, and Moffitt 1998). If anything, then, the individuals remaining in the PSID should have increasingly stable labor market characteristics over time, underestimating the increase in job changing over time. In the case of the PSID, I use

the annually updated individual sampling weights as they are designed to partially counteract the effects of attrition. See appendix C for details on the PSID sample sizes.

A final issue with the PSID is that it only provides occupation data for the household "heads" and their "wives." The large majority of males and females ages 22 to 61 in the PSID are in fact designated as head or wife. This proportion has declined slightly over time, though, with 90 percent of males and 93 percent of females designated as head or wife in 1968 and 82 percent of males and 89 percent of females in 2005.

CPS

The strengths of the CPS are the very large sample size and the continuously refreshed sample, which in theory should eliminate the attrition concerns present in the longitudinal datasets. It is important to note, however, that the panel aspect of the CPS is based upon physical addresses, not individuals or families. If a new family moves into a household selected for the CPS survey, the CPS interviews this new household rather than tracking down the original occupants. The CPS matched across the one-year panel, therefore, will not include movers, which will likely underestimate the extent of occupation changing in a given period. There is some variation in matching rates over time, with 70% to 78% of observations matching. There is not a clear time trend, though, in these matching rates. See appendix D for more details on the CPS matching process as well as final sample sizes.

The CPS does change occupation coding schemes quite frequently. About every ten years the CPS adopts the new occupation codes developed by the census. The CPS and the PSID, therefore, suffer from opposite problems in terms of occupation codes. The PSID uses the same codes throughout, which provides consistency but one could argue it leads to increasing misclassification as the codes become outdated. The CPS, in contrast, updates codes regularly,

perhaps creating better fitting codes but less consistency. The advantage of using both datasets is if they provide similar results then it is difficult to argue that the coding schemes created the results.

Appendix B: NLS attrition adjustments and sample sizes

The earlier cohorts of the NLS had considerably higher attrition rates than the later cohorts.[15] Since the attrition in the earlier cohorts could not be reversed, I instead applied several rules to the other cohorts to imitate the attrition of the 1966 Men and create comparable samples. This process involved five steps: 1) Since the 1966 Male cohort was only conducted for a 15-year period, I only considered a similar 15-year span in the other cohorts. In addition, both the 1966 Men and 1968 Women skipped four interview years during this 15-year span (see below), and so I dropped the corresponding years of data for the later cohorts. 2) Any interviews that took place while the respondent was in an institution or in the military were marked as non-interviews. 3) Any interview that required more than twenty[16] calls to make contact was marked as a non-interview. 4) If a respondent was marked as refusing to participate in a given year all future years were marked as non-interviews (in the earlier cohorts, once a person refused to participate the NLS stopped trying to contact him/her). 5) If an individual had two non-

[15] The initial years of the 1968 Women had attrition problems that were similar to the 1966 Men but this improved over time. For the sake of consistency, I apply the same rules to all four cohorts.

[16] For an unknown reason, the average number of calls in the sample was considerably higher in 1987. In this year I set the threshold at 30 calls to result in a proportion of noninterviews comparable to the other years.

interviews in a row (not counting skipped survey years), all subsequent years were marked as non-interviews.[17]

Table B shows the cumulative percent attrition by age for each of the cohorts as well as the adjusted samples created by the rules above. One should note that the attrition rate accelerates considerably after age 30 in all of the adjusted cohorts because, depending upon the age at the start of the interview, the 15-year span of the surveys reaches its end between ages 30 and 37. Even before age 30, though, the adjusted samples match quite well.

Table C shows the numbers of observations used to calculate occupation changing in a given year. In order to be used in the calculation, the individual had to report an occupation in time 1 and be interviewed in time 2. The row labeled “at least once” indicates the number of unique respondents who had at least one observation. The number of observations for the 1968 Women cohort is lower because lower labor force participation rates lead to fewer people with occupations in time 1. The analysis presented here examines all available observations in a given two-year period. I also conducted an analysis restricted to individuals who remained in the survey until age 30 with similar results. As mentioned above, the NLS skipped four years of data. The first six surveys were conducted annually, but then years 7, 9, 12 and 14 were skipped. Since the survey began with individuals at several different ages, at least a portion of the sample was observed at every age. However, these skipped years do reduce the observations available at

[17] I also did not include in the NLS 1979 cohorts the members of the military sample and respondents in the "poor white" sample who were dropped from the survey before age 30 (the poor white sample was dropped in 1991). Since I used the sampling weights from the initial survey year, I had to adjust the weights to account for the dropped poor white respondents. The NLS marks "poor white" individuals from the cross-sectional sample so their weights could be increased such that the total of the poor white weights remained the same.

older ages. The declining sample sizes in the NLS are not ideal, but the similarity in the sample sizes and patterns across the cohorts suggests that they are quite comparable.

Appendix C: PSID sample sizes

Table D provides the samples sizes for the change calculations in each year of the PSID. These samples are the number of people reporting an occupation in time one who were interviewed again two years later. The sample sizes increase over time as more women entered the labor force, the children in the initial families entered the workforce, and as new adults jointed the original core families. I use annual sampling weights provided by the PSID to adjust the results (as best as possible) to be nationally representative.

Appendix D: CPS matching and sample sizes

The CPS matches were based upon identifiers designed to uniquely identify the households across the CPS panels. The primary method of matching was to use these household identifiers and then individual "line numbers" to match individuals. Unfortunately, there is some amount of error in these variables. The unique household identifiers are supposed to be different if the household is occupied by new members, but this does not always occur. In addition, at times the individual line numbers contain errors and so records within a household are not properly matched. In order to address these problems, I examined a number of demographic variables to check the validity of the matches. I first matched individuals based upon the household identifiers, the line numbers, and sex, and then assigned certain "penalties" if the demographic information did not match. See Table E for how the penalties were assigned. If the total penalties were greater than two, I did not count it as a match in this initial stage. In the second stage I matched households but did not use the line number, allowing for the fact that the

line numbers might be wrong. Again I assigned penalties based upon demographics and rejected any matches where the penalty was greater than three. If there was more than one possible match I took the best fitting match. Most of the matches were made in the initial stage, with only 1.4% to 3.7% matching in the second stage in a given year.

Table F gives the matching rate for all individuals ages 22-61, the matching rate for individuals in this age range who had a reported occupation in the first year, and finally the sample sizes used to calculate occupation changing rates (the number of matched individuals with a reported occupation in time 1).

Appendix E: Adjusting for changing occupation coding schemes

All three datasets required some adjustments for changes in their coding schemes. The NLS used 1960 census occupation codes in the earlier cohorts and 1970 codes in the later cohorts. Luckily, there are only moderate differences between the 1960 and 1970 coding schemes. The structure of the one-digit codes was left largely unchanged and required little adjustment. At the three-digit level, much of the change involved a larger number of more detailed codes in the 1970 scheme. I used the results of a cross-classification of individuals under the two schemes (Priebe, Heinkel, and Greene 1972) to create a concordance between the two schemes.

The CPS used 1970, 1980, 1990, and 2000 census occupation codes. At the one-digit level, I created major occupation categories based upon the same ten major occupations used by the 1960 and 1970 schemes. I used data provided by Weeden (2005) to categorize the 1980 through 2000 schemes into these major groups. This categorization scheme was not perfect, however, and I did not even try to create uniform codes at the three-digit level. I therefore used estimates from probit models, described in a moment, to account for coding scheme changes.

The PSID used 1980 census occupation codes throughout the survey, but still faces a problem. As discussed earlier, the pre-1980 codes have a much lower error rate than the post-1980 period. This problem, in the end, is basically the same as the problem posed by changing census coding schemes: we expect to see jumps in the occupation changing rate that reflect changes in the coding scheme rather than actual trends. Furthermore, we might expect that changes in coding schemes will affect the error rates of some types of occupations more than others. Again I used the probit estimates to account for this change.

In order to adjust the results for changes in coding schemes, I used the probit estimates to calculate two predicted values for each individual. The first predicted value was a typical fitted value, creating a predicted probability of changing occupations based upon each individual's data. To obtain the second predicted value, I used the same coefficients and data, except that I set the values for the coding period dummy variables to zero. This second predicted value, therefore, is the predicted probability under the baseline (omitted) coding scheme. The difference between an individual's original predicted probability and this second predicted value represents the difference in coding error between the baseline and observed coding periods. The interactions between the coding period and occupation group variables allow this coding error to vary by occupation group in each period.

To remove the effect of the coding errors, I took the difference between the two predicted values for each individual to create an estimate of the error level for that individual. I then subtracted this error from the original outcome variable. This practice creates odd values for what was originally a dummy outcome variable, but when one calculates the average of this measure it in effect shifts the estimated proportion down (or up) by the appropriate level. Figure 15 shows an example of the effect this adjustment. It should be noted that this method is not

specifically designed to align the lines at the break points. Instead it calculates the occupation-specific effects of the coding changes. As the figure shows, though, the end result matches the lines up quite well. This approach was adapted from Kamborouv and Manovskii (2008).

Appendix F: Estimating the effect of changing demographics

The process of estimating the effect of changing demographics is difficult because the effect of a probit coefficient varies by the level of the other variables included in the model. A simple additive model, therefore, will not work. For this calculation, I took the observations from the initial survey year and made *n* copies of these observations for the *n* years of the survey, creating samples that were identical in all of the independent variables except for the survey year. I then used the coefficients from the probit model to create a predicted probability of changing occupations for these new fixed-demographic samples. Finally, I calculated the average predicted probability in each year, in other words the level of occupation changing we would have expected to see in each year if the population remained fixed with the characteristics of the initial year.

Table B. Percent attrition by age in the NLS cohorts.

	Men			Women			
		1979		1966		1979	
Age	1966	Actual	Adjusted	Actual	Adjusted	Actual	Adjusted
20	8.0	0.8	6.9	4.4	4.7	0.7	4.0
21	9.9	1.0	9.1	5.7	6.3	1.0	5.8
22	11.7	1.6	12.1	7.3	8.4	1.2	7.6
23	13.3	2.1	14.3	8.9	10.3	1.6	9.4
24	15.9	2.6	16.3	10.9	12.9	1.9	10.6
25	18.6	3.2	18.0	12.4	15.0	2.3	12.1
26	20.8	3.8	20.0	13.8	17.0	2.9	13.4
27	23.1	4.5	21.8	15.3	19.1	3.5	14.4
28	24.9	5.1	23.1	16.4	21.0	4.1	15.5
29	29.7	5.9	24.6	17.5	23.2	4.7	16.5
30	39.8	7.2	35.8	18.4	30.7	5.5	27.6
31	48.9	10.0	48.3	19.4	40.0	8.4	40.5
32	58.4	13.0	60.5	20.4	48.7	11.6	54.1
33	67.0	16.0	70.2	21.2	56.5	15.1	64.7
34	74.3	17.9	79.8	21.9	63.9	16.5	74.8
35	79.0	20.0	86.8	22.6	71.0	17.9	83.8

Table C. Sample sizes for occupation change calculations

	1966 Men	1979 Men	1968 Women	1979 Women
Initial sample	5,225	5,150	5,159	5,376
	Change Observations			
At least once	3,175	4,101	2,939	4,260
Age at time 1				
22	1,412	2,095	1,195	2,046
23	1,250	1,862	1,151	1,898
24	1,093	1,546	962	1,520
25	1,143	1,483	898	1,488
26	876	1,198	701	1,112
27	1,190	1,491	868	1,456
28	925	1,209	700	1,134
29	912	1,176	665	1,091
30	558	707	454	731
31	504	722	444	649
32	398	595	400	616
33	201	313	220	310

Table D. Sample sizes for occupation change calculations in the PSID by year.

Year at time 1	Change Observations
1968	3,289
1969	3,397
1970	3,501
1971	3,485
1972	3,547
1973	3,576
1974	3,707
1975	3,639
1976	3,797
1977	3,873
1978	4,008
1979	4,211
1980	4,276
1981	4,886
1982	4,897
1983	4,896
1984	5,157
1985	5,322
1986	5,438
1987	5,579
1988	5,698
1989	5,823
1990	5,914
1991	5,791
1992	5,785
1993	5,962
1994	6,740
1995	5,706
1997	5,999
1999	6,332

Table E. CPS matching penalties

	Penalties				
Variable	**0**	**1**	**2**	**3**	**4**
Age	1 year higher	0 or 2 yrs higher		1 yr less or 3 years more	2 yrs less, 3 years more, or greater
Race	same			different	
Relationship to head	same		different		
Marital status	same	anything to married, or married to divorced/separated/widowed	any shift within divorced, separated and widowed	any other changes	
Education	same or one higher		one less or two more	two less, three more, or greater	

Table F. CPS ORG matching rate and sample sizes

	Matching Rate		
Year at Time 1	Ages 22-61	Has Occ at Time 1	Final Sample
1979	0.75	0.75	59,551
1980	0.71	0.71	66,862
1981	0.74	0.74	65,270
1982	0.75	0.76	63,774
1983	0.74	0.74	63,022
1984	0.73	0.73	30,916
1985	0.71	0.72	15,899
1986	0.72	0.72	62,433
1987	0.69	0.70	60,952
1988	0.71	0.72	60,297
1989	0.73	0.74	64,009
1990	0.73	0.74	66,230
1991	0.73	0.74	65,047
1992	0.73	0.74	64,180
1993	0.71	0.73	62,086
1994	0.69	0.70	24,250
1995	0.68	0.70	19,346
1996	0.76	0.78	58,201
1997	0.75	0.77	58,339
1998	0.76	0.77	59,275
1999	0.76	0.78	59,486
2000	0.76	0.78	58,676
2001	0.76	0.78	62,770
2002	0.76	0.78	68,299
2003	0.75	0.77	65,768
2004	0.70	0.72	59,419
2005	0.74	0.76	64,421
2006	0.74	0.76	64,070

Figure 15. Example of coding scheme adjustments, PSID.