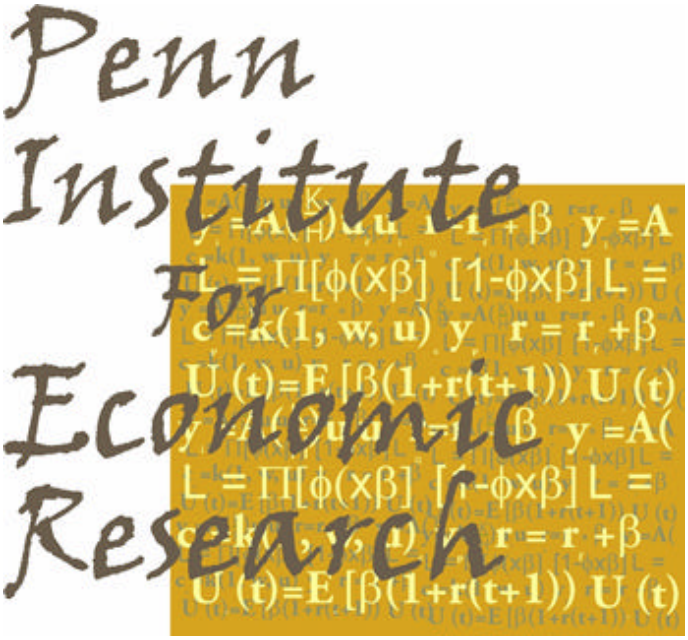

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"Rising Occupational and Industry Mobility in the United States: 1968-1993"

by

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Rising Occupational and Industry Mobility in the United States: 1968-1993*

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Abstract

We analyze the dynamics of worker mobility in the United States over the 1968-1993 period at various levels of occupational and industry aggregation. We find a substantial overall increase in occupational and industry mobility over the period and document the levels and time trends in mobility for various age-education subgroups of the population. To control for measurement error in occupation and industry coding, we develop a method that utilizes the newly released, by the Panel Study of Income Dynamics, Retrospective Occupation-Industry Supplemental Data Files. We emphasize the importance of the findings for understanding a number of issues in macro and labor economics, including changes in wage inequality, productivity, life-cycle earnings profiles, job stability and job security.

JEL classification: E20, J21, J24, J44, J45, J62, J63.

Keywords: Occupational Mobility, Industry Mobility, Career Mobility, Sectoral Reallocation.

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1 Introduction

Recent research by Kambourov and Manovskii (2002b) has documented substantial returns to occupational tenure: everything else being constant, ten years of occupational experience increase wages by at least 19%. This finding is consistent with human capital being specific to the occupation in which an individual works (e.g. truck driver, accountant, chemical engineer). In earlier papers, Neal (1995) and Parent (2000) have argued that human capital may be specific to the industry of employment (e.g. colleges and universities, meat products, banking). Since these results imply that a substantial amount of human capital is destroyed upon switching occupation or industry, studying the levels and trends in occupational and industry mobility is important for understanding various macro and labor economic phenomena. Despite this, the issue has not been addressed in the literature in a satisfactory way.

This paper addresses this deficiency. We present the facts that characterize occupational and industry mobility in the United States. The main message of the paper is that occupational and industry mobility in the United States is high and has increased sharply since the late 1960s. We do not present any theoretical analysis here. Instead, we see this paper as introducing a number of facts on worker mobility that point the quest to better understand the workings of the labor markets in a new direction. Any future theoretical work on the forces behind the rise in mobility and on the channels through which they are affecting the economy will have be to consistent with the facts reported here.[1]

For most of the analysis we use data from the Panel Study of Income Dynamics (PSID) which contains annual descriptions of occupation and industry affiliation for a panel of in-

[1]The findings described in this paper are already widely cited in the theoretical papers modeling the labor markets, including Felli and Harris (2003), Jovanovic and Rousseau (2003), Kambourov and Manovskii (2002a), Khun (2003), Ljungqvist and Sargent (2002), and Moscarini and Vella (2003) among others.

dividuals representative of the population of the United States in each year. We define occupational mobility as the fraction of currently employed individuals who report a current occupation different from their most recent previous report of an occupation.[2] Industry mobility is defined similarly. Using these definitions, we find that among male workers over the 1968-1993 period:

1. The average level of occupational mobility is around 13% at the one-digit level, 15% at the two-digit level, and 17% at the three-digit level.[3] The corresponding numbers are 9%, 10%, and 11% for industry mobility. Such high levels of mobility imply a sizeable yearly destruction of specific human capital. As discussed below, although these levels of mobility may appear "too high", they represent the most reliable estimates in the literature.

2. Occupational mobility has increased from 10% to 15% at the one-digit level, from 12% to 17% at the two-digit level, and from 16% to 19% at the three-digit level. The corresponding increases in industry mobility are 7% to 11%, 8% to 12%, and 10% to 12%, respectively.

3. Occupational and industry mobility rates decline with worker's age and education.

4. Occupational and industry mobility has increased for most age-education subgroups.

5. The increases in mobility were not driven by a changing population structure. On the contrary, the fact that the population has become older and more educated over the

[2]For example, an individual employed in two consecutive years would be considered as switching occupations if she reports a current occupation different from the one she reported in the previous year. If an individual is employed in the current year, but was unemployed in the previous year, a switch in his occupation will be recorded if he reports a current occupation different from the one he reported when he was most recently employed.

[3]Appendix I contains the description of the detailed three digit occupation and industry codes. These codes may be aggregated into two- and one-digit codes. The details of the aggregation are presented in Appendices II and III.

period has slowed down the rise in mobility. If the population structure throughout the period stayed the same as in 1980, occupational mobility would have increased from 10% to 17% at the one-digit level, from 12% to 19% at the two-digit level, and from 16% to 21% at the three-digit level.

6. Net occupational mobility, defined as one half of the sum of the absolute changes in occupational employment shares, has increased sharply from 1% to 3% at the one-digit level, from 3% to 6% at the three-digit level, and from 9% to over 11% at the three-digit level.

7. The increase in occupational mobility was not driven by an increased flow of workers into or out of a particular one-digit occupation; the increase in occupational mobility was pervasive.

8. Occupational mobility of government workers is relatively low and has declined from 12% to 6% at the three-digit level. This pattern is in stark contrast with the trend in occupational mobility of private sector workers.

9. Around 30% of the workers switching occupations (industries) return to their one-digit occupation (industry) within a four year period after the switch while only 20% return to their three-digit occupation (industry). In this sense occupational and industry switches are fairly permanent.

10. Occupational mobility is mildly procyclical in the aggregate, but countercyclical for workers younger than 30.

Throughout the paper we emphasize our findings on occupational mobility. We choose to do this since as Kambourov and Manovskii (2002b) have shown, when the effect of occupational experience on wages is accounted for, tenure with an industry has little importance in

explaining wages. Their finding that human capital is occupation specific has a considerable intuitive appeal. Even narrowly defined industries typically encompass many distinct economic activities. For example, the Hotels and Motels industry would include those working in a hotel restaurant, front desk, laundry, etc. It seems implausible that the human capital of these workers is specific to the industry they work in rather than to the type of work they do, i.e., their occupation. As another example, it appears natural to expect that when a truck driver switches industries, say, from wholesale to retail trade, he loses less human capital than when he switches occupation and becomes a cook. For completeness we also present the findings on industry mobility, which are interesting in their own right since worker mobility across industries may help one think about the implied variability of demands for goods and services produced by various industries.

We continue by suggesting how the findings in this paper help shed light on four actively researched issues in labor and macro economics. In particular, we outline the relationship between occupational mobility and the concept of economic turbulence, the job stability and job security debate, the increase in wage inequality since the early 1970s, and the flattening life-cycle wage profiles.

A number of researchers, following Bertola and Ichino (1995) and Ljungqvist and Sargent (1998), have described the 1970s and the 1980s as a period of increased economic turbulence. The term turbulence is typically defined as an unobservable increase in the rate of skill depreciation upon a job switch during the two decades. Despite the intuitive appeal of the notion of increased economic turbulence over the period, identifying it in the data has proved elusive. Our results suggest that an observable increase in occupational mobility over the period serves as a measurable manifestation of the increased turbulence.

In recent years there has been keen interest, both in the popular press and among re-

searchers, in whether job stability and job security of American workers has declined. Anecdotal evidence and surveys of worker perceptions suggest that stability and security declined in the 1980s and 1990s. It turned out to be difficult, however, to find a significant increase in job (employer) mobility in the United States over the last three decades (see Journal of Labor Economics (1999) special issue). The results presented in this paper suggest that it may be appropriate to reinterpret workers' feeling of insecurity as a realization that they are now more likely to switch occupations. In addition, we find that a bigger fraction of the three-digit occupation and industry switches in the early 1990s involve a switch at the aggregated one-digit level than in the 1970s. This indicates that an occupation or industry switch in the 1990s is likely to represent a more fundamental career change.

Despite an active search by economists for the reasons behind a large increase in wage inequality among male workers in the United States over the last 30 years (an increase of 6.6 Gini points, or 25% from the late 1960s to the early 1990s), the culprit is still at large. An enormous literature was developed, mainly devoted to accounting for the rise in the college premium (e.g., Krusell, Ohanian, Ríos-Rull, and Violante (2000) among many others). The increase in the college premium, however, accounts for less than a third of the overall increase in inequality. Over half of the increase was due to rising wage inequality within narrowly defined age-education subgroups of the population. Two other facts make the search for a consistent explanation even more difficult. First, the increase in wage inequality reflects changes that affected all parts of the wage distribution. Second, Gottschalk and Moffitt (1994) document that during the 1980s the variance of transitory earnings as well as the variance of permanent earnings were each about 40% higher than in the 1970s.

Can the findings in this paper illuminate our thinking about these changes? Kambourov and Manovskii (2002a) show, in a general equilibrium model with occupation specific human

capital, that the increase in the variability of productivity or demand shocks to occupations from the 1960s to the 1990s, calibrated to the facts documented in this paper, accounts for over 80% of the increase in wage inequality. A distinguishing feature of the theory based on occupational mobility is that it also accounts for the increase in the variability of transitory earnings and for changes in within group wage inequality. This happens because a substantial part of the variance of wages for individuals from the same age-education group is accounted for by the heterogeneity of their occupational experience.

Knowledge of the patterns of occupational mobility elucidates the determinants of the observed age-earnings profiles. It has been documented that these profiles have become flatter for each successive cohort entering the labor market during the period we study (MaCurdy and Mroz (1995) and Bernhardt, Morris, Handcock, and Scott (1999) document this for the United States, while Beaudry and Green (2000) present evidence for Canada). The increase in occupational mobility that we document coupled with the occupational specificity of human capital makes this finding intuitive. A substantial part of the increase in the average life-cycle earnings profile is driven by an increased average occupational experience. Thus when the average occupational experience is not rising so fast (because of more frequent occupation switches), the cohort profile of earnings is expected to be flatter.

Turning to a discussion of data issues, we note that the PSID is particularly convenient for the study of the trends in mobility over time since it - unlike any other US data set - provides consistent occupation and industry codes throughout the 1968-1993 period. It is well known that panel data on occupation and industry affiliation is characterized by a substantial amount of noise. In 1999, the PSID released the Retrospective Occupation-Industry Supplemental Data Files (Retrospective Files hereafter) that re-coded the reported occupations and industries for the period 1968-1980. Exploiting the differences between

the methodology employed by the PSID in constructing the Retrospective Files and the one employed in the original coding of the occupation and industry affiliation descriptions, allows us to minimize the error in identifying true industry and occupation switches. We document that over 50% of occupation or industry switches identified on the uncontrolled data are not genuine and are the result of coding error. By reducing measurement error, we overcome the problem that plagued earlier attempts at identifying the levels of occupational and industry mobility.

As we mentioned above, so far the profession has paid little attention to the issues of occupational and industry mobility. Thus the related literature is very limited. Moscarini and Vella (2003) in a recent paper have documented the behavior of occupational mobility at the three-digit level in the United States using data from the March Current Population Survey over the 1976-2000 period. Their findings are consistent with ours for the overlapping period in the samples (1976-1993). Due to the limitations of the March CPS their analysis misses the biggest part of the increase in three-digit occupational mobility that took place in the first half of the 1970s. We discuss some of the relevant differences between the PSID and March CPS below.[4] In another related paper, Parrado and Wolff (1999) use the PSID and find an increase in one-digit occupational and industry mobility between the 1970s and the 1980s. Their analysis, however, is quite limited in scope and is based on the error ridden originally coded occupation and industry affiliation data. In an earlier work Rosenfeld (1979) reports that occupational mobility was constant in the 1960s. This suggests that the significant increase in mobility that we find in this paper was specific to the period we study.

The paper is organized as follows. In Section 2 we describe the data and document the differences between the originally coded occupation and industry affiliation data and the codes contained in the Retrospective Files. We provide evidence that the data from

[4]See Kambourov and Manovskii (2004) for an in-depth discussion.

the Retrospective Files is more reliable. We then develop a method for controlling for measurement error that allows us to identify precise levels and trends in occupational and industry mobility over the period. This procedure together with the patterns of mobility - overall and for various age-education subgroups of the sample - are reported in Section 3. We show that our findings of high and increasing mobility are robust to numerous modifications of the sample and the procedure used to control for measurement error in Section 4. In Section 5, we present a number of facts that help distinguish between various theories of occupational and industry mobility. We conclude in Section 6.

2 The Data

2.1 Sample Restrictions

The data we use comes from the PSID for the 1968-1993 period.[5] The sample is restricted to male heads of household, aged 23-61, who are not self- or dual-employed, and are not working for the government. The resulting sample consists of 59522 observations over the 1968-1993 period, with an average of 2289 observations a year. Restricting the sample to household heads is necessitated by the availability of occupation and industry affiliation data. This restriction does not affect our results significantly since most workers in the PSID who satisfy our other sample selection criteria are indeed household heads. Evidence provided below demonstrates that the exclusion of women and self- or dual-employed does not significantly affect the results on the level and trend of aggregate mobility. The exclusion of government workers, however, is less innocuous since occupational and industry mobility of government workers has declined substantially over the period - an issue that we discuss in depth below.

[5] 1993 represents the latest publicly available release of the fully processed data by the PSID.

2.2 Occupation and Industry Affiliation Data: Original vs Retrospective Coding

The PSID has used the 1970 Census occupation and industry codes from 1968 on. However, one-digit occupation codes were used in 1968-1975, two-digit occupation codes in 1976-1980, and three-digit occupation codes after 1981. The industry affiliation was coded at a two-digit level in 1971-1980, and at a three-digit level after 1981.

In 1996 the PSID started working on the 1968-1980 Retrospective Occupation-Industry Files. This work originated as part of the Working Lives and Mortality in an Aging National Cohort project. That project required three-digit occupation and industry codes throughout the course of the PSID. As mentioned above, the PSID did not originally code occupations and industries at the three-digit level prior to 1981. In order to produce the three-digit recode the PSID pulled out paper materials from its archives containing the written records of the respondents' descriptions of their occupations and industries. These were the same records from which the one and two-digit occupations and industries were coded prior to 1981. Using these records, the PSID retroactively assigned three digit 1970 Census codes to the reported occupations and industries of household heads and wives for the period 1968-1980. The work was completed in 1999, when the PSID released the Retrospective Occupation-Industry Supplemental Data Files.

Using the Retrospective Files, we create a series of consistent three-digit occupational codes that runs from 1968 till 1993. Appendix I contains the description of the three digit occupation and industry codes. Further, these series may be aggregated into a two- and one-digit codes, with the details of the aggregation we use presented in Appendices II and III. The PSID has recoded occupations and industries for most household heads and wives in the sample but not all. With our sample restrictions, however, only 398 observations in our

sample were not recoded. This had virtually no impact on the average sample characteristics.[6]

Surprisingly at first, we find a significant degree of disagreement between the originally assigned PSID occupation and industry codes and the codes assigned to the same individuals in the Retrospective Files. Consider, for example, the two-digit occupational mobility for the 1976-1980 period. During this period the PSID provides the originally assigned occupation (industry) codes as well as the codes reassigned in the Retrospective Files. One would expect the levels of occupational mobility computed on these two series to be similar, if not exactly the same, since both are based on the same raw information - the respondent's description of his or her occupation contained in the PSID interview records. Any difference must come from the way the original information contained in those records was transferred into an occupation code. One finds, however, that the level of occupational mobility in the Retrospective Files during the 1976-1980 period is roughly twice smaller, at approximately 14%, than the mobility obtained on the originally coded occupations that is approximately 27%.

Why is occupational mobility so much lower when computed using the Retrospective Files? We argue that the difference between the originally and the retrospectively assigned occupation and industry codes was caused by differences in the methodology employed by the PSID in constructing these data. When originally coding the occupation (industry) data, the PSID coder could not compare the current year description to the one in the previous year. As a result, for a respondent who is in the same occupation (industry) in both years, similar occupational (industry) descriptions could end up being coded differently. This was not the case with the constructed Retrospective Files, where as reported in the PSID (1999),

[6]The number 398 refers to the observations that have a positive PSID sample weight. Since the analysis below is performed on weighted data, this is the relevant statistic.

"to save time and increase reliability, the coder coded all occupations and industries for each person across all required years before moving on to the next case." Thus in constructing the Retrospective Files, the coders had access not only to the respondents' description of their current occupation (industry), but also to the description of their past and future occupations (industries). This allowed them to compare these descriptions, decide whether they are similar, and assign the same occupational (industry) code where appropriate.

Our hypothesis is supported by the results of an experiment summarized in Mathiowetz (1992). Reports of occupations obtained in interviews of employees of a large company were checked against company records. This was done in two ways. First, the coders were asked to compare simultaneously the two descriptions and to code them as being in agreement if the two sources could result in the same three-digit classification. The procedure resulted in a disagreement rate of 12.7%. Second, the coders independently coded the two descriptions at the one- and three-digit level. The comparison of the independently assigned codes resulted in a disagreement rate of 48.2% at the three-digit level and 24.3% at the one-digit level. The results indicate that by far the largest amount of error in occupational or industry affiliation data is generated at the coding stage.

Which occupation and industry codes, then, are more reliable? The discussion above suggests that the Retrospective Files are. For further confirmation, note that switching an industry or an occupation is a major labor market change for a worker. Therefore, it should be unlikely to observe an industry switch without a switch of employer. Indeed, 84.9% of the one-digit industry switches and 85.7% of the two-digit industry switches in the Retrospective Files are accompanied by employer switches. When one looks at the originally coded data, however, only 55.8% of the one-digit industry switches and 46% of the two-digit industry switches are accompanied by employer switches. Similarly, it should be unlikely to

observe an occupation switch without either a switch of employer, or a switch of position with the same employer. While 80% of the one- and two-digit occupation switches in the Retrospective Files are accompanied by either an employer or a position switch, only 62% and 56% of the one- and two-digit occupation switches in the originally coded data are. This suggests that the occupation and industry codes from the Retrospective Files are more reliable, and that there is a higher degree of misclassification of occupations and industries in the originally coded data. Kambourov and Manovskii (2002b) provide additional evidence that the Retrospective Files are much more reliable than the originally coded data.

Our use of the Retrospective Files for the first time allows to reconcile differences in occupational and industry mobility obtained using various US data sets. Annual occupational mobility obtained using the National Longitudinal Surveys (NLS) or the matched Current Population Survey (CPS) is similar to the one obtained using the originally coded PSID data and is consequently characterized by a large amount of noise. In the case of the NLS, this happens because NLS coders do not have access to last year's description of the respondent's occupation or industry when they code this year's affiliation. Despite the use of a "dependent coding" technique by the CPS, introduced in an effort to reduce coding error, the descriptions of occupations in the two periods are still coded independently from each other for a large fraction of the sample. Occupational mobility obtained from the March supplement to the CPS (March CPS) is closer to the one we obtain on the PSID Retrospective Files. As argued in Kambourov and Manovskii (2004) this happens because the March CPS measures mobility over a much shorter than a year period, and not because of reducing the amount of noise generated by independent coding of the current and last year's occupational descriptions.

3 Occupational and Industry Mobility in the United States

This Section contains the main result of the paper. In particular, we document the levels and trends in occupational and industry mobility in the United States using the data from the Retrospective Files for the 1968-1980 period and the originally coded data for the 1981-1993 period. The use of the Retrospective Files allows us to minimize the measurement error in occupation and industry coding.

In addition to the analysis of occupational and industry mobility, we also provide the results for mobility of workers across occupation-industry cells. It is defined as the fraction of currently employed individuals who report a current occupation-industry pair both elements of which are different from their most recent previous report of an occupation-industry pair. Such definition of mobility may be useful for researchers that work with other data sets such as, say, the NLSY, and face the problem of measurement error in the occupation and industry coding.[7] We show that switching both an occupation and an industry is more likely to identify true switches rather than erroneous miscoding.[8]

3.1 Methodology

As discussed above, due to the coding and recoding procedures used in the PSID, the level of occupational mobility after 1981 obtained from the originally coded data is substantially higher than the one before 1980 obtained from the Retrospective Files. To control for the effects of the change in the coding procedure in 1981, we adopt the following two-step empirical methodology. First, we obtain the estimate of occupational and industry mobility in the originally coded data that is due to the coding error. Given that occupational

[7] Mobility across occupation-industry cells was used as a measure of career mobility in Neal (1999).
[8] Figures describing the mobility across occupation-industry cells are contained in Appendix IV.

(industry) mobility fluctuates over the business cycle and that its level and trend are expected to be related to one's age and education, we incorporate those feature into the analysis. Second, having identified the effect of the coding error, we document accurate trends and levels of mobility for the overall sample and its various age-education subgroups.

We divide the sample into ten age-education categories indexed by j. By age individuals are divided into the following five groups: 23-28, 29-34, 35-40, 41-46, 47-61. By education, individuals are divided into those who have 12 years of education or less and those who have more than 12 years of education. We do not use a finer age-education partition, since this would lead to some groups having too small sizes in some years. The results presented below are robust to partitioning the education level into high school dropouts, high school graduates, some college, and college graduates.

We use a probit model with the following specification:

$$P_{it} \equiv Pr(y_{it} = 1|X_{it}) = E(y_{it}|X_{it}) = N(X_{it}\beta),$$

where y_{it} is a binary variable that assumes the value of one if individual i switches her, say, occupation in period t and is zero otherwise. $N(\cdot)$ represents the cumulative Normal distribution function. X_{it} includes Dum_{ijt}, a dummy variable indicating whether individual i belongs to group j in period t; $TDum_{ijt}$, a group dummy interacted with a time trend; as well as $UnDum_{ijt}$ and $UnlagDum_{ijt}$, the current level of unemployment in the county of residence and its lagged level for each individual i in group j in period t.[9] The group dummies are interacted with a time trend and the unemployment variables in order to allow different groups to have different trends in mobility over time and over the business cycle.

[9]We choose unemployment in the county of residence - rather than GDP growth - as our indicator of the macroeconomic conditions because the local labor market situations are directly affecting worker mobility decisions. The weighted average of the county of residence unemployment rates on our sample is very similar to the yearly economy-wide unemployment rate. The choice of the business cycle variable, however, will turn out to be of little importance for our results.

Because of the change in the coding procedure in 1981 we include $Break * Dum_{ijt}$ in the model, where $Break$ is a variable that assumes the value of one if the year is in the period 1981-1993. We include dummy variables for the structural breaks separately for each of the age-education groups since one may expect the coding error to be distributed non-uniformly over them. This may be particularly true at the three-digit level since at this level occupations are very disaggregated and while it is virtually impossible to misclassify a medical doctor it is possible to misclassify a machine operator, and the distribution of doctors and machine operators is not uniform across the age - education groups. On the one- and two-digit level occupational classifications, however, one has less reason to expect the coding error to vary across the age-education groups. Similar arguments apply to industries. This conjecture is supported by the results of the Wald test for the null hypothesis that the increase in mobility due to the coding error (estimated coefficient on $Break$) is the same across all groups, reported in Table 1 for the various mobility variables. The null hypothesis is rejected for all the specifications at a 5% confidence level, with the $\chi^2(9)$ test statistic monotonically increasing with the number of digits in the occupational or industry classification. Our estimates of the average increase in the probability of a switch after 1981 due to the estimated coding error are presented in column 3 of Table 1.[10]

The estimated coefficients from the probit regression allow us to obtain fitted values for each individual - the predicted probability of an occupation (industry) switch - in each of the years that the individual is in the sample. We predict one's mobility in each year after 1980 if there were no structural change in the coding procedure (setting the coefficient on $Break$

[10]These estimates imply that the use of the uncontrolled data will result in estimates of the three-digit occupational and industry mobility that is approximately 25% percentage points higher than its true level. The estimated size of the coding error goes down to 12-15% and 10% at a two- and one-digit levels, respectively. Note that the increase in mobility due to the coding error is significantly smaller - at 11% - for the switches of both occupation and industry at a three-digit level, and is as low as 2.8% and 1.4% at a two and one-digit levels, respectively.

to zero). Using these fitted values we obtain occupational (industry) mobility - overall and in each of the age-education groups.

Alternatively, we could obtain an estimate of the coding error in, say, 1981, or compute an average coding error in the 1981-1993 period and subtract this value from each observation after 1980. Under such a procedure the overall mobility increases would on average be one percentage point larger than the ones presented below. This is due to the convexity of the left tail of the cumulative Normal distribution and the facts that the estimates of the trend we obtain are positive and that the probability of a switch never exceeds 50%. Thus the way of adjusting the Figures that we adopt represents the lower bound on the mobility increase in the 1981-1993 period.[11]

Figures 1 to 4 presented below incorporate the following adjustment. We use the estimated coefficients to predict what one's mobility would have been in each year after 1980 setting the coefficient on *Break* to zero. We compare the derived probability to the actual fitted value in each corresponding year and treat the difference as a coding error. When plotting the aggregate occupational and industry mobility (not the fitted lines), we subtract our estimate of mobility due to the coding error from the raw data in each year after 1980.

We weight the sample using the PSID sample weights in order to make the sample representative of the US population in each period. This weighting of the sample has little effect on our results.

A useful experiment, however, is to consider mobility trends had the overall age, educational, and racial structure of the population remained constant throughout the 1968-1993 period. To this end we divide the sample into 96 age-education-race groups.[12] We then

[11]The estimates from the linear probability model also suggest increases in mobility approximately one percentage point larger on average than the ones we describe below.

[12]Specifically, by age individuals are divided into 12 four-year age groups starting with the age of 18. By education, individuals are divided into high school dropouts, high school graduates, some college, and college graduates. By race individuals are divided into whites and non-whites.

construct 1970 weights, 1980 weights, 1990 weights, and average weights defined to reflect the average size of each group during the period. For example, in constructing the 1980 weights, we calculate the relative size of each group in 1980. Then, in all other years we scale everyone's weight in each group in order to keep the relative size of each group at its 1980 level. Weighting the sample using, say, the 1970 weights will then demonstrate what would have happened to the occupational and industry mobility in the United States had its population not grown older and more educated on the average. In this sense, fixing the population structure may provide a better idea of the underlying changes in the forces affecting the labor markets.

3.2 Main Results

Overall mobility across occupations and industries over the 1968-1993 period is plotted in Figure 1. The graphs present mobility for the actual population structure and for the fixed 1980 population structure.

3.2.1 The Level of Overall Mobility

The Retrospective Files reveal that the average level of occupational mobility is around 13% at the one-digit level, 15% at the two-digit level, and 17% at the three-digit level. The corresponding numbers are 9%, 10%, and 11% for industry mobility. These levels of mobility imply a substantial yearly destruction of the human capital generated by the experience in an occupation or an industry. As illustrated below, these apparently high estimates of the level of mobility are substantially lower than the ones obtained from the originally coded data. In fact, because we use the Retrospective Files in the analysis - the most reliable data on occupational and industry affiliation available - these numbers represent the most

accurate estimates of the annual occupational mobility in the literature.[13]

The numbers above suggest that the one-, two-, and three-digit mobility levels are of a similar enough magnitude so that many of the switches at a three-digit level are also switches across the much more aggregated one- and two-digit codes.[14] For example, consistent with Markey and Parks II (1989), we find that almost 70% of the three-digit occupational switches entail a one-digit occupational switch as well. It is notable that the fraction of three-digit switches that are also one- or two-digit switches has increased significantly over the period.

3.2.2 Dynamics of Overall Mobility

All of the panels in Figure 1 exhibit an increase in overall mobility over the period. For example, for the actual population structure, occupational mobility has increased from 10% to 15% at the one-digit level, from 12% to 17% at the two-digit level, and from 16% to 19% at the three-digit level. The estimates of the time trend of overall mobility, presented in Table 2, show that the observed increases in mobility are highly statistically significant. These estimates are obtained from an OLS regression of the corresponding mobility variable, corrected for the estimated coding error after 1980, on a constant and a time trend. The trend in three-digit occupational mobility that we identify is consistent with the findings in Markey and Parks II (1989) based on the January CPS supplements collected periodically since 1966.[15] This rise in mobility implies a substantial increase in the destruction rate of

[13]The fact that these high levels of mobility are not due to measurement error is corroborated by the findings in Hagedorn, Kambourov, and Manovskii (2004). In that paper the authors use a large panel of male workers in West Germany over the 1975-1995 period representing a 1% sample from German Social Security records (IAB data). This data set provides a very detailed and accurate administrative labor market information on each worker. With sample restrictions and definitions of mobility equivalent to those in this paper, the authors find annual occupational mobility of 12% at the three-digit level, and industry mobility of 10% at the two-digit level. Since Germany is generally perceived as a country with rigid labor markets, one would expect the levels of mobility in the United States to be higher.

[14]Note that a switch at a one-digit level implies a switch at a two- and three-digit levels, but not otherwise.

[15]Murphy and Topel (1987) have argued using the March CPS data that two-digit industry mobility has declined sharply over the 1970-1984 period. Their result is entirely driven by a 40% decline in mobility between 1975 and 1976. Moscarini and Vella (2003) argue that this was due to a revision in the March CPS imputation procedures in 1976. There is no evidence of this decline neither in the PSID nor in the January

human capital.

Mobility increases are even more pronounced with the fixed population structures. Using occupational mobility as an example again, fixing the population structure to be the same as in 1980, it has increased from 10% to 17% at a one-digit level, from 12% to 19% at a two-digit level, and from 16% to 21% at a three-digit level. This finding is not particular to our choice of fixing the population structure to be the same as in 1980. Figure 2 presents occupational mobility at the two-digit level for the actual, average, 1980, and 1990 fixed population structures.[16] Although there is a difference in the levels of mobility, its time trend - summarized in Table 2 - is similar for various fixed population structures. Indeed, occupational mobility computed for the actual population structure exhibits the smallest increase of all. This is due to the composition bias, i.e. the share of high mobility age-education subgroups of the population is declining over time, and this effect partially offsets the increase in mobility within most groups. Increases in mobility across industries and across occupation-industry cells follow identical pattern.

3.2.3 Patterns of Mobility for Various Age-Education Groups

Figures 3 and 4 and Tables 3 and 4 summarize the patterns of mobility across occupations and industries over the 1969-1993 period for various age-education groups.

As might be expected, levels of mobility differ significantly across the age-education groups. Both occupational and industry mobility rates decline with age. This finding is consistent with the standard human capital and occupational-matching theories and is corroborated by the evidence in Miller (1984) and McCall (1990). Since human capital of workers is accumulated with occupational experience, the opportunity cost of switching oc-

CPS data.

[16]Occupational mobility for the 1970 fixed population structure is very similar to the one for the average fixed population structure and is ommited from the Figure.

cupations is rising with occupational tenure.[17] Thus as the average occupational experience in a cross-section of workers is rising with age, occupational mobility is declining with age. In addition, life-cycle considerations reduce the mobility with age since the pay-off period from investment into skills in the new occupation or learning about the match quality with the new occupation declines with age.

In the same age group the college educated workers exhibit lower occupational mobility than their less educated counterparts. This is perhaps not surprising. Since college education may be thought of as representing investment into human capital that is not perfectly transferable across all occupations, it is expected to reduce workers' occupational mobility. What is surprising, however, is the finding that occupational mobility of college educated workers is quite high. This indicates that either college provides workers with skills that are fairly transferable (general) or that college education represents a very risky investment for workers. Both possibilities open interesting avenues for future research.

The results indicate that among those with more than 12 years of education occupation and industry mobility increased for almost all of the age groups, with the largest increases in mobility concentrated among those younger than 40. Among those with 12 years of education or less, occupational mobility increased for workers younger than 40 and industry mobility - for workers in their 20s. Occupational and industry mobility did not change significantly for older uneducated workers.

[17] We find the hazard rate of an individual switching occupations declining sharply with the occupational tenure of that individual.

4 Sensitivity Analysis and Related Discussion

4.1 Occupational and Industry Mobility as Revealed by the Originally Coded Data

The most direct check of the robustness of our finding of a sharp increase in occupational and industry mobility in the United states over the 1968-1993 period is to describe the level and the trend of occupational and industry mobility as revealed by the originally coded data. Since the originally coded occupation and industry affiliation data is noisy, we treat the results in this subsection only as suggestive. In particular, under the assumption that the amount of coding error has not changed over time in the originally coded data (and there is no evidence to suggest that it did), the trend in mobility that we find here is informative, while the level of mobility is not.

Overall occupational and industry mobility, obtained from the originally coded data, is presented in Figure 5.[18]All of the panels in Figure 5 show a striking increase in overall mobility. Occupational mobility increases from 20% in 1969 to 27% in 1993 at the one-digit level, and from 25% in 1977 to 31% in 1993 at the two-digit level. Industry mobility increases from 14% in 1975 to 22% in 1993 at the one-digit level, and from 22% in 1977 to 28% in 1993 at the two-digit level.[19]

Of course, since we are using the originally coded data in this subsection, the level of mobility that we document here is exaggerated by the presence of the measurement error in occupation and industry coding. For example, it implies that the average worker switches

[18]The fitted occupational (industry) mobility for each year are obtained following the same empirical methodology as in Section 3 but excluding $Break * Dum_{ijt}$ variables from the model since there is no longer a break in the coding procedure in 1981. We weight the sample using the PSID sample weights in order to have a sample representative of the US population in each period.

[19]We do not plot industry mobility in years 1972-1974, nor do we use it in the regression. We do so because industry mobility obtained from the originally coded data in those years is substantially higher than in any other year. The Retrospective Files do not exhibit such pattern. It appears that there is something wrong with the original PSID coding of industry affiliation in those years. Loungani and Rogerson (1989) also report this problem.

her aggregated two-digit occupation once every three years. The use of the Retrospective Files in the previous Section revealed a much lower corrected level of mobility.

Figure 6, that reports the fitted occupational and industry mobility by age-education groups, further validates our finding that the increase in occupational and industry mobility was pervasive: it increased for most of the age-education subgroups of the population.

4.2 Sensitivity of the Empirical Results to the Sample Restrictions

In this Subsection we provide evidence that our results are robust to numerous variations in the sample selection criteria. Our usual sample, called the base sample here, is restricted to male heads of household, aged 23-61, who are not self- or dual-employed, and are not working for the government. In Figure 7 we show how the measure of occupational mobility at the two-digit level[20] is affected if we relax some of the imposed sample restrictions. The addition of women to the base sample makes the increase in mobility slightly bigger while the addition of self-employed workers slightly reduces the observed increase. Adding government workers to the base sample makes the increase in mobility 1.5 percentage points lower than what it would otherwise have been (more on this below). Restricting the base sample to full-time workers only (those who report working at least 1500 hours in a given year) results in an increase in mobility that is 0.5 percentage points lower than in the base sample. Finally, restricting the sample to white workers only has no effect on the increase in occupational mobility.

4.3 Occupational Mobility and Unemployed Workers

One important advantage of using the PSID data to study occupational and industry mobility is that the PSID, being a panel data set, allows us to follow individuals through

[20] Our choice to present the results at the two-digit level is inconsequential for the message of this Subsection.

unemployment spells. If a worker is employed at the interview date in year t, unemployed in year $t+1$, and employed again in year $t+2$ in a different occupation, the PSID allows us to capture this occupational switch. If one uses the (March) CPS, for instance, this occupational switch will not be captured since in year $t+2$ the CPS provides information only on the worker's current occupation and last year's occupation but not on the occupation in period t. In order to compute occupational (industry) mobility in the CPS, one needs to restrict the sample to workers who are employed in two consecutive years and consider what fraction of this sample changed occupations (industries).

Figure 8a compares our preferred measure of occupational mobility with the one obtained on the sample of workers employed in two consecutive years. Two important conclusions emerge. First, not taking the unemployed individuals into account reduces the measured level of occupational mobility by around 2.5 percentage points - from 19% to 16.5%. Second, the trend in occupational mobility is different - while the first measure is relatively flat for most of the 1980, the second measure exhibits a downward trend. This evidence suggests that workers in the 1980s might have been facing more fundamental occupational changes requiring a higher degree of skill upgrading and retooling and longer periods of transition from one occupation to another. This is consistent with the evidence in Murphy and Topel (1987) who report that the rise in unemployment in the 1970s and early 1980s was almost entirely due to the rise in the incidence of the long spells of unemployment.

Note that our preferred measure of mobility is defined as the faction of switchers out of all individuals for whom a switch could be identified. This implies that since the PSID sample starts in 1968, in 1969 we compute mobility on the sample of those who were employed in 1968 and 1969. According to the discussion above, this may bias downward our mobility measure in 1969. Fortunately, 1968 was a very low unemployment year - only 4.2% of the

workers in our sample were unemployed in 1968. Furthermore, by 1969 91% of them were already re-employed. That implies that the mobility from 1970 on is accurately computed.

4.4 Occupational Mobility of Government Workers

The pattern of occupational mobility exhibited by government workers is markedly different from the observed general pattern. We define occupational mobility for government workers in year t as the fraction of government workers who in year t work in an occupation that is different from the one they worked in in year $t-1$ or last time they were employed. Most of occupational switches thus identified represent workers changing occupations within the government rather than workers entering the government sector and starting in a new occupation.

Figure 8b shows three-digit occupational mobility for government workers for the period 1969-1993. Two observations emerge. First, occupational mobility for government workers is twice lower - around 9% - than the mobility of workers in the private sector. Second, occupational mobility of government workers has declined sharply over the period - from 12% in the late 1960s to 6% in the early 1990s. These facts explain why including government workers in the sample decreases the overall level and flattens the upward trend in occupational mobility.

The trend in occupational and industry mobility of government workers is in such a contrast to that of private sector workers that it begs for a rigorous investigation of its sources. One possible explanation for this observation may be the change in the occupational mix employed by the government, due to, for example, contracting out of many government provided services.[21]

[21]The issue which sample - with or without the government workers - is more appropriate depends on the question the analysis addresses. If one is after measuring the degree of 'creative destruction' of human capital due to occupational switching in the economy the sample with government should be used. If, on the other hand, one is investigating the underlying volatility of demands for various occupations the sample

4.5 Is Fixing the Occupational and Industry Classification over the Period Appropriate?

As mentioned above, the PSID uses the same 1970 Census of Population occupation and industry codes throughout the 1968-1993 period. Clearly, some of the occupations people worked in in the early 1990s were not even in existence when the 1970 Census classification was developed. How does this affect the levels and trends in mobility that we document in this paper? It biases our estimates of mobility downward, especially on the three-digit level. When new occupations appear, workers in those occupations will be coded as belonging to the "not elsewhere classified" occupational categories of the outdated classification. This implies that over time these "not elsewhere classified" occupations themselves represent collections of new occupations. Since we cannot identify switches across those occupation, over time we necessarily identify smaller and smaller fraction of occupational switches.[22] This implies that the increase in occupational and industry mobility documented in this paper represents a lower bound on the true increase.

It does not appear feasible to identify by how much we underestimate mobility late in the sample due to the use of the 1970 classification. One may consider using the March CPS which changes its occupational and industry classifications three times during the 1968-1993 period. Unfortunately, each successive occupational classification not only introduces new occupations, but also aggregates some of the existing ones. As a consequence, in the March CPS data occupational mobility *declines* each time a new classification is introduced. This makes the interpretation of trends in occupational mobility obtained on the March CPS difficult.

without government is more appropriate.

[22]The fraction of workers in our sample employed in the "not elsewhere classified" occupational categories increases from 14% to 20% over the 1968-1993 period.

5 Additional Facts on Occupational Mobility

5.1 Net Occupational Mobility

So far we have studied the gross reallocation of workers across occupations and industries. In this section we study the behavior of the net reallocation, defined as one half of the sum of the absolute changes in occupational employment shares, i.e., if $s_{m,t}$ is the fraction of employment in occupation m in year t, net mobility in year t is given by $1/2 \sum_m |s_{m,t} - s_{m,t-1}|$.

The analysis in this Section provides insights into the reasons for the observed high levels of gross mobility. In particular, if mobility is primarily caused by shifting demands for labor in different sectors of the economy (as in Lucas and Prescott (1974)), gross flows of workers should approximately equal net flows. If, however, it turns out that gross flows dwarf net flows, this would point the quest for understanding workers' mobility decisions toward studying the matching process between workers and occupations (as in Jovanovic (1979), Miller (1984), and McCall (1990)).[23]

As we pointed out earlier in the paper, until 1980 the Retrospective Files provide us with reliable information on sectoral affiliations in the economy, while after 1980 we are restricted to using the Originally coded data characterized by substantial amount of noise. When one addresses the question of gross occupational mobility, it is imperative to control for the coding error after 1980. In the case of net mobility, however, the issue is more subtle. If one individual could be wrongly misclassified from occupation x into occupation y, then it is conceivable that another worker might be misclassified from occupation y into occupation x. Such switches cancel out having no effect on computed net mobility.[24] In order to estimate the contribution of the coding error to net mobility, we regressed net occupational

[23] Jovanovic and Moffitt (1990) study the relative importance of sectoral shocks and employer-worker mismatch in explaining sectoral reallocation. They, however, use only three very aggregated sectors: manufacturing, services and trade, and other industries.

[24] Blanchard and Diamond (1990) present a somewhat more formal exposition of this argument.

mobility on a constant, time trend, unemployment, and a dummy variable *Break* which takes the value of one for all years after 1980. Then, in reporting net occupational mobility in Figure 9, we subtract the estimated coding error as given by the coefficient on the *Break* variable. Consistent with the discussion above, at the one- and two-digit level the estimated coding error is very small and statistically insignificant, and controlling for it turns out inconsequential for the the reported results. We find that at the one-digit level net mobility increases from 1% to over 3% over the 1970-1993 period, while at the two-digit level the increase is from 3% to 6%. At the three-digit level the estimate of the coding error is larger and statistically significant. In particular, net occupational mobility increases from 9% to 14% if one does not account for the coding error post 1980, and from 9% to 11%, if one does.

We conclude that net occupational mobility accounts for the large part of gross occupational mobility.[25] Moreover, most of the increase in gross mobility over the 1968-1993 period is accounted for by the rise in net mobility. This lends support to the hypothesis that the rise in gross occupational mobility is attributable to the increased variability of occupational labor demands - a theory formalized in Kambourov and Manovskii (2002a).

5.2 The Extent of Return Mobility

An important question for anyone studying occupational and industry mobility is how permanent occupational and industry switches are. To address this issue we compute the fraction of workers who switch their occupations (industries) and then return to the original occupations (industries) one, two, and three years after the switch. The Retrospective Files are appropriate for computing this statistic. For each of the years from 1969 till 1977 we identify those workers who have just switched their occupation (industry), and then we follow them

[25] As opposed to the level of gross mobility, the levels of net mobility found in the PSID should be interpreted with some caution due to the relatively small PSID sample size. We tried enlarging the sample by pooling together observations for several years, or including females into the sample, and the results were virtually unchanged.

for three years in order to determine the fraction that returns to their original occupation (industry). The reported statistics are averaged over the period.

The results summarized in Table 5 indicate that around 30% of workers return to their one-digit occupation (industry) within a three year period, and around 20% return to their three-digit occupation (industry). These estimates are in line with those reported by Loungani and Rogerson (1989) for two-digit industry switches. The probability of return declines sharply with years after the switch. These findings put measurable restrictions on the theories of worker mobility.

5.3 Occupational Mobility across Broad Occupational Groups

Why is mobility of college educated workers so high and increasing? A conjecture that is often offered is that this might be due to upward career mobility into management positions. Therefore, it is important to take a more detailed look at the nature of the observed occupational switches. We show that while some of the increase in mobility in the high-skilled occupations indeed came from moves into management positions, a substantial part involved moves into occupations typically employing lower-skilled workers.

In this subsection we document the patterns of occupational switches over time across six large occupational groups that correspond to the one-digit occupational classification: group 1 - professional, technical, and kindred workers; group 2 - managers, officials, and proprietors; group 3 - clerical and sales workers; group 4 - craftsmen, foremen, and kindred workers; group 5 - operatives and kindred workers; and group 6 - laborers and service workers. Unfortunately, we cannot use a finer occupational partition because the sample size would be too small to precisely estimate all the implied occupational transitions. For comparability across time we use originally coded data for this analysis. Thus while the implied level of

mobility is too high, the trends are informative.[26]

We concentrate the analysis on three time periods: 1970-1975, 1982-1987, and 1988-1993. The procedure is as follows. We count those employed in a given year in occupation i who will be working the following year in occupation j and divide this by the number of those who are employed today in occupation i and who will report any occupation next year (by doing so we effectively restrict the sample to those employed and reporting occupations in both years). This is done in each year in the specified time period, and the average result weighted by the PSID sample weights is reported in the cell ij of Table 6.[27]

The results confirm our findings of increased overall occupational mobility. Except for group 5, where the fractions of stayers remains virtually unchanged over time, all other occupational groups exhibit a significant decrease in the fraction of workers who remain in those occupations from one year to the next. Consistent with our earlier findings, the increase in mobility is not limited to occupations that employ mainly highly educated (groups 1 and 2) or mainly uneducated workers (groups 3, 4, and 6).

The mobility of those who move out of educated groups like 1 and 2 is particularly interesting. The data indicates that although some of the increase in mobility from educated groups comes from occupation switches between groups 1 and 2, a higher fraction of workers in those occupational categories are moving into less educated occupational groups. In fact, while in the 1970-1975 period, on average 4.57% of workers in group 1 switched to groups

[26]We repeated the same analysis using the Retrospective Files in the 1970s. We do not report those findings because it is not clear what is the most appropriate procedure for identifying genuine *individual* occupational switches in the noisy originally coded data after 1980. An extensive discussion of such procedures can be found in Kambourov and Manovskii (2002c). We experimented with a number of such procedures and all the experiments supported the basic message of this subsection: the increase in occupational mobility was not driven by an increased flow of workers into or out of a particular one-digit occupation.

[27]It is not clear if the use of the sample weights is appropriate in this experiment since the weights are not designed to reflect the occupational structure of the overall population. This does not appear to be a problem here, however, since at the one-digit level the fraction of population in each occupation is large. The results obtained on the unweighted sample are similar.

3 to 6 from one year to the next, in the 1988-1993 period 8.56% did. The corresponding numbers for the group 2 workers are 11.31% and 15.96%.

Note that the results of this Subsection are not driven by business cycle effects. All three periods represent roughly the same business cycle characteristics. We have performed similar analysis for selected years only and the results are essentially the same. The analysis suggests that the increase in occupational mobility was not limited to a subset of particular one-digit occupations. In this sense the increase in occupational mobility was pervasive.

The analysis in this Subsection also sheds light on the hypothesis advanced by Jovanovic and Nyarko (1997) that many occupations serve as stepping-stones or spring boards for other occupations and this accounts for a substantial fraction of occupational mobility. As noted in McCall (1990) under this hypothesis our Table 6 should be very asymmetric across the diagonal. The fact that this is not the case implies that there is no evidence that one-digit occupations can be ordered to form a sequence in a typical career path. Perhaps one must look at more disaggregated occupations for evidence of stepping-stone mobility.

5.4 Occupational Mobility over the Business Cycle

A careful analysis of the behavior of occupational (industry) mobility over the business cycle is called for but is beyond the scope of this paper. Here we just point out some basic but important observations. We find aggregate occupational and industry mobility only mildly procyclical (almost acyclical).[28] As is evident from Figures 3 and 4, however, this masks the very different patterns of behavior of various age-education population subgroups over the business cycle. For the workers with education levels of high school or less, it is strongly countercyclical for workers younger than 30 and strongly procyclical for those older than 30. Occupational (industry) mobility of college educated workers in all age groups is little

[28]This result is consistent with Loungani and Rogerson (1989) who find that (gross) labor reallocation across two-digit industries does not display any pronounced cyclical pattern.

affected by the business cycle conditions. These findings suggest a potentially important type of worker heterogeneity so far overlooked in the analysis of the welfare costs of business cycles.

6 Conclusion

The analysis in this paper was designed to provide a set of key facts characterizing the patterns of occupational and industry mobility in the US over the 1968-1993 period. We document that the level of occupational and industry mobility is high and has increased substantially over the period. In addition, we show that this is a profound change in the labor market that has affected a large fraction of the labor force. For instance, occupational mobility has increased for most age-education groups, and its rise was not driven by an increased flow of workers into or out of a particular one-digit occupation.

The high level of occupational mobility that we documented in this paper may seem surprising to an academic economist. It may be less surprising if a curious economist took the time to question other people about their careers. He or she might hear a story like this one: "Yes, I very much enjoy my position as a journalist writing for a newspaper chain. I used to be a high school English teacher," or, "my career as a small business consultant grew from my love of training employees in my chain of donut shops. Before that I was a police officer. I started out as a truck driver, however."[29] More rigorously, we must reiterate that the Retrospective Files available from the PSID represent the best data on annual occupational and industry mobility available in the United States. We thus have a lot of confidence in the levels and trends of mobility that we have reported.

We defined occupations and industries using the one, two-, and three-digit classifications

[29]These examples are based on "Making Career Sense of Labour Market Information" - the 1998 guide to Canadian Career Councilors. This Guide prepared by Canadian Career Development Foundation contains much anecdotal evidence on the increasing pace of occupational mobility.

utilized by the 1970 Census of Population and provided by the Panel Study of Income Dynamics for the 1968-1993 period. The examination of the occupational titles suggests that human capital is likely to be three-digit rather than one- or two-digit specific. A close look at the three-digit occupation classification reveals that skills accumulated in a given three-digit occupation may not be easily transferable to another three-digit occupation. For example, if an economics professor becomes a psychologist or a librarian, then, despite staying in the same one- and two-digit occupation, she would not be able to use most of her human capital accumulated while being in economics. Results in Kambourov and Manovskii (2002b) confirm this intuition. Specifically, they find that the returns to ten years of occupational experience are as high as 12.33% at the one-digit level, 15.19% at the two-digit level, and 19.00% at the three-digit level. Thus we suggest that researchers interested in calibrating their models using observations on career mobility should use the levels and trends in occupational mobility at a three-digit level documented in this paper.

Of course, most of the time workers who switch occupations tend to move into occupations that are relatively close to the occupation they have left. It remains an open research question, however, how one can develop a metric of how close various occupations are from each other in terms of skill transferability. It remains true, however, that everything else being constant, the average worker with ten years of occupational tenure would see his wages decline by at least 19% upon an occupation switch because many of the skills accumulated in the previous occupation are not used any longer and new skills need to be developed.

In view of the sharp rise in mobility documented in this paper, the next logical step is the investigation of the causes of its increase. Kambourov and Manovskii (2002a) suggest that the variability of occupational demand shocks has increased over time. They also argue in a general equilibrium model that the increase in mobility was not likely to be caused by a

decline in the costs of switching occupations. Other potential causes of the increased mobility include the usual suspects such as technological change, globalization and international trade, changes in government regulation and labor force unionization.

An intriguing research question is to relate changes in occupational mobility to changes in the growth rate of productivity. It may not be a coincidence that the increase in occupational mobility we have documented has coincided with a much discussed slowdown in productivity growth.

To conclude, with this paper we would like to bring the issue of occupational mobility to the attention of the profession. Why do people switch their occupations so often? How do people choose their occupations? Why has occupational mobility increased so much in the last 30 years? Is the increase in occupational mobility the missing link that would finally help us understand the changes in wage inequality and the aggregate performance of the economy? These and many other related questions beg economists' attention. We believe that answering them will significantly advance our understanding of the labor markets.

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Table 1: Coding Error Statistics.

Variable	$\chi^2(9)$	$Prob > \chi^2$	Average Increase in Mobility
1-Digit Occupations	27.61	0.0011	0.1061
2-Digit Occupations	40.24	0.0000	0.1279
3-Digit Occupations	74.74	0.0000	0.2430
1-Digit Industries	32.06	0.0002	0.0949
2-Digit Industries	57.88	0.0000	0.1515
3-Digit Industries	64.30	0.0000	0.2505
1-Digit Ind.-Occ. Cells	18.80	0.0270	0.0143
2-Digit Ind.-Occ. Cells	24.28	0.0039	0.0275
3-Digit Ind.-Occ. Cells	47.64	0.0000	0.1085

Note. - The first column reports the Wald test statistic for the null hypothesis that the coding error is the same across all age-education groups while the second column reports the probability of not being able to reject the null hypothesis. The last column reports the average increase in occupational, industry, or occupation-industry mobility after 1981 due to the estimated coding error.

Table 2: Estimated Coefficient on the Time Trend in Mobility on the Overall Sample, Various Population Structures.

	Population Structure				
Variable	Actual	Average	1970	1980	1990
1-Digit Occupations	0.0021	0.0025	0.0024	0.0026	0.0026
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
2-Digit Occupations	0.0021	0.0025	0.0024	0.0028	0.0025
	(0.0003)	(0.0003)	(0.0004)	(0.0004)	(0.0003)
3-Digit Occupations	0.0012	0.0018	0.0015	0.0022	0.0016
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
1-Digit Industries	0.0018	0.0021	0.0023	0.0023	0.0021
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
2-Digit Industries	0.0017	0.0021	0.0020	0.0023	0.0021
	(0.0004)	(0.0003)	(0.0004)	(0.0004)	(0.0003)
3-Digit Industries	0.0008	0.0012	0.0012	0.0014	0.0011
	(0.0004)	(0.0004)	(0.0005)	(0.0004)	(0.0004)
1-Digit Ind.-Occ. Cells	0.0014	0.0016	0.0016	0.0016	0.0017
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
2-Digit Ind.-Occ. Cells	0.0019	0.0021	0.0019	0.0023	0.0022
	(0.0002)	(0.0002)	(0.0003)	(0.0002)	(0.0002)
3-Digit Ind.-Occ. Cells	0.0010	0.0015	0.0015	0.0018	0.0014
	(0.0003)	(0.0003)	(0.0004)	(0.0003)	(0.0003)

Note. - Each cell represents estimates of the time trend in mobility on the overall sample for various population structures. The observed mobility is corrected for the estimated coding error after 1980. The estimates are obtained from an OLS regression of the corresponding mobility variable on a constant and a time trend for the 1969-1993 period. Standard errors are in parentheses.

Table 3: Average Estimated Switch Probability for Various Age-Education Groups and Different Occupational, Industry, and Industry-Occupation Classifications.

	Occupation			Industry			Industry-Occupation Cells		
Variable	1-Digit (1)	2-Digit (2)	3-Digit (3)	1-Digit (4)	2-Digit (5)	3-Digit (6)	1-Digit (7)	2-Digit (8)	3-Digit (9)
Group 11	0.2644	0.3040	0.3881	0.2130	0.2634	0.2695	0.1537	0.1985	0.2444
Group 12	0.2193	0.2619	0.3198	0.1702	0.1919	0.2153	0.1117	0.1480	0.1825
Group 21	0.1766	0.2032	0.2405	0.1108	0.1253	0.1286	0.0890	0.1086	0.1213
Group 22	0.1350	0.1597	0.1986	0.1095	0.1218	0.1373	0.0671	0.0911	0.1211
Group 31	0.1333	0.1513	0.1736	0.0736	0.0857	0.1016	0.0427	0.0649	0.0853
Group 32	0.0752	0.0810	0.1064	0.0634	0.0739	0.0759	0.0397	0.0426	0.0503
Group 41	0.0826	0.0997	0.1192	0.0798	0.0872	0.0807	0.0587	0.0612	0.0598
Group 42	0.0702	0.0691	0.0722	0.0436	0.0467	0.0583	0.0163	0.0240	0.0230
Group 51	0.0707	0.0763	0.0951	0.0399	0.0482	0.0502	0.0216	0.0261	0.0326
Group 52	0.0613	0.0684	0.0736	0.0297	0.0409	0.0474	0.0249	0.0420	0.0373

Note.- Each cell represents the average (over the 1969-1993 period) predicted switch probability for various age-education groups. The predictions are from a probit regression. The binary dependent variable indicates whether there was a switch on a one-, two-, or three-digit level, respectively. The sample was divided into 10 age-education groups ij, where i denotes the age group while j denotes the education group. By age individuals are divided into the following groups: 23-28, 29-34, 35-40, 41-46, 47-61. By education, individuals are divided into those who have 12 years of education or less and those who have more than 12 years of education. The independent variables in the regression include dummy variables dum_{ij} indicating the group that the individual belongs to, time trend variables $tdum_{ij}$ for each of the ten groups, structural break variables $break_{ij}$ for each of the ten groups capturing the change in the coding methodology in 1980, and the current and lagged unemployment levels in the county of residence, again separate for each group.

Table 4: Estimated Time Trend Coefficients for Various Age-Education Groups. Different Occupation, Industry, and Industry-Occupation Cell Classifications.

	Occupation			Industry			Industry-Occupation Cells		
Variable	1-Digit (1)	2-Digit (2)	3-Digit (3)	1-Digit (4)	2-Digit (5)	3-Digit (6)	1-Digit (7)	2-Digit (8)	3-Digit (9)
Group 11	0.0038	0.0046	0.0053	0.0071	0.0083	0.0058	0.0046	0.0065	0.0067
	(0.0010)	(0.0011)	(0.0013)	(0.0012)	(0.0011)	(0.0012)	(0.0009)	(0.0011)	(0.0011)
Group 12	0.0037	0.0040	0.0055	0.0023	0.0027	0.0026	-0.0003	0.0020	0.0023
	(0.0012)	(0.0012)	(0.0012)	(0.0014)	(0.0015)	(0.0015)	(0.0011)	(0.0011)	(0.0012)
Group 21	0.0031	0.0048	0.0026	-0.0002	-0.0001	-0.0023	0.0010	0.0020	-0.0003
	(0.0010)	(0.0012)	(0.0012)	(0.0008)	(0.0008)	(0.0008)	(0.0006)	(0.0008)	(0.0007)
Group 22	0.0039	0.0037	0.0045	0.0041	0.0037	0.0036	0.0018	0.0029	0.0047
	(0.0010)	(0.0010)	(0.0009)	(0.0006)	(0.0007)	(0.0008)	(0.0006)	(0.0007)	(0.0007)
Group 31	0.0030	0.0030	0.0013	0.0005	0.0005	-0.0002	0.0004	0.0011	0.0004
	(0.0008)	(0.0007)	(0.0009)	(0.0007)	(0.0006)	(0.0010)	(0.0007)	(0.0006)	(0.0007)
Group 32	0.0020	0.0013	-0.0005	0.0023	0.0020	0.0009	0.0023	0.0019	-0.0002
	(0.0010)	(0.0010)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0004)	(0.0005)	(0.0009)
Group 41	-0.0003	-0.0005	-0.0023	0.0033	0.0026	0.0002	0.0038	0.0022	0.0004
	(0.0014)	(0.0014)	(0.0015)	(0.0007)	(0.0007)	(0.0009)	(0.0006)	(0.0008)	(0.0011)
Group 42	0.0033	0.0014	-0.0006	0.0004	-0.0001	-0.0005	0.0009	0.0010	0.0001
	(0.0013)	(0.0010)	(0.0012)	(0.0009)	(0.0012)	(0.0008)	(0.0005)	(0.0006)	(0.0008)
Group 51	0.0004	-0.0001	-0.0009	-0.0002	-0.0006	-0.0012	-0.0006	-0.0010	-0.0016
	(0.0004)	(0.0004)	(0.0006)	(0.0005)	(0.0006)	(0.0008)	(0.0004)	(0.0004)	(0.0005)
Group 52	0.0011	0.0013	-0.0001	0.0009	0.0013	0.0010	0.0015	0.0030	0.0010
	(0.0006)	(0.0007)	(0.0007)	(0.0007)	(0.0006)	(0.0005)	(0.0005)	(0.0006)	(0.0006)

Note.- Each cell represents the time trend in mobility for a specific age-education group over the 1969-1993 period. Standard errors are in parentheses. The sample was divided into 10 age-education groups ij, where i is the corresponding age group while j is the corresponding education group. By age individuals are divided into the following groups: 23-28, 29-34, 35-40, 41-46, 47-61. By education, individuals are divided into those who have 12 years of education or less and those who have more than 12 years of education. For each group ij, the observed mobility is corrected for the estimated coding error after 1980. Then the reported estimates are obtained from an OLS regression of the mobility for group ij on a constant and a time trend.

Table 5: Fraction of Workers Returning to Their Occupation or Industry, 1969-1980.

	Fraction of Workers Returning After		
Variable	One Year	Two Years	Three Years
1-Digit Occupation	0.1953	0.1073	0.0630
	(0.0100)	(0.0078)	(0.0061)
2-Digit Occupation	0.1669	0.0870	0.0521
	(0.0095)	(0.0071)	(0.0056)
3-Digit Occupation	0.1172	0.0567	0.0346
	(0.0082)	(0.0058)	(0.0046)
1-Digit Industry	0.1861	0.0612	0.0608
	(0.0098)	(0.0058)	(0.0061)
2-Digit Industry	0.1453	0.0477	0.0507
	(0.0088)	(0.0053)	(0.0055)
3-Digit Industry	0.1188	0.0360	0.0476
	(0.0081)	(0.0047)	(0.0053)

Note. - Each cell represents the fractions of workers who return to their occupation (industry) one year, two years, or three years after they have switched them. Standard errors are in parentheses. The results are obtained using the Retrospective Files for the period 1969-1980. For each of the years from 1970 till 1977 we identify those workers who have just switched their occupation (industry), and then we follow them for three years in order to determine the fraction that returns to their previous occupation (industry). The reported statistics are averaged over this period.

Table 6: Mobility Across Broad Occupational Groups.

A. Average Mobility Over the 1970-1975 Period

From	To 1	2	3	4	5	6	Relative Size
1	91.73	3.70	2.17	1.31	0.60	0.49	17.45
	(0.17)	(0.11)	(0.08)	(0.06)	(0.05)	(0.05)	(0.10)
2	4.66	84.05	5.93	3.13	1.71	0.54	13.50
	(0.16)	(0.23)	(0.18)	(0.13)	(0.10)	(0.05)	(0.09)
3	3.75	10.53	78.97	2.64	4.35	1.82	11.03
	(0.14)	(0.23)	(0.33)	(0.13)	(0.16)	(0.09)	(0.07)
4	1.08	1.85	2.32	80.78	10.97	3.01	27.78
	(0.05)	(0.07)	(0.08)	(0.17)	(0.13)	(0.08)	(0.13)
5	0.97	0.95	1.99	14.18	74.31	7.60	21.41
	(0.06)	(0.05)	(0.08)	(0.18)	(0.25)	(0.16)	(0.10)
6	0.70	2.43	1.89	10.30	17.09	67.59	8.60
	(0.07)	(0.12)	(0.11)	(0.24)	(0.33)	(0.38)	(0.07)

B. Average Mobility Over the 1982-1987 Period

From	To 1	2	3	4	5	6	Relative Size
1	81.50	9.94	2.78	4.40	0.46	0.92	17.86
	(0.22)	(0.17)	(0.10)	(0.12)	(0.04)	(0.05)	(0.09)
2	7.81	76.91	7.82	5.10	1.33	1.03	17.97
	(0.15)	(0.27)	(0.17)	(0.14)	(0.08)	(0.06)	(0.10)
3	4.59	14.26	68.01	4.51	4.40	4.23	10.76
	(0.16)	(0.25)	(0.31)	(0.15)	(0.16)	(0.16)	(0.08)
4	3.46	4.36	1.69	77.84	8.33	4.33	25.31
	(0.09)	(0.10)	(0.06)	(0.18)	(0.13)	(0.09)	(0.11)
5	0.79	1.83	2.24	11.66	76.60	6.87	19.49
	(0.05)	(0.07)	(0.09)	(0.20)	(0.26)	(0.15)	(0.10)
6	2.16	4.85	4.99	9.66	14.67	63.67	8.60
	(0.11)	(0.19)	(0.19)	(0.26)	(0.28)	(0.40)	(0.06)

C. Average Mobility Over the 1988-1993 Period

From	To 1	2	3	4	5	6	Relative Size
1	80.21	9.94	3.79	3.56	1.37	1.12	19.24
	(0.23)	(0.18)	(0.09)	(0.11)	(0.04)	(0.06)	(0.08)
2	8.89	75.15	7.77	5.37	1.34	1.48	19.67
	(0.14)	(0.25)	(0.16)	(0.12)	(0.08)	(0.06)	(0.10)
3	5.86	13.44	68.74	3.19	4.00	4.77	11.80
	(0.15)	(0.21)	(0.34)	(0.17)	(0.14)	(0.15)	(0.08)
4	3.97	4.92	1.80	76.63	8.60	4.07	22.44
	(0.09)	(0.09)	(0.06)	(0.22)	(0.15)	(0.09)	(0.10)
5	2.02	1.64	1.91	10.43	76.97	7.04	18.26
	(0.05)	(0.07)	(0.09)	(0.19)	(0.25)	(0.15)	(0.10)
6	2.07	4.08	6.19	10.55	15.01	62.10	8.89
	(0.12)	(0.16)	(0.19)	(0.23)	(0.26)	(0.34)	(0.07)

Note. - Cell ij represents the average (over the period) percent of those working in occupation i in a given year who will work in occupation j the following year. Occupational groups are defined as: 1. Professional, technical, and kindred workers; 2. Managers, officials, and proprietors; 3. Clerical and sales workers; 4. Craftsmen, foremen, and kindred workers; 5. Operatives and kindred workers; 6. Laborers and service workers, farm laborers. Standard errors are in parentheses.

Figure 1. Occupational and Industry Mobility in the United States, 1969-1993.

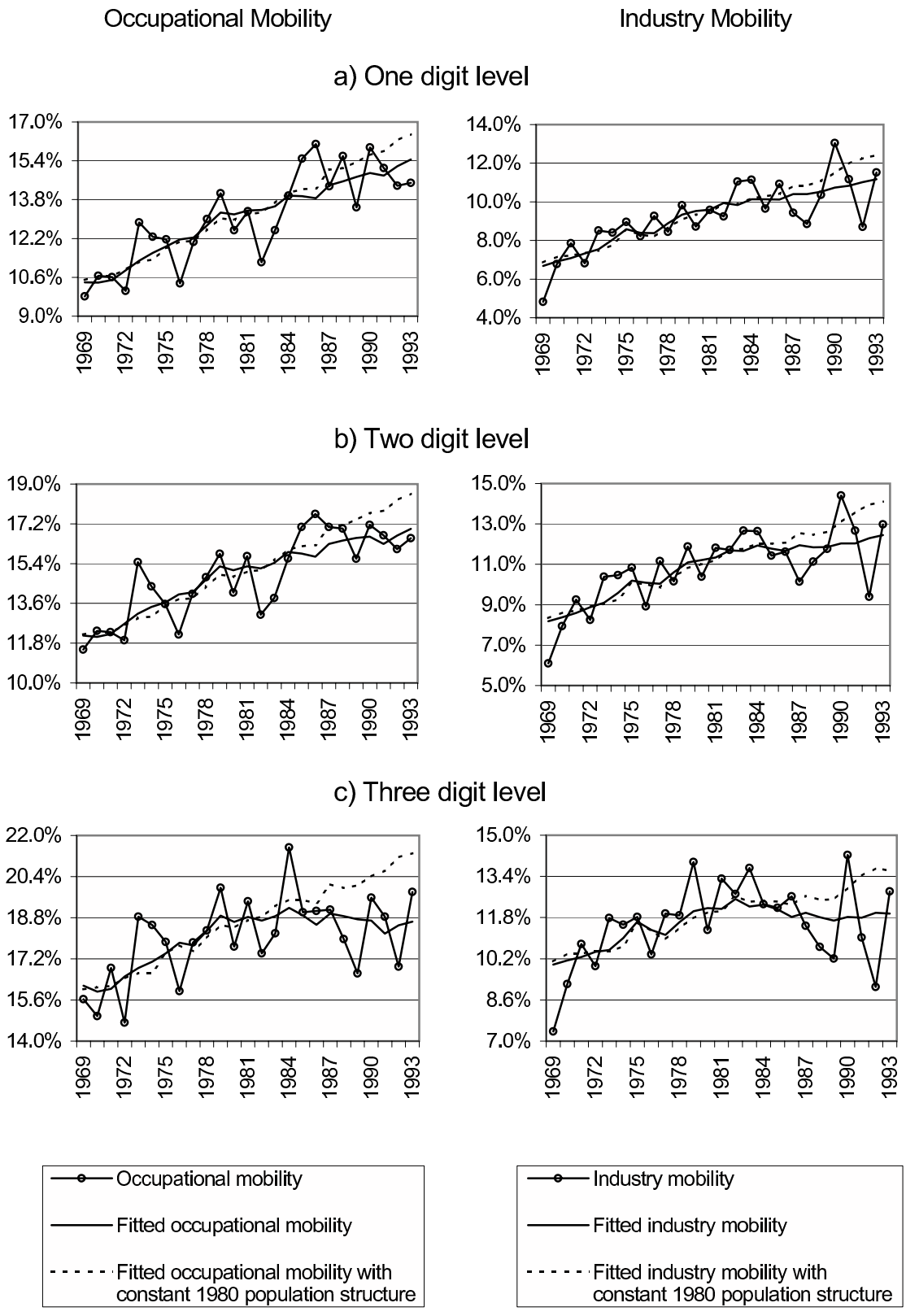
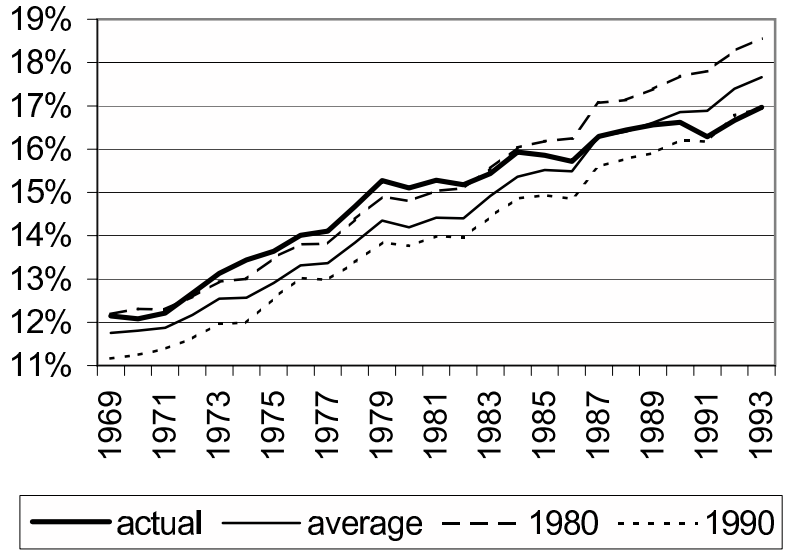
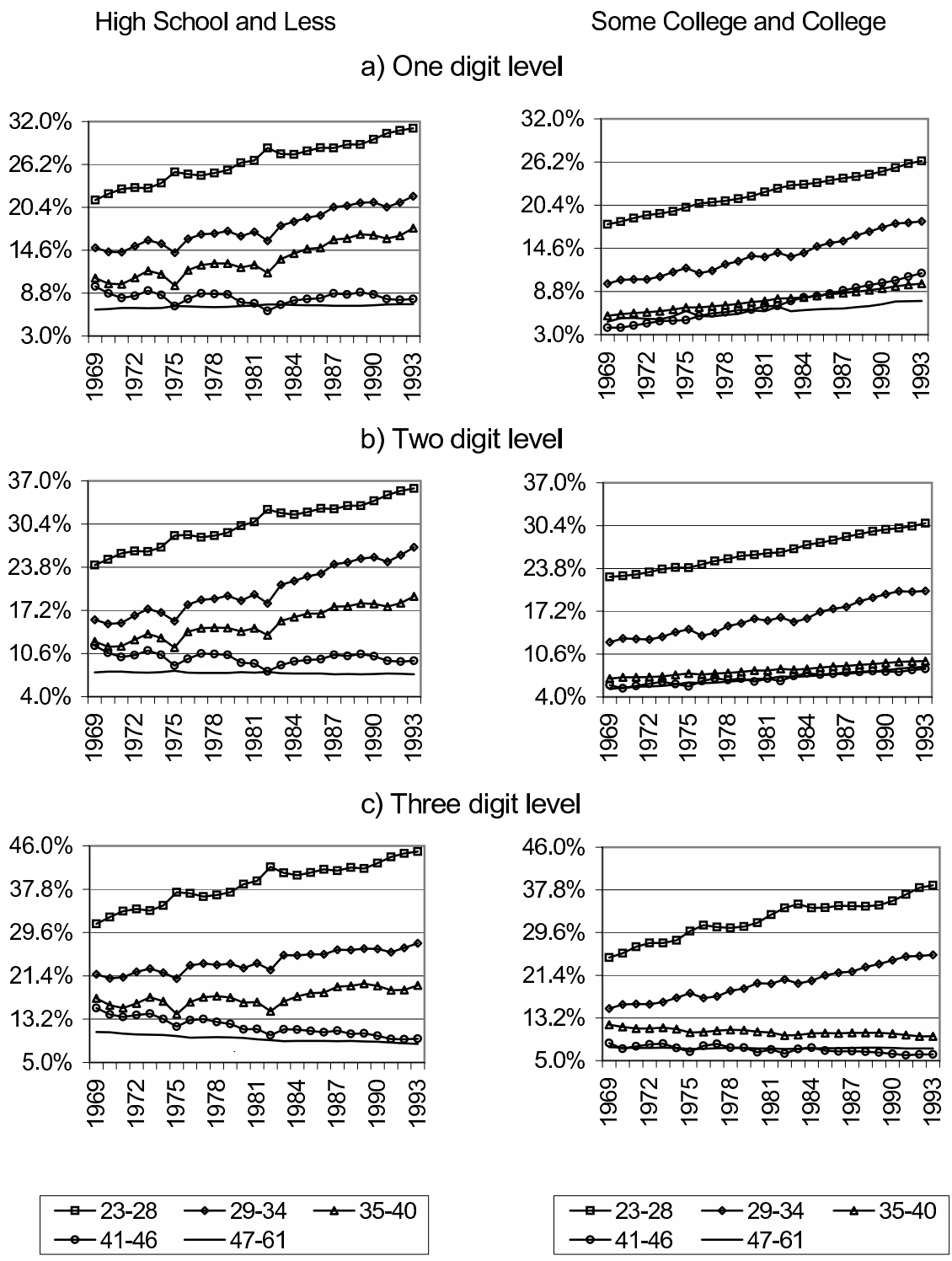


Figure 2. Occupational Mobility at the Two Digit Level, Different Population Structures, 1969-1993.



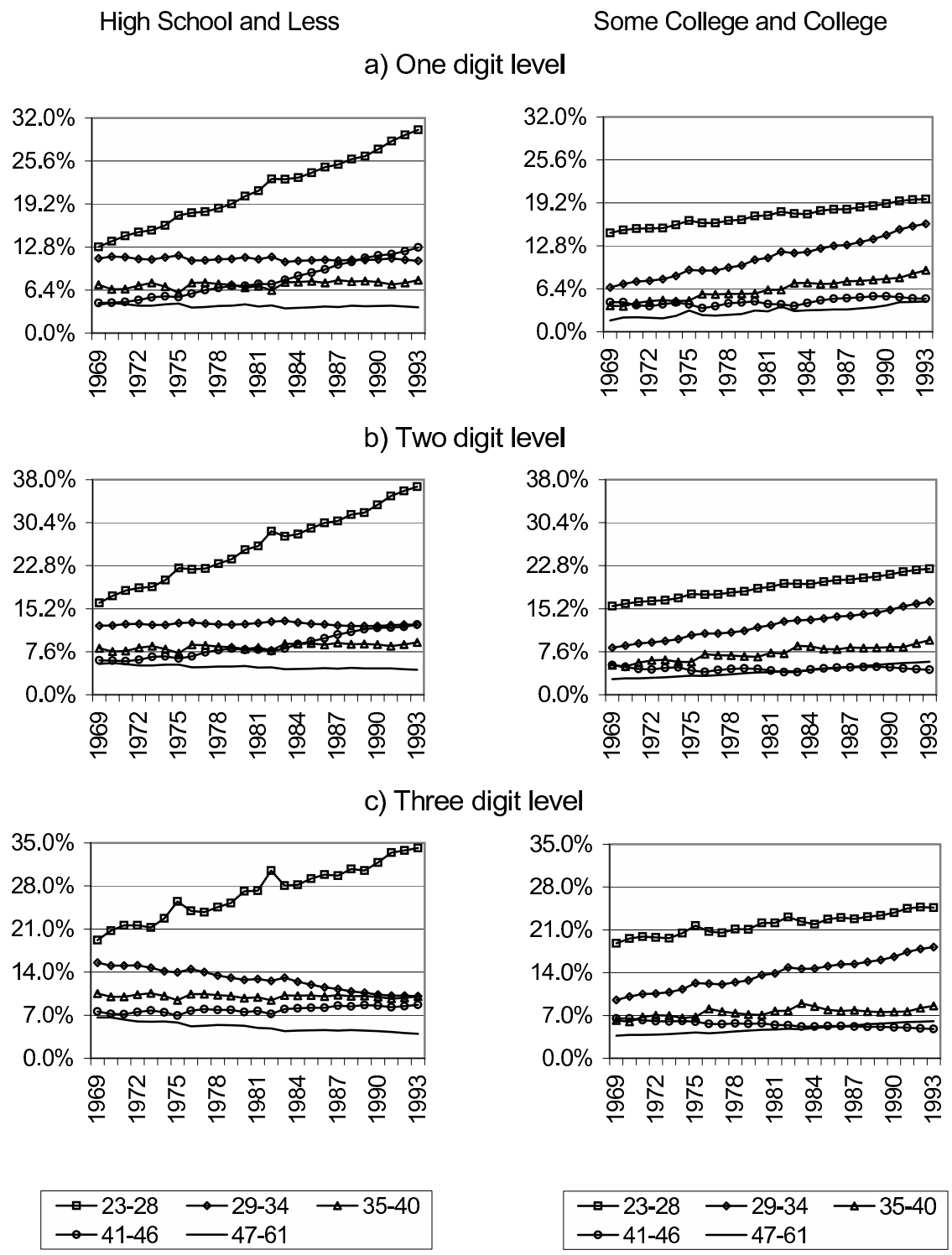
Note: The figure shows the fitted occupational mobility values for various population structures. For instance, the 1980 series shows what the trend in occupational mobility would have been had the age, education, and racial structure of the population remained constant, throughout the 1968-1993 period, at its 1980 level.

Figure 3. Occupational Mobility in the United States by Age and Education Levels, 1969-1993.



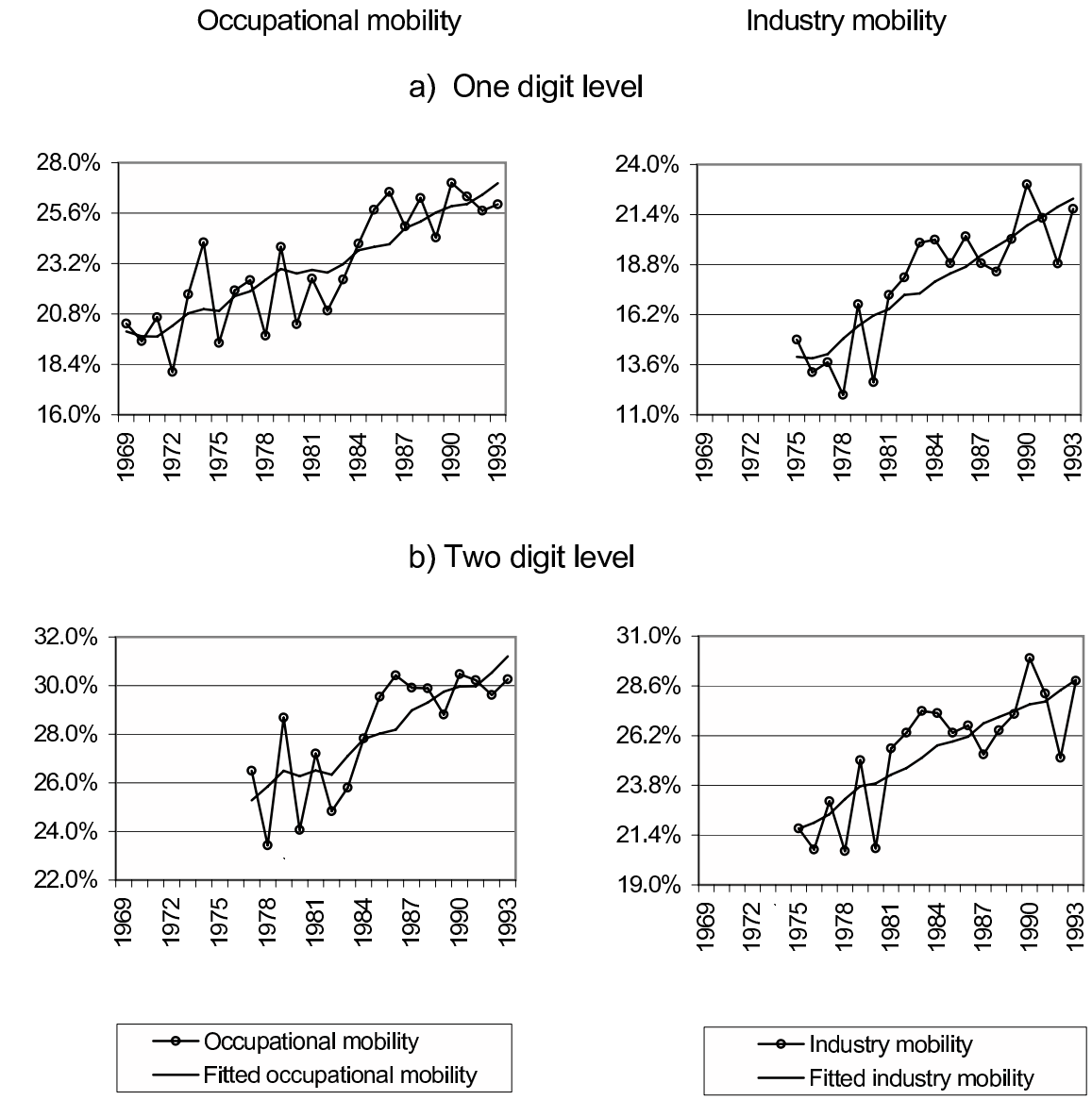
Note: The figure shows the fitted occupational mobility values for various age-education groups. See the text for further details regarding the procedure that is used in obtaining the fitted values.

Figure 4. Industry Mobility in the United States by Age and Education Levels, 1969-1993.



Note: The graphs shows the fitted industry mobility values for various age-education groups. See the text for further details regarding the procedure that is used in obtaining the fitted values.

Figure 5. Occupational and Industry Mobility in the United States, 1969-1993, Original PSID Coding.



Note: Verticale scale is different in each panel.

Figure 6. Occupational and Industry Mobility in the United States by Age and Education Level, 1969-1993, Original PSID Coding.

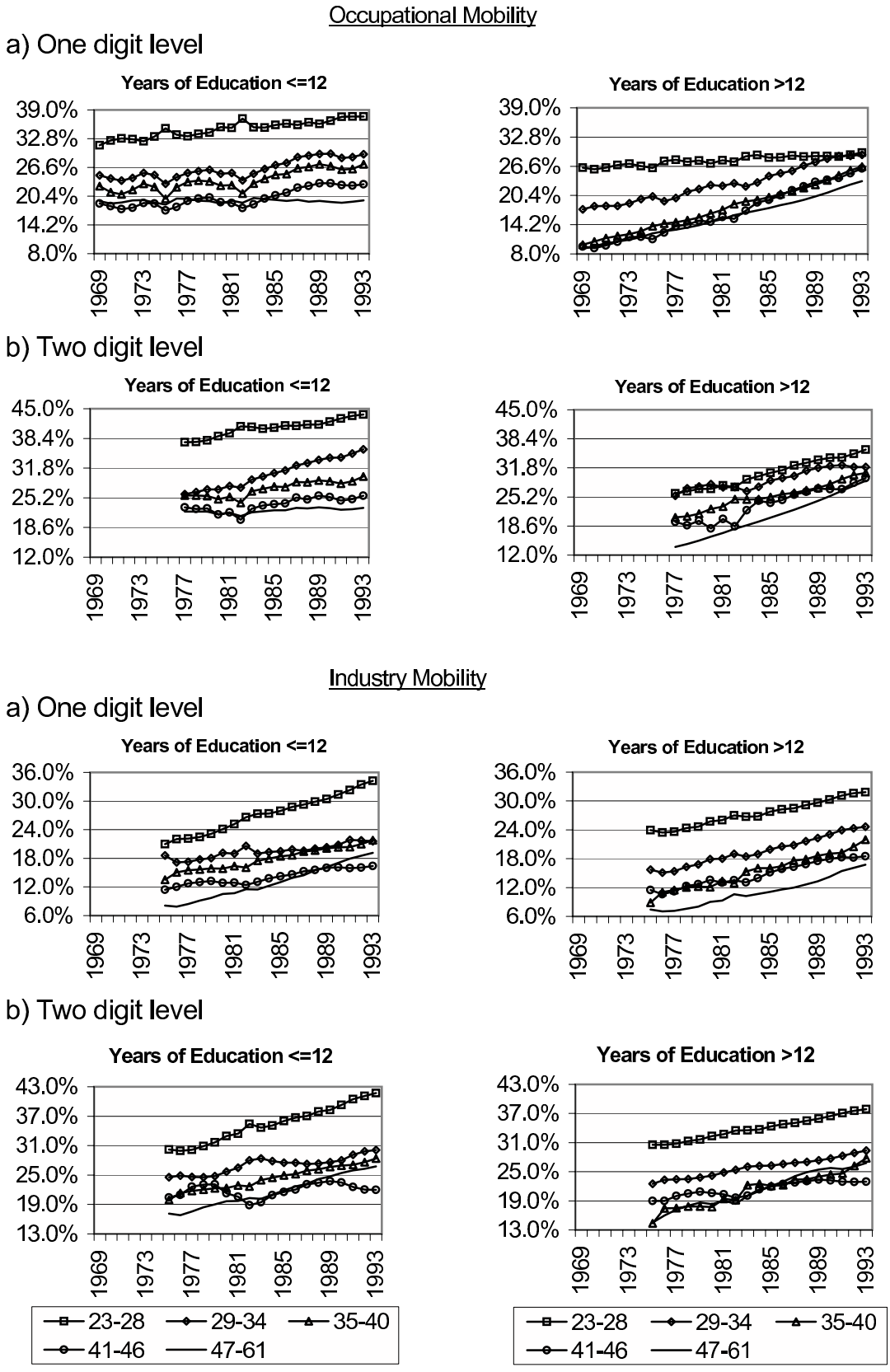
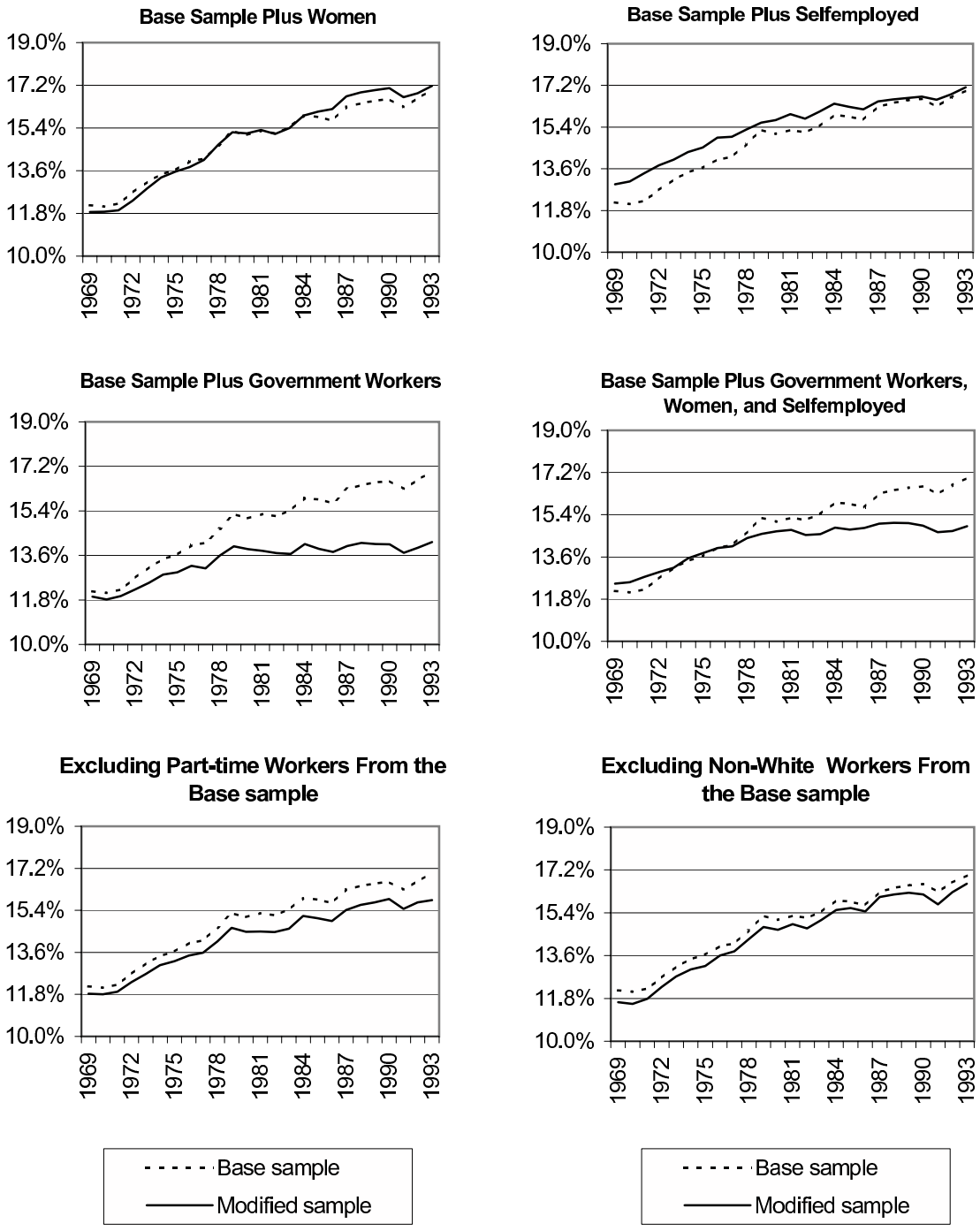
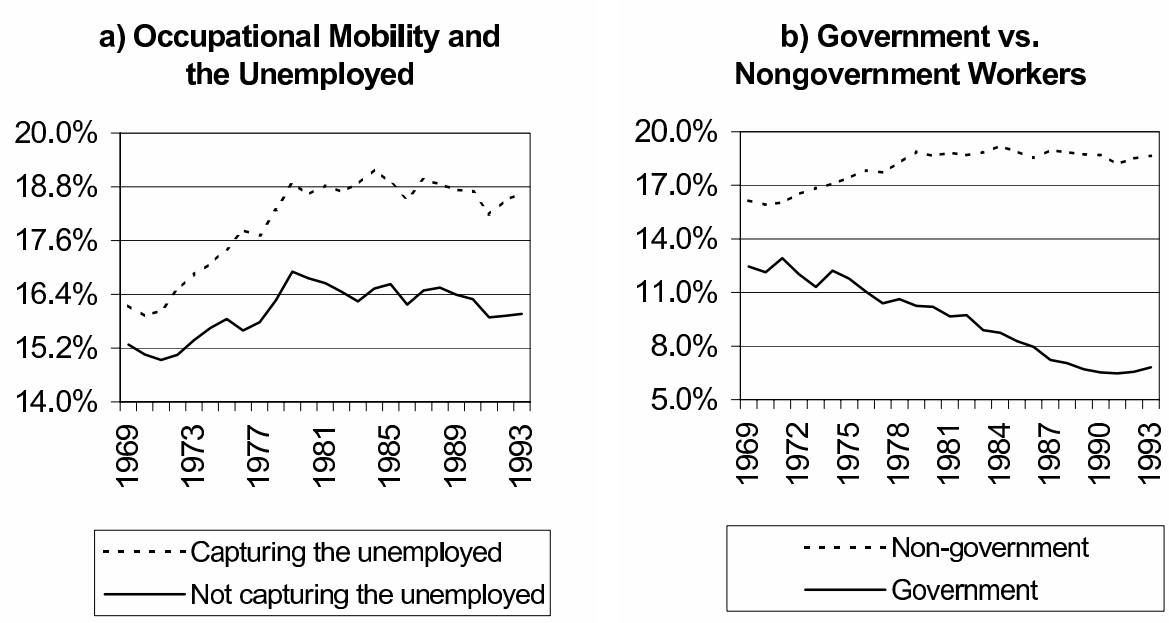


Figure 7. Occupational Mobility in the United States, Two Digit Level: Different Sample Restrictions.



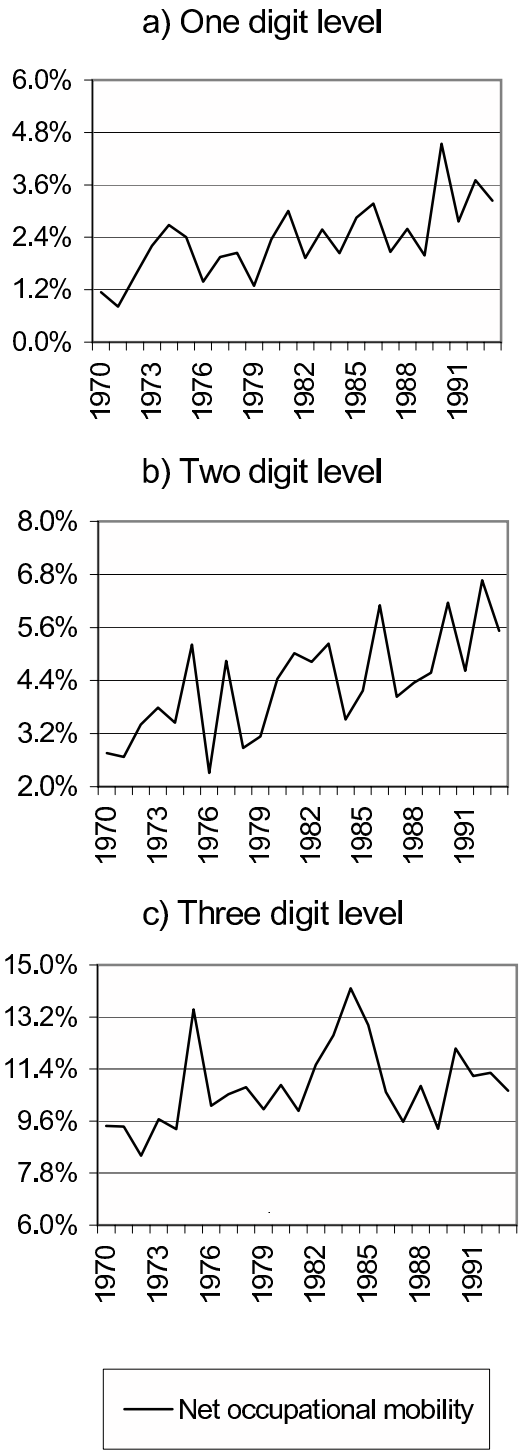
Notes: The base sample includes male heads of household, aged 23-61, who are not self-employed, or dual-employed and are not working for the government. The graphs show the fitted occupational mobility values for various sample restrictions. See text for further details regarding the procedure used in obtaining the fitted values.

Figure 8. Occupational Mobility in the United States, 3 Digit Level, 1969-1993.



Notes: The dotted line on both figures shows occupational mobility on our base sample which includes male heads of household, aged 23-61, who are not self-employed, or dual-employed, and are not working for the government. The solid line on panel a) shows occupational mobility when the base sample is restricted to those employed in both years. The solid line on panel b) shows occupational mobility when we consider a sample of government workers only.

Figure 9. Net Occupational Mobility in the United States, 1970-1993.



Notes: Verticale scale is different in each panel. The graphs show the fitted values of net occupational mobility. See the text for further details regarding the procedure used in obtaining the fitted values.

I Three-Digit Occupational and Industry Codes

Three-Digit Occupation Classification System.[30]

PROFESSIONAL, TECHNICAL, AND KINDRED WORKERS
001 Accountants
002 Architects

Computer specialists
003 Computer programmers
004 Computer systems analysts
005 Computer specialists, not elsewhere classified

Engineers
006 Aeronautical and astronautical engineers
010 Chemical engineers
011 Civil engineers
012 Electrical and electronic engineers
013 Industrial engineers
014 Mechanical engineers
015 Metallurgical and materials engineers
020 Mining engineers
021 Petroleum engineers
022 Sales engineers
023 Engineers, not elsewhere classified
024 Farm management advisors
025 Foresters and conservationists
026 Home management advisors Lawyers and judges
030 Judges
031 Lawyers

Librarians, archivists, and curators
032 Librarians
033 Archivists and curators

Mathematical specialists
034 Actuaries
035 Mathematicians
036 Statisticians

Life and physical scientists
042 Agricultural scientists
043 Atmospheric and space scientists
044 Biological scientists
045 Chemists
051 Geologists
052 Marine scientists
053 Physicists and astronomers
054 Life and physical scientists, not elsewhere classified
055 Operations and systems researchers and analysts
056 Personnel and labor relations workers, Physicians, dentists, and related practitioners
061 Chiropractors
062 Dentists
063 Optometrists
064 Pharmacists
065 Physicians, medical and osteopathic
071 Podiatrists
072 Veterinarians
073 Health practitioners, not elsewhere classified

Nurses, dietitians, and therapists
074 Dietitians
075 Registered nurses
076 Therapists

Health technologists and technicians
080 Clinical laboratory technologists and technicians
081 Dental hygienists
082 Health record technologists and technicians
083 Radiologic technologists and technicians
084 Therapy assistants
085 Health technologists and technicians, not elsewhere classified

Religious workers
086 Clergymen
090 Religious workers, not elsewhere classified

Social scientists
091 Economists
092 Political scientists
093 Psychologists
094 Sociologists
095 Urban and regional planners
096 Social scientists, not elsewhere classified

Social and recreation workers
100 Social workers
101 Recreation workers

Teachers, college and university
102 Agriculture teachers
103 Atmospheric, earth, marine, and space teachers
104 Biology teachers
105 Chemistry teachers
110 Physics teachers

[30]Source: PSID wave XIV - 1981 documentation, Appendix 2: Industry and Occupation Codes.

111 Engineering teachers
112 Mathematics teachers
113 Health specialties teachers
114 Psychology teachers
115 Business and commerce teachers
116 Economics teachers
120 History teachers
121 Sociology teachers
122 Social science teachers, not elsewhere classified
123 Art, drama, and music teachers
124 Coaches and physical education teachers
125 Education teachers
126 English teachers
130 Foreign language teachers
131 Home economics teachers
132 Law teachers
133 Theology teachers
134 Trade, industrial, and technical teachers
135 Miscellaneous teachers, college and university
140 Teachers, college and university, subject not specified

Teachers, except college and university
141 Adult education teachers
142 Elementary school teachers
143 Prekindergarten and kindergarten teachers
144 Secondary school teachers
145 Teachers, except college and university, not elsewhere classified

Engineering and science technicians
150 Agriculture and biological technicians, except health
151 Chemical technicians
152 Draftsmen
153 Electrical and electronic engineering technicians
154 Industrial engineering technicians
155 Mechanical engineering technicians
156 Mathematical technicians
161 Surveyors
162 Engineering and science technicians, not elsewhere classified

Technicians, except health, and engineering and science
163 Airplane pilots
164 Air traffic controllers
165 Embalmers
170 Flight engineers
171 Radio operators
172 Tool programmers, numerical control
173 Technicians, not elsewhere classified
174 Vocational and educational counselors
Writers, artists, and entertainers
175 Actors
180 Athletes and kindred workers
181 Authors
182 Dancers
183 Designers
184 Editors and reporters
185 Musicians and composers
190 Painters and sculptors
191 Photographers
192 Public relations men and publicity writers
193 Radio and television announcers
194 Writers, artists, and entertainers, not elsewhere classified
195 Research workers, not specified

MANAGERS AND ADMINISTRATORS, EXCEPT FARM
201 Assessors, controllers, and treasurers; local public administration
202 Bank officers and financial managers
203 Buyers and shippers, farm products
205 Buyers, wholesale and retail trade
210 Credit men
211 Funeral directors
212 Health administrators
213 Construction inspectors, public administration
215 Inspectors, except construction, public administration
216 Managers and superintendents, building
220 Office managers, not elsewhere classified
221 Officers, pilots, and pursers; ship
222 Officials and administrators; public administration, not elsewhere classified
223 Officials of lodges, societies, and unions
224 Postmasters and mail superintendents
225 Purchasing agents and buyers, not elsewhere classified
226 Railroad conductors
230 Restaurant, cafeteria, and bar managers
231 Sales managers and department heads, retail trade
233 Sales managers, except retail trade
235 School administrators, college
240 School administrators, elementary and secondary
245 Managers and administrators, not elsewhere classified

SALES WORKERS
260 Advertising agents and salesmen
261 Auctioneers
262 Demonstrators
264 Hucksters and peddlers
265 Insurance agents, brokers, and underwriters
266 Newsboys
270 Real estate agents and brokers
271 Stock and bond salesmen
280 Salesmen and sales clerks, not elsewhere classified

Salesmen were divided into 5 categories dependent on industry. The industry codes are shown in parentheses.
281 Sales representatives, manufacturing industries (Ind. 107-399)
282 Sales representatives, wholesale trade

(Ind. 017-058, 507-599)
283 Sales clerks, retail trade
(Ind. 608-699 except 618, 639, 649, 667, 668, 688)
284 Salesmen, retail trade
(Ind. 607, 618, 639, 649, 667, 668, 688)
285 Salesmen of services and construction
(Ind. 067-078, 407-499, 707-947)

CLERICAL AND KINDRED WORKERS
301 Bank tellers
303 Billing clerks
305 Bookkeepers
310 Cashiers
311 Clerical assistants, social welfare
312 Clerical supervisors, not elsewhere classified
313 Collectors, bill and account
314 Counter clerks, except food
315 Dispatchers and starters, vehicle
320 Enumerators and interviewers
321 Estimators and investigators, not elsewhere classified
323 Expediters and production controllers
325 File clerks
326 Insurance adjusters, examiners, and investigators
330 Library attendants and assistants
331 Mail carriers, post office
332 Mail handlers, except post office
333 Messengers and office boys
334 Meter readers, utilities

Office machine operators
341 Bookkeeping and billing machine operators
342 Calculating machine operators
343 Computer and peripheral equipment operators
344 Duplicating machine operators
345 Key punch operators
350 Tabulating machine operators
355 Office machine operators, not elsewhere classified
360 Payroll and timekeeping clerks
361 Postal clerks
362 Proofreaders
363 Real estate appraisers
364 Receptionists

Secretaries
370 Secretaries, legal
371 Secretaries, medical
372 Secretaries, not elsewhere classified
374 Shipping and receiving clerks
375 Statistical clerks
376 Stenographers
381 Stock clerks and storekeepers
382 Teacher aides, except school monitors
383 Telegraph messengers
384 Telegraph operators
385 Telephone operators
390 Ticket, station, and express agents
391 Typists
392 Weighers
394 Miscellaneous clerical workers
395 Not specified clerical workers

CRAFTSMEN AND KINDRED WORKERS
401 Automobile accessories installers
402 Bakers
403 Blacksmiths
404 Boilermakers
405 Bookbinders
410 Brickmasons and stonemasons
411 Brickmasons and stonemasons, apprentices
412 Bulldozer operators
413 Cabinetmakers
415 Carpenters
416 Carpenter apprentices
420 Carpet installers
421 Cement and concrete finishers
422 Compositors and typesetters
423 Printing trades apprentices, except pressmen
424 Cranemen, derrickmen, and hoistmen
425 Decorators and window dressers
426 Dental laboratory technicians
430 Electricians
431 Electrician apprentices
433 Electric power linemen and cablemen
434 Electrotypers and stereotypers
435 Engravers, except photoengravers
436 Excavating, grading, and road machine operators, except bulldozer
440 Floor layers, except tile setters
441 Foremen, not elsewhere classified
442 Forgemen and hammermen
443 Furniture and wood finishers
444 Furriers
445 Glaziers
446 Heat treaters, annealers, and temperers
450 Inspectors, scalers, and graders; log and lumber
452 Inspectors, not elsewhere classified
453 Jewelers and watchmakers
454 Job and die setters, metal
455 Locomotive engineers
456 Locomotive firemen
461 Machinists
462 Machinist apprentices

Mechanics and repairmen
470 Air conditioning, heating, and refrigeration
471 Aircraft
472 Automobile body repairmen
473 Automobile mechanics
474 Automobile mechanic apprentices
475 Data processing machine repairmen
480 Farm implement
481 Heavy equipment mechanics, including diesel
482 Household appliance and accessory installers and mechanics

483 Loom fixers
484 Office machine
485 Radio and television
486 Railroad and car shop
491 Mechanic, except auto, apprentices
492 Miscellaneous mechanics and repairmen
495 Not specified mechanics and repairmen
501 Millers; grain, flour, and feed
502 Millwrights
503 Molders, metal
504 Molder apprentices
505 Motion picture protectionists
506 Opticians, and lens grinders and polishers
510 Painters, construction and maintenance
511 Painter apprentices
512 Paperhangers
514 Pattern and model makers, except paper
515 Photoengravers and lithographers
516 Piano and organ tuners and repairmen
520 Plasterers
521 Plasterer apprentices
522 Plumbers and pipe fitters
523 Plumber and pipe fitter apprentices
525 Power station operators
530 Pressmen and plate printers, printing
531 Pressman apprentices
533 Rollers and finishers, metal
534 Roofers and slaters
535 Sheetmetal workers and tinsmiths
536 Sheetmetal apprentices
540 Shipfitters
542 Shoe repairmen
543 Sign painters and letterers
545 Stationary engineers
546 Stone cutters and stone carvers
550 Structural metal craftsmen
551 Tailors
552 Telephone installers and repairmen
554 Telephone linemen and splicers
560 Tile setters
561 Tool and die makers
562 Tool and die maker apprentices
563 Upholsterers
571 Specified craft apprentices, not elsewhere classified
572 Not specified apprentices
575 Craftsmen and kindred workers, not elsewhere classified

ARMED FORCES
600 Members of armed forces

OPERATIVES, EXCEPT TRANSPORT
601 Asbestos and insulation workers
602 Assemblers
603 Blasters and powdermen
604 Bottling and canning operatives
605 Chainmen, rodmen, and axmen; surveying
610 Checkers, examiners, and inspectors; manufacturing
611 Clothing ironers and pressers
612 Cutting operatives, not elsewhere classified
613 Dressmakers and seamstresses, except factory
614 Drillers, earth
615 Dry wall installers and lathers
620 Dyers
621 Filers, polishers, sanders, and buffers
622 Furnacemen, smeltermen, and pourers
623 Garage workers and gas station attendants
624 Graders and sorters, manufacturing
625 Produce graders and packers, except factory and farm
626 Heaters, metal
630 Laundry and dry cleaning operatives, not elsewhere classified
631 Meat cutters and butchers, except manufacturing
633 Meat cutters and butchers, manufacturing
634 Meat wrappers, retail trade
635 Metal platers
636 Milliners
640 Mine operatives, not elsewhere classified
641 Mixing operatives
642 Oilers and greasers, except auto
643 Packers and wrappers,except meat and produce
644 Painters, manufactured articles
645 Photographic process workers

Precision machine operatives
650 Drill press operatives
651 Grinding machine operatives
652 Lathe and milling machine operatives
653 Precision machine operatives, not elsewhere classified
656 Punch and stamping press operatives
660 Riveters and fasteners
661 Sailors and deckhands
662 Sawyers
663 Sewers and stitchers
664 Shoemaking machine operatives
665 Solderers
666 Stationary firemen

Textile operatives
670 Carding, lapping, and combing operatives
671 Knitters, loopers, and toppers
672 Spinners, twisters, and winders
673 Weavers
674 Textile operatives, not elsewhere classified
680 Welders and flame-cutters
681 Winding operatives, not elsewhere classified
690 Machine operatives, miscellaneous specified
692 Machine operatives, not specified
694 Miscellaneous operatives
695 Not specified operatives

TRANSPORT EQUIPMENT OPERATIVES
701 Boatmen and canalmen
703 Bus drivers
704 Conductors and motormen, urban rail transit
705 Deliverymen and routemen
706 Fork lift and tow motor operatives
710 Motormen; mine, factory, logging camp, etc.
711 Parking attendants
712 Railroad brakemen
713 Railroad switchmen
714 Taxicab drivers and chauffeurs
715 Truck drivers

LABORERS, EXCEPT FARM
740 Animal caretakers, except farm
750 Carpenters' helpers
751 Construction laborers, except carpenters' helpers
752 Fishermen and oysterman
753 Freight and material handlers
754 Garbage collectors
755 Gardeners and groundskeepers, except farm
760 Longshoremen and stevedores
761 Lumbermen, raftsmen, and woodchoppers
762 Stock handlers
763 Teamsters
764 Vehicle washers and equipment cleaners
770 Warehousemen, not elsewhere classified
780 Miscellaneous laborers
785 Not specified laborers

FARMERS AND FARM MANAGERS
801 Farmers (owners and tenants)
802 Farm managers

FARM LABORERS AND FARM FOREMEN
821 Farm foremen
822 Farm laborers, wage workers
823 Farm laborers, unpaid family workers
824 Farm service laborers, self-employed

SERVICE WORKERS, EXCEPT PRIVATE HOUSEHOLD

Cleaning service workers
901 Chambermaids and maids, except private household
902 Cleaners and charwomen
903 Janitors and sextons

Food service workers
910 Bartenders
911 Busboys
912 Cooks, except private household
913 Dishwashers
914 Food counter and fountain workers
915 Waiters
916 Food service workers, not elsewhere classified, except private household

Health service workers
921 Dental assistants
922 Health aides, except nursing
923 Health trainees
924 Lay midwives
925 Nursing aides, orderlies, and attendants
926 Practical nurses

Personal service workers
931 Airline stewardesses
932 Attendants, recreation and amusement
933 Attendants, personal service, not elsewhere classified
934 Baggage porters and bellhops
935 Barbers
940 Boarding and lodging house keepers
941 Bootblacks
942 Child care workers, except private household
943 Elevator operators
944 Hairdressers and cosmetologists
945 Personal service apprentices
950 Housekeepers, except private household
952 School monitors
953 Ushers, recreation and amusement
954 Welfare service aides

Protective service workers
960 Crossing guards and bridge tenders
961 Firemen, fire protection
962 Guards and watchmen
963 Marshals and constables
964 Policemen and detectives
965 Sheriffs and bailiffs

PRIVATE HOUSEHOLD WORKERS
980 Child care workers, private household
981 Cooks, private household
982 Housekeepers, private household
983 Laundresses, private household
984 Maids and servants, private household

Three-Digit Industry Classification System.[31]

AGRICULTURE, FORESTRY, AND FISHERIES
017 Agricultural production
018 Agricultural services, except horticultural
019 Horticultural services
027 Forestry
028 Fisheries

MINING
047 Metal mining
048 Coal mining
049 Crude petroleum and natural gas extractions
057 Nonmetallic mining and quarrying, except fuel

CONSTRUCTION
067 General building contractors
068 General contractors, except building
069 Special trade contractors
077 Not specified construction

MANUFACTURING-Durable Goods
Lumber and wood products, except furniture
107 Logging
108 Sawmills, planing mills, and mill work
109 Miscellaneous wood products
118 Furniture and fixtures

Stone, clay, and glass products
119 Glass and glass products
127 Cement, concrete, gypsum, and plaster products
128 Structural clay products
137 Pottery and related products
138 Miscellaneous nonmetallic mineral and stone products

Metal industries
139 Blast furnaces, steel works, rolling and finishing mills
147 Other primary iron and steel industries
148 Primary aluminum industries
149 Other primary nonferrous industries
157 Cutlery, hand tools, and other hardware
158 Fabricated structural metal products
159 Screw machine products
167 Metal stamping
168 Miscellaneous fabricated metal products
169 Not specified metal industries

Machinery, except electrical
177 Engines and turbines
178 Farm machinery and equipment
179 Construction and material handling machines
187 Metalworking machinery
188 Office and accounting machines
189 Electronic computing equipment
197 Machinery, except electrical, not elsewhere classified
198 Not specified machinery

Electrical machinery, equipment, and supplies
199 Household appliances
207 Radio, T.V., and communication equipment
208 Electrical machinery, equipment, and supplies, not elsewhere classified
209 Not specified electrical machinery, equipment, and supplies

Transportation equipment
219 Motor vehicles and motor vehicle equipment
227 Aircraft and parts
228 Ship and boat building and repairing
229 Railroad locomotives and equipment
237 Mobile dwellings and campers
238 Cycles and miscellaneous transportation equipment

Professional and photographic equipment, and watches
239 Scientific and controlling instruments
247 Optical and health services supplies
248 Photographic equipment and supplies
249 Watches, clocks, and clockwork-operated devices
257 Not specified professional equipment
258 Ordnance
259 Miscellaneous manufacturing industries

MANUFACTURING-Nondurable Goods
Food and kindred products
268 Meat products
269 Dairy products
278 Canning and preserving fruits, vegetables, seafoods
279 Grain-mill products
287 Bakery products
288 Confectionery and related products
289 Beverage industries
297 Miscellaneous food preparation and kindred products
298 Not specified food industries
299 Tobacco manufactures

Textile mill products
307 Knitting mills
308 Dyeing and finishing textiles, except wool and knit goods
309 Floor coverings, except hard surface
317 Yarn, thread, and fabric mills
318 Miscellaneous textile mill products

Apparel and other fabricated textile products
319 Apparel and accessories
327 Miscellaneous fabricated textile products

[31]Source: PSID wave XIV - 1981 documentation, Appendix 2: Industry and Occupation Codes.

Paper and allied products
328 Pulp, paper, and paperboard mills
329 Miscellaneous paper and pulp products
337 Paperboard containers and boxes

Printing, publishing, and allied industries
338 Newspaper publishing and printing
339 Printing, publishing, and allied industries, except newspapers

Chemicals and allied products
347 Industrial chemicals
348 Plastics, synthetics and resins, except fibers
349 Synthetic fibers
357 Drugs and medicines
358 Soaps and cosmetics
359 Paints, varnishes, and related products
367 Agricultural chemicals
368 Miscellaneous chemicals
369 Not specified chemicals and allied products

Petroleum and coal products
377 Petroleum refining
378 Miscellaneous petroleum and coal products

Rubber and miscellaneous plastic products
379 Rubber products
387 Miscellaneous plastic products

Leather and leather products
388 Tanned, curried, and finished leather
389 Footwear, except rubber
397 Leather products, except footwear
398 Not specified manufacturing industries

TRANSPORTATION, COMMUNICATIONS, AND OTHER PUBLIC UTILITIES
Transportation
407 Railroads and railway express service
408 Street railways and bus lines
409 Taxicab service
417 Trucking service
418 Warehousing and storage
419 Water transportation
427 Air transportation
428 Pipe lines, except natural gas
429 Services incidental to transportation

Communications
447 Radio broadcasting and television
448 Telephone (wire and radio)
449 Telegraph and miscellaneous communication services

Utilities and sanitary services
467 Electric light and power
468 Electric-gas utilities
469 Gas and steam supply systems
477 Water supply
478 Sanitary services
479 Other and not specified utilities

WHOLESALE AND RETAIL TRADE
Wholesale trade
507 Motor vehicles and equipment
508 Drugs, chemicals, and allied products
509 Dry goods and apparel
527 Food and related products
528 Farm products-raw materials
529 Electrical goods
537 Hardware, plumbing, and heating supplies
538 Not specified electrical and hardware products
539 Machinery equipment and supplies
557 Metals and minerals, not elsewhere classified
558 Petroleum products
559 Scrap and waste materials
567 Alcoholic beverages
568 Paper and its products
569 Lumber and construction materials
587 Wholesalers, not elsewhere classified
588 Not specified wholesale trade

Retail trade
607 Lumber and building material retailing
608 Hardware and farm equipment stores
609 Department and mail order establishments
617 Limited price variety stores
618 Vending machine operators
619 Direct selling establishments
627 Miscellaneous general merchandise stores
628 Grocery stores
629 Dairy products stores
637 Retail bakeries
638 Food stores, not elsewhere classified
639 Motor vehicle dealers
647 Tire, battery, and accessory dealers
648 Gasoline service stations
649 Miscellaneous vehicle dealers
657 Apparel and accessories stores, except shoe stores
658 Shoe stores
667 Furniture and home furnishings stores
668 Household appliances, TV, and radio stores
669 Eating and drinking places
677 Drug stores
678 Liquor stores
679 Farm and garden supply stores
687 Jewelry stores
688 Fuel and ice dealers
689 Retail florists
697 Miscellaneous retail stores
698 Not specified retail trade

FINANCE, INSURANCE, AND REAL ESTATE
707 Banking

708 Credit agencies
709 Security, commodity brokerage, and investment companies
717 Insurance
718 Real estate, including real estate, insurance, law offices

BUSINESS AND REPAIR SERVICES
727 Advertising
728 Services to dwellings and other buildings
729 Commercial research, development, and testing labs
737 Employment and temporary help agencies
738 Business management and consulting services
739 Computer programming services
747 Detective and protective services
748 Business services, not elsewhere classified
749 Automobile services, except repair
757 Automobile repair and related services
758 Electrical repair shops
759 Miscellaneous repair services

PERSONAL SERVICES
769 Private households
777 Hotels and motels
778 Lodging places, except hotels and motels
779 Laundering, cleaning, and other garment services
787 Beauty shops
788 Barber shops
789 Shoe repair shops
797 Dressmaking shops
798 Miscellaneous personal services

ENTERTAINMENT AND RECREATION SERVICES
807 Theaters and motion pictures
808 Bowling alleys, billiard and pool parlors
809 Miscellaneous entertainment and recreation services

PROFESSIONAL AND RELATED SERVICES
828 Offices of physicians
829 Offices of dentists
837 Offices of chiropractors
838 Hospitals
839 Convalescent institutions
847 Offices of health practitioners, not elsewhere classified
848 Health services, not elsewhere classified
849 Legal services
857 Elementary and secondary schools
858 Colleges and universities
859 Libraries
867 Educational services, not elsewhere classified
868 Not specified educational services
869 Museums, art galleries, and zoos
877 Religious organizations
878 Welfare services
879 Residential welfare facilities
887 Nonprofit membership organizations
888 Engineering and architectural services
889 Accounting, auditing, and bookkeeping services
897 Miscellaneous professional and related services

PUBLIC ADMINISTRATION
907 Postal service
917 Federal public administration
927 State public administration
937 Local public administration

II Two-Digit Occupational and Industry Codes

Two-Digit Occupation Classification System.[32]

PROFESSIONAL, TECHNICAL AND KINDRED WORKERS (001-195)

10. Physicians (medical + osteopathic), Dentists (062,065)
11. Other Medical and Paramedical: chiropractors, optometrists, pharmacists, veterinarians, nurses, therapists, healers, dieticians (except medical and dental technicians, see 16) (061,063,064,071-076)
12. Accountants and Auditors (001)
13. Teachers, Primary and Secondary Schools (including NA type) (141-145)
14. Teachers, College; Social Scientists; Librarians; Archivists (032-036,091-096,102-140)
15. Architects; Chemists; Engineers; Physical and Biological Scientists (002,006-023,042-054)
16. Technicians: Airplane pilots and navigators, designers, draftsmen, foresters and conservationists, embalmers, photographers, radio operators, surveyors, technicians (medical, dental, testing, n.e.c.) (003-005,025,055,080-085,150-173,183,191)
17. Public Advisors: Clergymen, editors and reporters, farm and home management advisors, personnel and labor relations workers, public relations persons, publicity workers, religious, social and welfare workers (024,026,056,086,090,100-101,184,192)
18. Judges; Lawyers (030,031)
19. Professional, technical and kindred workers not listed above (174,175-182,185,190,193-195)

MANAGERS, OFFICIALS AND PROPRIETORS (EXCEPT FARM) (201-245)

20. Not self-employed
31. Self-employed (unincorporated businesses)

CLERICAL AND KINDRED WORKERS

40. Secretaries, stenographers, typists (370-372,376,391)
41. Other Clerical Workers: agents (n.e.c.) library assistants and attendants, bank tellers, cashiers, bill collectors, ticket, station and express agents, etc., receptionists (301-364,374-375,381-390, 392-395)

SALES WORKERS

45. Retail store salesmen and sales clerks, newsboys, hucksters, peddlers, traveling salesmen, advertising agents and sales- men, insurance agents, brokers, and salesmen, etc. (260-285)

CRAFTSMEN, FOREMEN, AND KINDRED WORKERS

50. Foremen, n.e.c. (441)
51. Other craftsmen and kindred workers (401-440,442-580)
52. Government protective service workers: firemen, police, marshals, and constables (960-965)

OPERATIVES AND KINDRED WORKERS

61. Transport equipment operatives (701-715)
62. Operatives, except transport (601-695)

LABORERS

70. Unskilled laborers–nonfarm (740-785)
71. Farm laborers and foremen (821-824)

SERVICE WORKERS

73. Private household workers (980-984)
75. Other service workers: barbers, beauticians, manicurists, bartenders, boarding and lodging housekeepers, counter and fountain workers, housekeepers and stewards, waiters, cooks, midwives, practical nurses, babysitters, attendants in physicians' and dentists' offices (901-965 except 960-965 when work for local, state, or federal government)

FARMERS AND FARM MANAGERS

80. Farmers (owners and tenants) and managers (except code 71) (801-802)

MISCELLANEOUS GROUPS

55. Members of armed forces

[32]Numbers in parentheses represent the 3-digit codes from the 1970 Census of Population.

Two-Digit Industry Classification System.[33]

11. AGRICULTURE, FORESTRY, AND FISHERIES (017-028)

21. MINING AND EXTRACTION (047-057)

MANUFACTURING DURABLES

30. Metal industries (139-169)
31. Machinery, including electrical (177-209)
32. Motor vehicles and other transportation equipment (219-238)
33. Other durables (107-138, 239-259)
34. Durables, N.A. what (267)

MANUFACTURING NONDURABLES

40. Food and kindred products (268-298)
41. Tobacco manufacturing (299)
42. Textile mill products, apparel and other fabricated textile products, shoes (307-327, 389)
43. Paper and allied products (328-337)
44. Chemical and allied products, petroleum and coal products, rubber and miscellaneous plastic products (347-387)
45. Other nondurables (388-397)
46. Nondurables, N.A. what (399)
49. Manufacturing, N.A. whether durable or nondurable (398)

51. CONSTRUCTION (067-078)

55. TRANSPORTATION (407-429)

56. COMMUNICATION (447-449)

57. OTHER PUBLIC UTILITIES (467-479)

61. RETAIL TRADE (607-698)

62. WHOLESALE TRADE (507-588)

69. TRADE, N.A. WHETHER WHOLESALE OR RETAIL (599, 699)

71. FINANCE, INSURANCE, AND REAL ESTATE (707-719)

81. REPAIR SERVICE (757-759)

82. BUSINESS SERVICES (727-749)

83. PERSONAL SERVICES (769-799)

84. AMUSEMENT, RECREATION AND RELATED SERVICES (807-817)

85. PRINTING, PUBLISHING AND ALLIED SERVICES (338-339)

86. MEDICAL AND DENTAL AND HEALTH SERVICES, WHETHER PUBLIC OR PRIVATE (828-848)

87. EDUCATIONAL SERVICES, WHETHER PUBLIC OR PRIVATE (857-868)

88. PROFESSIONAL AND RELATED SERVICES OTHER THAN MEDICAL OR EDUCATIONAL (849, 869-897)

91. ARMED SERVICES (917 if occ is 600)

92. GOVERNMENT, OTHER THAN MEDICAL OR EDUCATIONAL SERVICES (927-947, 917 if occ is not 600)

[33]Numbers in parentheses represent the 3-digit codes from the 1970 Census of Population.

III One-Digit Occupational and Industry Codes

One-Digit Occupation Classification System.[34]

01. Professional, technical, and kindred workers (10-19)
02. Managers, officials, and proprietors (20)
03. Self-employed businessmen (31)
04. Clerical and sales workers (40-45)
05. Craftsmen, foremen, and kindred workers (50-52)
06. Operatives and kindred workers (61-62)
07. Laborers and service workers, farm laborers (70-75)
08. Farmers and farm managers (80)
09. Miscellaneous (armed services, protective workers) (55)

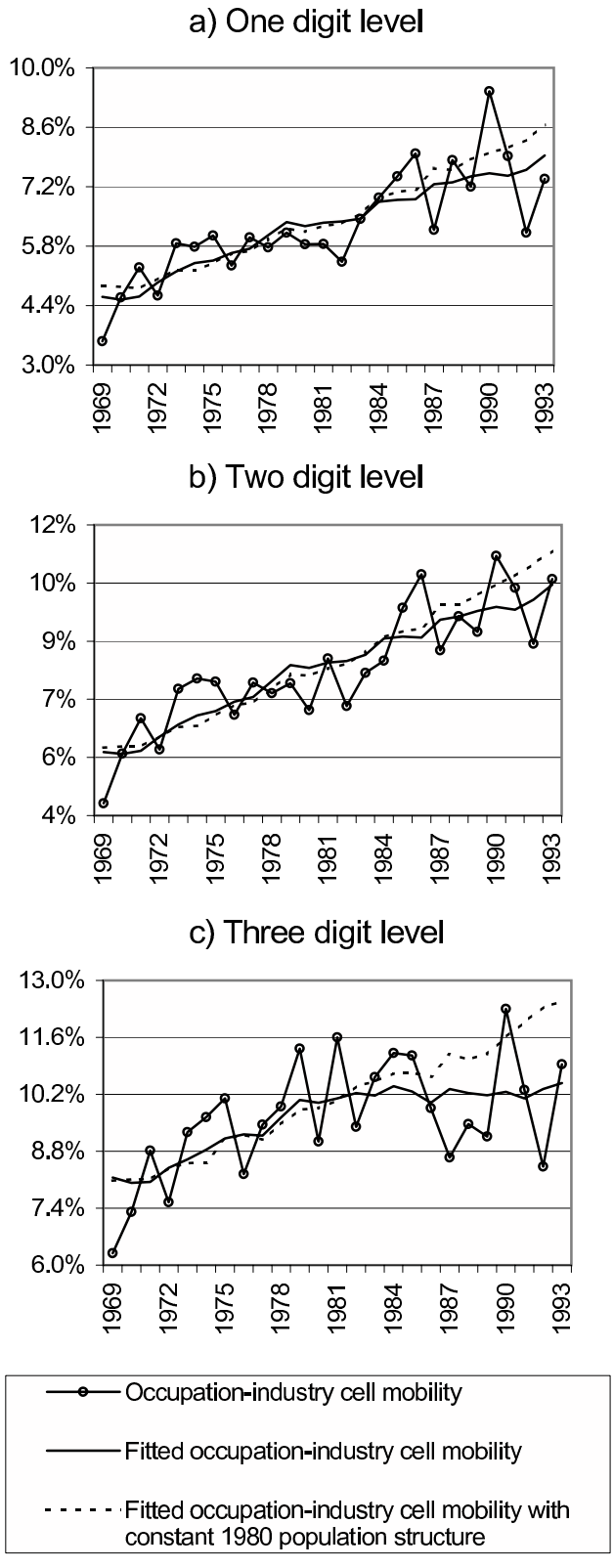
[34]Numbers in parentheses represent 2-digit occupation codes, recoded by the authors based on PSID documentation.

One-Digit Industry Classification System.[35]

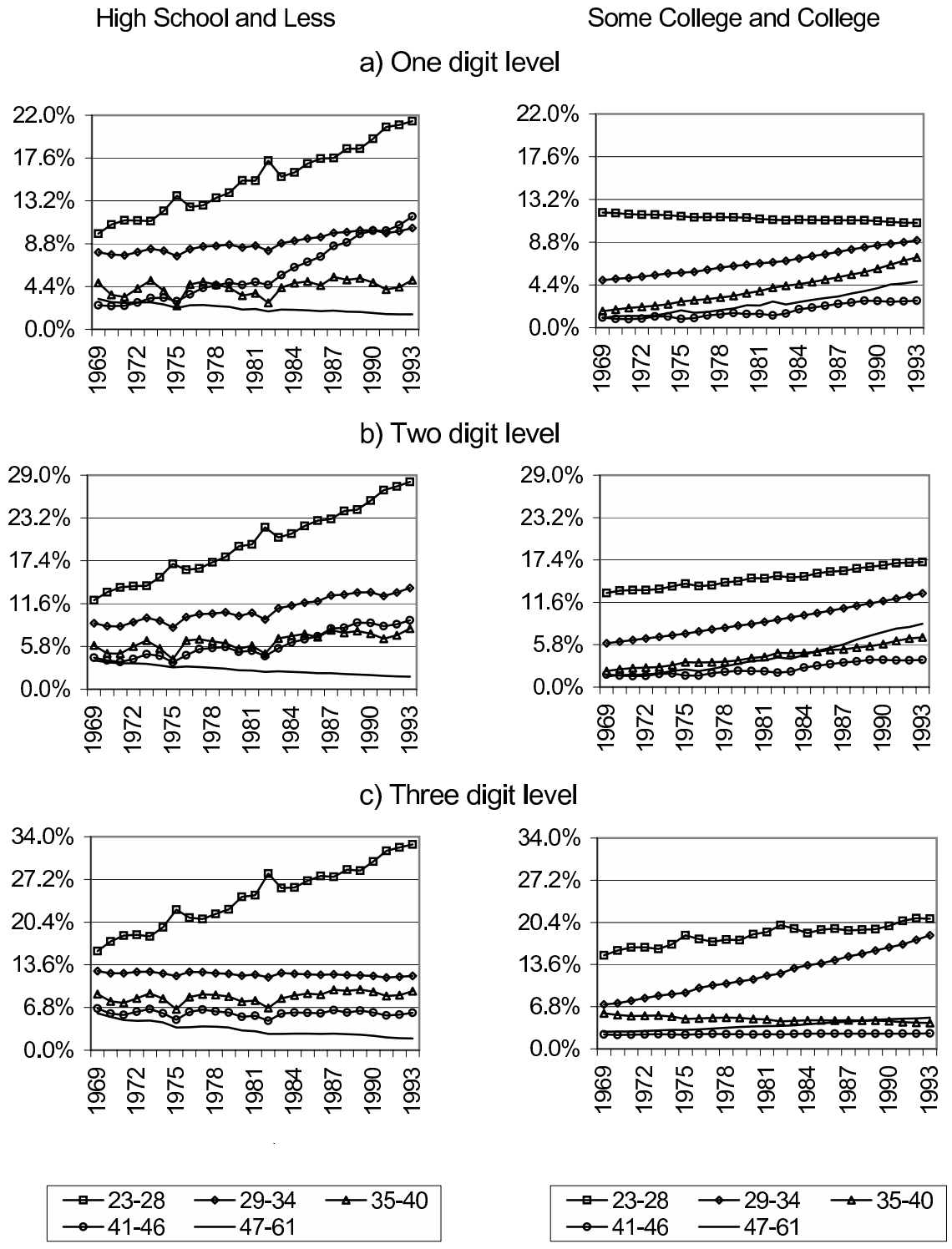
01. Agriculture, forestry, and fisheries (017-028)
02. Mining (047-057)
03. Construction (067-077)
04. Manufacturing (107-398)
05. Transportation, communications, and other public utilities (407-479)
06. Wholesale and retail trade (507-698)
07. Finance, insurance, and real estate (707-718)
08. Business and repair services (727-759)
09. Personal services (769-798)
10. Entertainment and recreation services (807-809)
11. Professional and related services (828-897)
12. Public administration (907-937)

[35]Numbers in parentheses represent the 3-digit industry codes from the 1970 Census of Population.

Appendix IV: Figure IV-1. Mobility Across Occupation-Industry Cells in the United States, 1969-1993.



Appendix IV: Figure IV-2. Mobility across Occupation-Industry Cells in the United States by Age and Education Levels, 1969-1993.



Notes: Verticale scale is different in each panel. The graphs show the fitted values of mobility across occupation-industry cells. See text for further details regarding the procedure used in obtaining the fitted values.