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Abstract

The decline in employment of men near retirement age was concentrated between the early 1970s and 1980s, a period of dramatic shifts in the United States labor market. The paper begins to explore the effect of these shifts on retirement behavior. To do so, it analyzes the effect of changes in economic conditions at the individual, industry, and state level on employment of workers near retirement. Declines in labor demand reduce employment of older workers if their wages are rigid, possibly because of high replacement rates, habits, or implicit contracts. The paper gives a preliminary assessment of this potential mechanism by analyzing the response of relative employment of older and younger more and less educated workers to economic shocks. Preliminary results suggest that economic conditions are likely to have important effects on the employment of men near retirement age. However, the current evidence does not strongly suggest an explanation based on rigid wages or secular declines of economic conditions of low-skilled workers. An exception to this pattern is the manufacturing sector.

I. Introduction

There has been a dramatic decline in labor force participation of older men since the early 1970s. A large literature evaluates the potential contribution of changes in pension benefits, health, wealth, and retirement preferences to explaining these trends. Yet, during the same period there have been important developments in the U.S. labor market, such as changes in industry decomposition and a strong decline in manufacturing employment, a rise in the returns to skill, and increases in inequality. Although these changes have potentially important implications for retirement behavior, they have found less attention in the literature.

A small but increasing literature shows that older workers are indeed particularly likely to leave employment after career shocks such as a job loss. Secular changes in the demand for low-skilled labor may thus induce large groups of older workers to seek retirement. If this is the case, retirement may become a shelter from declining labor market opportunities rather than an outcome of an ideal life plan. Such a perspective on recent retirement trends may suggest alternative policy implications relevant for ongoing efforts to keep and reintegrate older workers into the labor force.

To help assess the role of labor market conditions in determining employment outcomes of male workers near retirement, this paper proceeds in two steps. First, it documents the effect of economic conditions on employment of older workers. To do so, it first demonstrates that older workers are indeed at risk of large employment and wage losses at an individual career shock; second, it analyzes the timing of employment trends of older workers by skill groups in relation to business cycle trends; third, it estimates the effects on employment of economic trends at the industry and state level.

Second, the paper assesses the potential sources of adverse effects of labor market changes on retirement rates. Standard economic models imply that labor demand changes lead to a persistent decline in employment of older workers only if wages do adjust very slowly to new market conditions. This is likely to be the case since a large literature suggests older workers are covered by explicit or implicit long-term contracts; moreover, retirement benefits are based on a measure of life-time earnings and adjust only slowly to new market conditions; thus, older workers' reservation wages may be sticky. The paper evaluates

whether economic shocks indeed lead to a shift of employment towards younger and more educated workers as this basic economic hypothesis would suggest.

Preliminary findings support the notion that labor market shocks have an important effect on employment of older workers. First, we find that the majority of the decline in employment of men age 60-64 occurred between the early 1970s and the early 1980s, and that this drop was particularly pronounced for less-educated workers. Second, job loss leads to much stronger reductions in employment and earnings for that age range. Third, output and employment trends at the industry and state level significantly affect employment near retirement. However, it does not appear that economic shocks lead to a systematic shift of employment against older or less educated workers nor that these patterns have strengthened over time. Thus, while economic conditions do matter, the preliminary results do not support a simple story based on rigidity in labor costs.

This paper contributes to three strands of literature. First, Autor and Duggan (2003) argue that a continuing decline in labor market conditions of less educated workers in conjunction with rising replacement rates helps to explain rapidly rising disability insurance rolls. The same trends and similar replacement rates affect workers near retirement age, and the current paper extends Autor and Duggan's paper to the study of retirement. Second, a long literature has hypothesized that older workers are covered by long-term implicit contracts, but there have been relatively few empirical assessments of the importance and impact of such contracts (e.g., Lazear 1979). Yet, such contracts may have important implications for the evolution of older workers' labor costs and their attractiveness to employers. Third, the paper contributes to the literature analyzing the effect of economic shocks at both the individual and aggregate level on labor supply decisions, in particular for older workers (e.g., Chan and Stevens 2001). It is also related to recent research aiming to uncover the role of the overall economic environment in determining employment choices (Blau and Shvydko 2006).

The paper proceeds as follows. First it gives a brief review of the existing literature and the main conceptual arguments underlying the empirical analysis. Second, it describes the data used and the empirical approach. The following section summarizes and discusses the main empirical results. A final section offers preliminary conclusions.

II. Previous Literature

A long literature has documented important trends in the U.S. labor market since the early 1970s. First, there has been a rapid increase in inequality and a rise in the return to education. An important part of these trends has occurred from the mid-70s to mid-1980s especially for changes in the lower tail of the wage distribution (e.g., Card and DiNardo 2002, Lemieux 2006). Since then, there has been a continuing increase of earnings at the very top of the distribution, with relative stability for the majority of workers (e.g., Kopczuk, Saez, and Song 2007). The source of these changes has been subject to an ongoing debate. Candidate explanations for the observed shifts include technological change, minimum wage, the decline in unionization, and the strong 1982 recession (e.g., Katz and Autor 1999).

Another important trend occurring in the U.S. labor market has been the change in industry decomposition of employment, including a strong decline of employment in manufacturing sector and a rise in professional services. These changes have been triggered among others by increasing trade, outsourcing, as well as technological developments. All of these trends are likely to have been accompanied by or triggered by shifts in the demand for labor, in particular for less skilled workers.

If wages are completely flexible, labor demand changes do not affect participation. However, if wages of older workers do not adjust as much as that of their younger counterparts, changes in labor demand can lower their labor force participation. Two recent papers have explored the effect of labor demand on employment in case of rigid wages. First, in an often cited paper Autor and Duggan (2003) explore a very similar argument to ours in relation to disability. The authors argue that the rise in generosity of disability benefits due to a spreading wage distribution and the concavity of benefit schedule in conjunction of reduced stringency of screening can explain an important fraction of the increase in Social Security Disability Insurance (SSDI) and the reduction in male labor force participation for mature workers. Thus, they claim that SSDI absorbs workers at the lower end of the wage distribution in economic difficulties. Since benefits of SSDI and Old Age Survivor Insurance (OASI) are calculated according to the same formula (albeit based on different concept of average of earnings), a similar argument can be made for less educated older workers, as described below.

Second, Card, Kramarz, and Lemieux (1999) explore the effect of wage rigidities on employment trends in Europe. In the presence of large changes in demand for low-skilled workers, a rigid wage structure should induce a decline in employment for the least educated. Although the authors do confirm significant difference in the wage structure of the US, Canada, and France (with France having more rigid wages), they do not find a decline in relative employment in France as predicted by a shift in relative labor demand against low skilled workers.

A long literature suggests older worker's wages are more rigid than those of younger workers. Most notably, the "active labor market hypothesis" suggests that wages in the labor market are set for participants, whereas workers in long-term jobs are sheltered from outside labor market conditions (Freeman 1975). This has been invoked as an explanation of why the relative wage of older less-educated has fallen less than the wage of younger less-educated in face of possible demand shocks (e.g., Katz and Autor 1999, Katz, Loveman and Blanchflower 1995).[1] Evidence suggests that wages of workers on the job indeed move much less with labor market conditions than wages for job changes (e.g., Devereux 2001).

This rigidity may come in part from long lasting implicit insurance contracts that shelter workers from outside labor market conditions (Harris and Holmstrom 1982). These contracts predict that wage levels are set according to labor market condition at the start of jobs, and then only rise (but never decline) with productivity innovations. Evidence in favor of such contracts has been found by Beaudry and DiNardo (1991) and von Wachter and Bender (2007). This form of wage contract suggests that wages only slowly adjust to labor market conditions, since existing contracts are benchmarked to initial wages. As a result, it can take several cohorts for wages to respond to existing labor market conditions. This would lead to significant and persistent wage rigidities, particularly for older workers.

Another source of long-term contracting is incentive contracting in the spirit of Lazear (1979). In this case, the value of the wage profile is determined by lifetime productivity, and later in life workers are being repaid with above-productivity wages for having accepted lower wages early in their careers. Unless employers renege on debts, the presence of such contracts implies slow adjustment of wages to new labor market conditions across successive cohorts of workers.

[1] Another explanation has been the relative decline in supply of young college graduates (Card and Lemieux 2001).

A potentially equally important but less studied reason for persistent downward wage rigidity of older workers is the determination of retirement benefits. On the one hand, as emphasized by Autor and Duggan (2003), the concavity of benefit schedule implies that low skilled older workers may have substantial replacement rates; in particular the case if their opportunities in labor market decline. On the other hand, the fact that the primary insurance amount is calculated based on average monthly earnings (AME) – and AME is based on the largest contributed earnings – implies that retirement benefits adjust only slowly downwards if market conditions have shifted permanently. Thus, after a permanent shift of the wage structure, the replacement rates rises and declines only slowly for successive cohorts.

Clearly older workers' wages may also be downwardly rigid because reservation wages adjust slowly for reasons other than the schedule of social security benefits (e.g., Blanchard and Katz 1992). In particular, older workers may have come to enjoy substantial wages and benefits on the job, and may be slow to adjust to new realities. In addition, private pension benefits may raise potential non-market income. The rise in the prevalence of private pension benefits makes this an important factor. Private pension plans may also have direct incentives to retire early. However, as Anderson, Gustmann, and Steinmeyer (1999) document, incentives embodied in private plans have not shifted significantly towards early retirement, especially since the tightening of the Age Discrimination in Employment Act (ADEA) in 1979.

Under flexible wages, a short-term shock leads only to a temporary transition out of the labor force (or to higher retirement rates of a single cohort). However, in the presence of slow wage adjustment, even a single permanent shift in labor demand may lead to lasting declines in labor force participation of older workers. Similarly, in the presence of declining market opportunities and rising replacement rates, even short-term shocks should have lasting effects on labor force participation of older workers.

Changes in labor force participation driven by the labor market may be complementary to impulses towards earlier retirement from improved health, increasing wealth, or joint retirement. In fact, some of these phenomena may be different facets of the same underlying trend; e.g., the increasing prevalence of private pension plans may be a result of the desire of companies to shed older workers. Clearly, there are also other "market" driven reasons for changes in labor force participation rates. For example, it may be that firms increasingly discriminate against older workers. While discrimination per se has

not been shown to directly effect on older workers' labor force participation, we know that mandatory retirement and its ban had a significant effect on older workers' labor force participation (von Wachter 2002, Neumark and Stock 1999). More generally, recent work suggests that different firms do provide work environments that are differentially accommodating to older workers (e.g., Blau and Shvydko 2006).

III. Data and Approach

In this paper, we use Current Population Survey (CPS) data spanning over three decades to analyze the labor force participation and employment trends for groups in the labor force that should have been differentially affected by recent labor market trends. Since we are particularly interested in the evolution of retirement the focus of our analysis will be the group of 60-64 year old men. In addition, as comparison groups we will analyze selected age groups of workers in their 40s and 50s as well. Clearly, a reduction in labor force participation does not equal an increase in permanent retirement. Especially in recent cohorts of older workers, there has been increasing prevalence of partial retirement and bridge jobs (e.g., Ruhm 1990, Cahil, Giandrea, and Quinn 2005). However, particularly for earlier cohorts and for workers close to full retirement age, the majority of exits from labor force is likely to be permanent.[2] Nevertheless, the results should be replicated with a more direct measure of retirement. To do so, we have begun merging observations from the same workers in adjacent years of the March CPS.

From CPS data, we obtain basic information on labor force status, industry of main job, education, age and gender. For 1976 onwards, we use full monthly CPS files to maximize the amount of observations. Prior to 1976, we have only three months (March, June, and October) at our disposition going back to 1966. A considerable amount of time was spent recoding the data to make sure the information on labor force status and industry is correct. We have also information on state of residence. Due to difficulty in coding of the state variables for the state level analysis we use only 1976-2002.

Since we are interested in retirement trends at the group level, we collapse our individual level data into cells at the year, age group, education group, and 1-digit industry

[2] Tabulations from the March CPS show that fraction of workers with multiple employers among older workers are small (von Wachter 2002). This suggests that the rate of reentry or of industry changes is likely to be small.

level. If relevant, we also split cells by state of residence. We use this cell level data for all our graphical and regression analysis, weighting by cell size where appropriate.

To analyze the effect of job loss on employers and wages of older workers, we also work with data from the Displaced Worker Survey (DWS) to the CPS. The DWS was administered on either January or February at a biannual frequency. It asked displaced workers (those losing job because of plant closing, layoff, or shift abolition) a range of questions on their lost job. Together with information on current job from the basic CPS, this data has been extensively used to analyze the plight of displaced workers (e.g., Farber 1997, 2003). However, it has not been used for an explicit analysis of job loss by age groups.

Using the alternative sources of CPS data our analysis proceeds in the following steps. First, we assess the sensitivity of older workers' labor market attachment to individual career shocks. To do so, we analyze the effect of an individual level shock – a job loss – on the proportion of job losers working and on earnings conditional on employment. Once we have confirmed that older workers are particularly vulnerable to individual labor market shocks, we then move on to a descriptive analysis retirement trends.

Second, we describe the patterns of labor force participation for two groups of workers that have been particularly at risk of negative labor market shocks, low skilled workers and workers in manufacturing. In a first step we seek to establish whether and when relative labor force participation of high versus low skilled workers rose. In a second step, we document differential decline in labor force participation of older workers across sectors.

Third, we assess whether a differential decline in labor force participation across industries is correlated with industry growth, as measured by industry Gross Social Product (GSP), and the evolution of total employment in industry. Neither of these measures should be driven by retirement preferences of older workers, but by forces shaping economic growth, product demand, and the industry decomposition of production. Thus, a correlation between labor force participation of older workers and such indicators for labor demand would suggest that market forces play an important role in determining retirement. Since low skilled workers should be more affected, we will also focus on differential effect educated group.

Since the variation in the main variable of interest, employment, occurs at the level of year, state, and industry, we run our regression at the cell level. Cells are defined by age groups, year groups, and education groups interacted with either the state or the one digit

industry level. This has the advantage of forcing standard errors to be correct and saving computation time.[3] Our main specification thus is of the form

$$y_{atej} = \alpha + \beta_{ea} E_{tj} + \theta_t + \theta_e + \theta_j + \theta_a + u_{teja}, \quad (1)$$

where the outcome variable y_{atej} denotes the employment population, the labor force participation, or the employment rate for a given age-group (a) in a given year (t) for a group of workers in a state or an industry (j). The main explanatory variable is employment or output in a given industry-year or state-year cell (E_{tj}). Since the model includes state (industry) fixed effects (θ_j), and year fixed effects (θ_t), the model is identified by state (industry) specific changes in employment over time. The inclusion of age (θ_a) and education fixed effects (θ_e) implies that these changes identify the deviation of employment patterns from the average age-structure and education-structure. In addition, we will allow for the effect of our measure of labor demand changes (E_{tj}) to differ across age and education groups.

Fourth, by the same argument, economic conditions at the state level should not be driven by older workers' labor supply decisions. Thus, we analyze the impact of unemployment rates and GSP at the state level on labor force participation. Thereby, since secular declines of the demand for low-skilled labor predict increasing retirement rates for low-skilled workers, we focus on whether the correlation has increased over time.

Fifth, we will use differential effects of labor market shocks across ages and skill groups to assess whether the observed pattern are indeed due to relative rigidity of older low skilled workers' wages.

Sixth, we will use the available information to assess the contribution of a simple plausibly exogenous trend – the decline in relative importance of manufacturing. This counterfactual exercise will help to gauge the potential magnitude of older workers.

Lastly, we will examine the effect of changes in the relative supply of younger high skilled workers on employment of older workers. If younger and older workers are at least partly substitutes in production, rigid wages of older workers imply that a reduction in

[3] The basic monthly files in the CPS contain more than one million of observations each year. Since about a quarter of these make it into our sample due to age- and employment-restrictions, for thirty years the samples become very large.

relative supply of young college graduates should affect changes in employment of high skilled older workers. Since there has been a rapid decline in the relative supply of young college graduates in the early 1980s, this is another channel that could explain the relative rise in employment of older high skilled workers. To assess this possibility, we replicate the analysis of Card and Lemieux (2001) concerned with relative earnings changes for the evolution of employment of older workers.

IV. Empirical Analysis

This section summarizes a series of descriptive results on employment and participation of workers close to retirement age obtained from CPS data spanning multiple decades. When evaluating the results, we are looking for evidence relating to the following three questions.

First, do labor market shocks – such as a job loss, a reduction in industry growth, or a decline in local labor market conditions – reduce the participation of men age 60-64? Is this effect stronger for less educated workers as predicted by the importance of demand shocks against low-skilled labor?

Second, has this effect increased over time, as predicted by a secular downward trend of low-skilled labor market opportunities leading to rising replacement rates?

Third, do reductions in labor demand lead to a shift of employment towards younger workers, as predicted if relative wages of older workers are more rigid? Is this effect stronger for less-educated workers?

We obtain the following preliminary results from our descriptive cell-level analysis of male employment patterns near retirement age.

- First, we show that job losers at age 60-64 have a much lower propensity to work, especially if they are low-skilled. Similarly, earnings losses among 60-64 years old job losers who work are very large [Table 1]. The numbers suggests that labor market shocks are likely to lead to transitions of older workers out of the labor force.
- Second, the labor force participation (LFP) rate among low-skilled workers aged 60-64 relative to their high-skilled counter parts declines quickly and dramatically

from the mid 1970s to the mid 1980s – a period of significant changes in the labor market. Afterwards, relative participation remains constant. Two large jumps occur in 1975 and 1985, the through years of important recessions. The increase in differential LFP for low vs. high skilled among younger age groups is present but less drastic and much smaller [Figure 1].

- Third, the decline in employment of 60-64 year olds varies considerably across sectors, with some large declining sectors – notably manufacturing and construction – leading the way [Figure 2]. On average, we find sector-specific trends in production and total employment lead to significant reduction of employment of workers near retirement age [Table 2].
- Fourth, we confirm that local labor market conditions reduce employment of older workers [Table 3]. However, the effect of state or industry specific economic conditions is not increasing over time, nor is it significantly stronger for older or less-educated workers [Table 2 and 3]. The initial evidence does not strongly point towards the presence of rigid wages and secular trends in demand shifts.
- Fifth, the age-structure in manufacturing has shifted towards younger more educated workers. Overall, reductions in the share of high-school employment among older workers at the industry level could explain up to a quarter of the observed increase in relative participation of 60-64 year olds [Figure 5].
- Last, the reduction in the relative supply of younger college graduates in the early 1980s could explain some of the increase in relative employment rates [Table 4, Figure 6].

Overall, it appears that labor market conditions may play an important role in affecting retirement decisions and explaining part of recent trends in labor force participation of older workers. However, our preliminary results do not indicate that there has been a secular decline of economic conditions of low-skilled workers pushing older workers out of employment because of rigid wages or high replacement rates. Instead, an important part of the reduction in employment of older workers due to changes in the labor

market may be concentrated during the period of the mid 1970s to the mid 1980s, a period worthy of further study.

1. Evidence from Displaced Workers

As a preliminary step in our descriptive analysis of the correlation of labor market conditions and retirement patterns, we extend the evidence on the effect of job loss on employment and earnings of workers near retirement age. To do so, we use evidence from the displaced worker survey (DWS). The DWS asks workers whether they lost their job permanently in the last three years due to economic causes (i.e., firings are excluded), and records whether they are employed at the survey date and what their hourly wages are. The first panel of Table 1 shows the fraction of displaced older workers reemployed by age group for each survey year. The table clearly shows that those near retirement age (age 60-64) have a much smaller probability of finding reemployment than, for example, workers in their early 50s (for all years, an average of 46% vs. 66%). This 20 point gap holds for lower and higher educated workers as well, albeit at different levels. Note that the numbers by education groups include women to increase sample sizes.

This evidence is suggestive of a pattern where a larger fraction of workers near retirement age permanently leaves labor force at job loss, and that this effect is particularly strong for less educated workers. However, the table does not suggest this pattern has changed since the mid-1990s. At best, from a low point around the 1982 recession, the fraction of reemployment has slightly increased. The series is noisy (with a data driven decline in 1994, the year of the redesign of the CPS), but suggests a slight positive trend. Similarly, displacement rates (Appendix Table 1) do not reveal an upward trend.

The lower panel shows the average percentage loss in wages among the employed. Wage losses of reemployed workers around retirement age are on average much larger than for workers ten years younger. Note that the difference appears particularly large in the 1980s and fades in the 1990s. Again, the figures are noisy because of small sample sizes, yet it seems to be that higher educated older workers lose more than both their younger peers and their less educated counterparts.

This evidence suggests that an economic shock may have particularly strong effects on workers near retirement age. These effects appear to have been particularly large in the 1980s. Clearly, this result is no more than indicative since we do not have direct information

on retirement transitions for a sufficiently large sample of workers. Moreover, the DWS is known to be an imperfect measure of job loss that systematically undercounts job loss (e.g., Hildreth, von Wachter, and Weber 2005). The definition of job loss appears to capture only a fraction of relevant job transitions. Moreover, there is evidence of recall bias in earnings, particularly for older workers. These problems add to the concern that displaced older workers may not be comparable to workers to younger job losers.

Yet, similar results have been found with other longitudinal data sets (e.g., Chan and Stevens 2001) and larger samples (e.g., Jacobson, Lalonde, and Sullivan 1993), and thus we believe the evidence can be taken to be at least broadly indicative of an important underlying pattern suggesting differential effects of job loss across age-groups.

2. Employment Trends by Education

We begin our descriptive analysis by reviewing the trends in employment of workers near retirement age since the mid-1960. Figure 0 shows the trends in annual labor force participation measured from the Current Population Survey (CPS) monthly files from 1965 to 2002. Panel A of the figure shows the labor force participation rate for workers age 50 to 64 in three groups, Panel B shows the employment population (EPOP) rate (employment divided by working age population). The latter is sometimes preferred by labor economists as an indicator of employment conditions unrelated to the definition of unemployment. To better characterize the employment trends for workers in retirement age, the figures also show the ratio of LFP or EPOP rates of younger workers to that of workers age 60-64.

The figures demonstrate the well-known fact that employment of older men has been falling since the mid-1960s and that the decline is particularly strong for men at retirement age. To a large extent this reflects the trend towards early retirement at age 62 the earliest age workers can claim Social Security benefits (from OASI). The figure also shows that a large fraction of the decline in employment of 60-64 year old men relative to 55-59 year olds occurred in two episodes – in the early half of the 1970s and the years from 1980 to 1983 (the actual jump between 1971 and 1972 may be due to changes in the CPS). This striking pattern suggests that events during a limited episode are responsible for the majority of the decline in employment of men at retirement age.

The shift in relative in employment occurs during a period of other important changes in the labor market. In particular, this is a period of a widening of the wage

distribution at the bottom and a rapid increase in the return to skill. These changes have been attributed to the declining real value of the minimum wage, the decline in unionization, increases in the returns to education due to technological change, and declines in the fraction of college educated in certain cohorts (e.g., Card and DiNardo 2002). Most of these explanations suggest opportunities of less-educated workers in the labor market may have worsened, particularly in the late 1970s and early 1980s.

Since this relative shift in economic fortunes may affect the propensity to retire through a variety of channels discussed above, Figure 1 breaks up the LFP and EPOP rates by education category for men age 60-64. The figure also plots relative LFP and EPOP rates of college vs. high school graduates for age 60-64 and 55-59. For ease of exposition, vertical lines at the through years of recessions during the sample period are included as well.[4] The figures show a remarkable difference in the trend of employment among older men by skill-group. While both groups experience a secular decline in employment, there is a swift decline in employment of lower educated men relative to higher educated occurring between the early 1970s and early 1980s. Two important shifts appear to occur in 1975 and 1982, both recession years. There is an increase in relative employment for 55-59 as well, but it is much less pronounced and of a smaller order of magnitude.

While the period saw some important changes in the determination of Social Security benefits in 1978 and modification of employment discrimination laws affecting older workers in 1979, at least part of the rapid decline of low-skilled participation among 60-64 year old men is likely to be due to economic factors. However, these forces do not appear to arise from long-lasting trends but concentrated in a relatively short period of time. In particular, the change in relative participation among skill-groups appears to be too rapid to be due to improvements in health or wealth or changes in retirement preferences.

3. Changes in Relative Wages of High and Low-Skilled Workers by Age

A long literature has documented that relative earnings of college and high school graduates have increased rapidly in the early 1980s. It has been less frequently noted that the relative earnings of older college graduates has adjusted much less than the relative earnings of younger high-skilled workers. This has led to a convergence in the relative skill-premium across age groups. While in the 1970s there was a significant age-gradient in the skill-

[4] The through years are from the National Bureau of Economic Research Business Cycle website.

premium, the age-gradient has declined significantly by the mid-1990s. These patterns are shown in Figure 2. The figure displays the ratio of average real annual earnings of college vs. high school graduates for various age and year groups. While there has been a significant break in the trend of relative earnings for 30-34 year olds between 1979 and 1980, and somewhat for 35-45 year olds, the pattern of average earnings developments of workers age 50 and above is very smooth throughout the 1980s.

As discussed at the outset it is puzzling that such large changes in relative employment documented in Figure 1 have occurred in the early 1980 for older workers without any adjustment in relative wages. One explanation of the differential development of relative wages and employment rates for older and younger workers may be that earnings of older workers are less flexible. While the patterns in Figure 2 are certainly consistent with such an explanation, other explanations of the trend in relative wages are possible. For example, Card and Lemieux (2001) suggest part of the rapid increase in relative wages for younger college graduates are due to a decline in the relative supply of college workers in that age range. Age-specific relative supplies only matter for relative earnings if age-groups are imperfect substitutes in production. Interestingly, if there is at least some substitutability among age-groups, rigid wages of older workers would imply that a decline in relative supply of young college graduates would *raise* the relative demand for older workers. This is addressed below.

4. Employment Trends by Sector and Role of Economic Conditions

An important source of the employment trends by age and education groups just described may be shifts in the decomposition of employment between sectors. Moreover, differential employment trends by sectors may be informative about the effect of economic conditions determining retirement. Differential retirement trends by sectors are of interest per se, since the underlying long-term health and wealth trends in the population as well as incentives from social security should be similar across sectors. The analysis of employment of older workers among sectors is interesting because changes at the level of sectors are unlikely to be driven by retirement decisions of older workers. Thus, if we see that industry output or employment growth affects employment of older workers, this is likely to represent a situation where retirement decisions are influenced by economic conditions in the labor market.

Figure 2 shows employment growth by age-group relative to 1976 for four major 1-digit industries, manufacturing, construction, trade, and professional services. The figures also include total employment growth in the industry. Clearly, the figures show differential trends in employment developments for older workers. In particular, the largest industry, manufacturing, has continuously shed older workers since 1980, with particularly steep declines occurring in the early 1980s. The only other sector shedding as many older workers is construction. These changes do not simply reflect the overall aging of the labor force, but reflect industry specific trends in the age-structure of employment

A key question is whether these changes reflect changes in industry demand for employment. In the case of manufacturing, a large sector with declining employment and output share, the time series for total employment growth indeed suggests so. However, the pattern is less clear for other sectors in Figure 2 such as trade. Table 2 shows the results of a series of cell level regressions of trend employment growth at the industry level on alternative measures of industry growth by age-group, year-group, and education group. The pattern in the first column clearly indicates that industry level output or employment growth affect employment of 60-64 year old men. (The same holds for state-level labor market conditions as discussed below).

Given the important differences in employment by education group shown in Figure 1, Table 2 breaks the sample into education groups. Contrary to the expectation that jobs of lower-educated older workers may be most vulnerable because they are most affected by wage rigidities or high reservation wages, it does not appear to be the case that employment of workers with high school responds more than that for college educated. It rather appears employment of older college graduates is more sensitive to industry shocks.

Part of these results may be due to the heterogeneity of the effects across industries. Figure 3 shows the total employment trends by education for 60-64 year olds relative for manufacturing and trade. Clearly, in the case of manufacturing the majority of the decline in employment is due a reduction in employment of low-skilled workers. However, similar patterns (albeit of a different magnitude) occur for sectors that are growing faster or increasing employment, leading to mixed results in the table.

The figure also shows relative employment growth of college vs. high school graduates together with relative employment for the full economy. It does not appear that there has been a stronger shift towards high skilled labor in manufacturing than in the full

economy. So while manufacturing employment of low-skilled declined rapidly, and due to the importance of manufacturing may be responsible for a sizeable part of the decline of low-skilled old age employment, it does not seem to be the case that manufacturing shifted more heavily towards high-skilled workers than other sectors. This is in line with previous research that has argued the shift in the return to skill and skill-intensity of production has been similar across sectors.

To obtain a direct assessment of the effect of changes in the share of older low-skilled workers' employment in a sector, we have decomposed relative employment of high vs. low skilled men age 60-64 and performed a simple counterfactual experiment. The total relative employment rate can be written as the sum of sector specific relative employment rates weighed by the share of high school graduates in employment of the sector

$$remp_t^{60-64} \equiv \frac{E_t^{COL,60-64}}{E_t^{HS,60-64}} = \sum_{j=1}^{J} \frac{E_{j,t}^{COL,60-64}}{E_{j,t}^{HS,60-64}} \frac{E_{j,t}^{HS,60-64}}{E_t^{HS,60-64}} = \sum_{j=1}^{J} remp_{j,t}^{60-64} s_{j,t}^{HS,60-64} .$$

To assess the role of changes in the skill-intensity across sectors or declines in the share of high school employment, we have obtained counterfactual total relative employment rates holding either of the components of the sum constant. The results are displayed in Figure 5. Two implications stand out; first, reductions in the importance of the manufacturing sector (as measured by the high school share in manufacturing employment) have helped to offset strong increases in the relative employment of high-skilled 60-64 year olds in the manufacturing sector. Similarly, given the declining role of manufacturing, if we hold manufacturing's skill intensity of employment constant, overall relative employment is hardly affected. Second, if we hold all industry shares in high school employment at the 67-69 level, relative employment drops by about 25%. Part of the increase in relative employment of 60-64 year olds can thus be explained by shifts of employment between sectors. However, the bulk of the rise in relative employment of older high-skilled workers can be explained by sector-specific increases in the retirement rates of low-skilled workers.

Overall, it appears that the fortune of a worker's industry appears to affect his retirement decision. In particular, industry specific declines in employment of older low skilled workers have the potential to explain an important portion of the decline of low-skill

employment at age 60-64. Only about 25% is due to the decline in the relative importance of sectors traditionally employing low-skilled older workers.

5. The Role of Economic Conditions by Age and Education

If it were true that industries in economic difficulty substituted older workers with younger ones because of differential wage flexibility, we would expect to see a corresponding shift in the age-structure of employment. This shift should be more pronounced for low-skilled older workers for whom we suspect wages should fall the most.

To explore this question further, Figure 4 shows measures of the change in the industry age-structure over time (the ratio of employment growth of older workers relative to that of workers age 18 to 50) relative to the age-structure in the full economy. It is apparent that manufacturing sector has shed more workers in retirement age than the full economy, especially in the 1980s. The relative employment of 55-59 year olds has increased at best. The rest of the figures show that there is considerable heterogeneity across sectors in the age distribution, with almost all combinations across age-groups present.

This is reflected in results in Table 2 (and Table 3 below) that do not find that older workers are more affected by industry (state) economic conditions to a larger degree than younger workers. At best, the effect is stronger for younger workers (the same way displacement rates as measured for the DWS tend to be higher for younger workers). This holds irrespective of education group. Although there are some differences between 55-59 and 60-64 year olds, these are unlikely to be driven by differences in relative wage developments but rather by the availability of social security as a 'safe haven' for the latter group.

Overall, neither the difference across age groups nor across education groups suggests that the jobs of older less-educated workers are substantially more affected than that of younger workers. This is of course no more than a very coarse assessment of the potential source of the effect of economic shocks on employment trends around retirement behavior. However, the results certainly do not indicate a strong pattern in systematic adjustments of age or education structures at the industry level. The clear exception is the change in age structure in manufacturing.

6. Evidence from State Level Regressions

It was suggested above that if retirement trends were driven by a secular decline in labor market opportunities for less educated workers, then there should be a rising correlation between labor market shocks and retirement rates as less-educated workers increasingly seek retirement as an alternative to less attractive employment. This strategy has been fruitfully exploited in the case of disability insurance using changes in state-level labor market conditions by Autor and Duggan (2003). The swift nature of the changes in the employment patterns of men near retirement documented above suggests that something else happening more quickly than such secular trends is the main driving force.

This is borne out when we implement the approach using our data. We regress employment trends at the state level on local unemployment rates for age and education groups across different year groups. The data we use starts in 1976 because of inconsistencies in the state variables in the CPS for earlier years. The results, shown in Table 3, do not show any evidence in favor of increasing responsiveness of 60-64 year old workers' employment changes in state unemployment rates, or trends in state level GSP or total state employment. There is an increase in the effect for the 1990s when we use the natural log of GSP as our dependent variable, but in this case we have just four years of data (since GSP information ends in 1997).

Similarly, there are no increases in the effect of local unemployment or growth on older workers' employment by education groups. These results corroborate results shown in Table 2. There, industry level GSP growth or employment trends had at best declining effects on participation of older workers over time. Overall, there appears to be little evidence of a secular push of older workers onto retirement because of economic conditions. These results are consistent with the relative stability of the relative difference in responses of older workers to job loss documented in Table 1. Consistent with the fact that many of the salient changes in employment trends for 60-64 year olds occurred in the early 1980s, at best that table showed a *decline* in the relative loss of employment in the late 1980s.

7. The Role of Relative Supply Changes of Younger High vs. Low Skilled Workers

Changes in the growth rate of college attainment have led to significant fluctuations in the relative supply of college vs. high school graduates since the early 1970s. In particular, there has been a rapid decline in the relative supply of younger college graduates starting in

the early 1980s. If older workers' wages are rigid and if older and younger workers are at least partly substitutable in production, this would imply a *positive* relative demand shift in favor of older high-skilled workers. Figure 6 displays the ratio of college vs. high school graduates in the population (Panel A) and employment (Panel B) for 60-64 year olds and 25-35 year olds from 1968 to 1999. While the relative supply of younger high skilled workers was falling in the 1980s, the relative supply of older workers was increasing.

To assess the effect of the reduction of younger workers' relative supply on older workers' relative employment, we ran a series of simple regression of relative employment rates on two measures of relative supply. The first measure is based on total population, the second on total employment. All models are estimated at the cell level, with nine age-groups and nine year groups, include fixed effects for age- and year-groups, and are weighted by cell size. The results are displayed in Table 4. The first three models of the table replicate the results of Card and Lemieux (2001) for the effect of relative supplies on earnings. The coefficient estimates on the relative supply measures are significantly negative and very similar in magnitude to their paper. Model (4) shows the same does not apply once we restrict ourselves to older workers; i.e., older workers' relative wages are much less responsive (if at all) to relative supply, consistent with the notion of wage rigidity.

The second part of the table then analyzes the effect of relative supply on relative employment rates. Models (5) to (7) show that relative supply in the same age-group has no effect on relative employment for either age-group. Models (8) to (11) then replicate the same analysis for workers age 50 and above only and also include the relative supply of younger workers. The results do not allow giving a clear cut conclusion on the role of relative supply across age-groups. If we include relative supply of 35-45 year olds, the coefficients are significantly positive. On the one hand, this may be because these workers are similar to workers age 50 and above. On the other hand, the relative supply of 35-45 year olds has been increasing as the relative employment of older workers rose. Thus, it supply in that age-category is unlikely to have induced a demand push during that period. If we include the relative supply of 25-35 year olds, the correlation is significantly negative, consistent with the pattern shown in Figure 6 – relative supply among younger workers fell as relative employment of older workers rose. Whether these patterns are coincidence, or whether indeed the drop in relative supplies of 25-35 year olds constituted a push in demand for

older workers will be hard to tell without measures of demand changes occurring at the same time.

8. Preliminary Summary

To summarize, first we have documented that an important part of reductions in labor force participation of men near retirement age occurred in a relatively narrow window of time from the early 1970s to the early 1980s. We have also shown that this decline is particularly pronounced for less educated workers. The rapidity of these changes, their differential nature across skill groups, and their occurrence in a very turbulent time in the United States labor market suggests that there may be important drivers of retirement trends coming from changes in workers' economic conditions during that period.

Second, we have used information from the effect of job loss, industry and state shocks and strong trends in relative retirement rates to argue that there is ample evidence that labor market shocks affect employment and participation of 60-64 year old workers. An important fraction of these workers is likely to permanently transit out of the labor force, in particular during the 1980s when gradual retirement was less common. Clearly, a non-negligible fraction of such economically induced retirees are also at risk of partial retirement and reentry into the labor force.

Third, we find little evidence that industry or state trends in economic conditions lead to a systematic shift in the age structure of employment towards younger workers or towards more educated workers. In this admittedly coarse assessment, there is no evidence that the jobs of low skilled older workers disappear first because they are relatively more costly to employers and wages are too slow to adjust.

Fourth, we find similarly little evidence that there has been an increasing trend towards early retirement of low skilled men because of secularly declining labor market conditions for low educated workers. Specifically, we do not find that the effect of economic shocks on employment of older workers has risen over time, contrary to the prediction of rising replacement rates due to the calculation of pension benefits.

While economic shocks matter for retirement, from this preliminary assessment it does not appear that the swift decline in employment of 60-64 year olds is due to a simple

interaction of systematic labor market shocks and rigid wages of older workers. However, it does appear that there has been a stepwise destruction of jobs held by low-skilled older workers at each major recession since 1970. The declines parallel reductions of employment of low skilled younger workers, but are much stronger in magnitude.

V. Preliminary Conclusions

This paper has examined the effect of labor market conditions on employment of workers near retirement and assessed their potential as an explanation for the trends towards early retirement over the last three decades. If labor market opportunities play an important role in determining retirement decisions and their variation over time and across workers this may have important implication for policies aimed at keeping older workers in the labor force. Yet, while there have been large changes in the U.S. labor market – such as shifts in employment and earnings between high and low skilled workers and between industries – few studies examine the impact of these developments on retirement trends. This is surprising since a large literature suggests older workers' wages may be more rigid, such that they are particularly vulnerable to changes in labor demand.

The paper helps to assess the role of labor market shocks by analyzing the labor force participation and employment of 60-64 year old men in different education and industry groups. It focuses on three questions. First, do labor market shocks such as a job loss, a decline in industry growth, or high local unemployment rates lower employment of 60-64 year olds? Second, do labor market shocks lead to a tilting of the age-structure of employment towards young, as rigid wages would suggest, and is this stronger for low educated workers? Third, has the correlation of labor market shocks and retirement increased over time, as a secular worsening of labor market conditions for low skilled workers in conjunction with rising replacement rates would suggest?

We find several pieces of evidence suggesting that the employment of 60-64 year olds is considerably affected by labor market conditions. First, the employment of 60-64 year olds has declined most rapidly within a narrow window of time – from the early to 1970s to 1980s – especially for less-educated workers during a period of rising returns to skill, increasing inequality, and the 1982 recession. Second, we confirm that older workers are much more likely to leave employment after a job loss. Third, we show that growth at industry and state level systematically affects employment of 60-64 year olds.

However, we find less evidence that these shifts are driven by a lack of relative wage adjustments among low-skilled older workers. Neither the age-structure nor the education-structure appears systematically related to changes industry or state growth. Moreover, we find that the effects of labor market conditions have remained roughly stable over time. Instead, it seems to be that jobs held by low skilled older workers have systematically disappeared in a stepwise fashion at each recession since the early 1970s. These declines parallel the reduction in employment of younger, low-skilled men occurring at the same frequency but of much smaller magnitude.

Overall, these results suggest that the role of economic shocks and trends as determinants of retirement behavior and the evolution of retirement trends is a worthy subject of further study that may complement current research emphasizing health, wealth, and retirement incentives as key drivers of employment and retirement decisions of older men.

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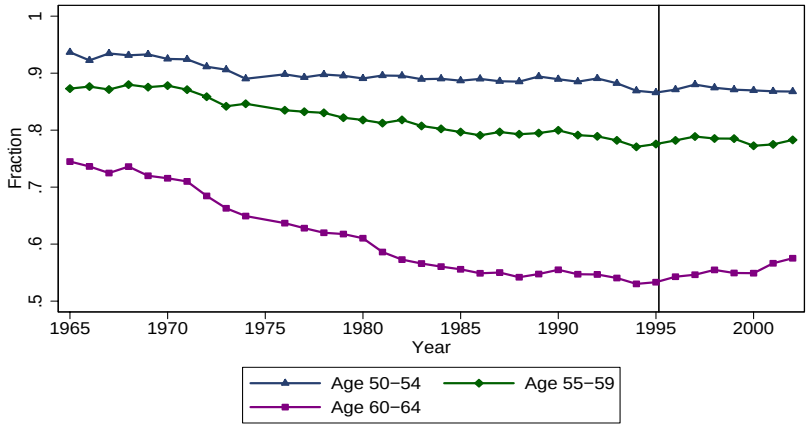
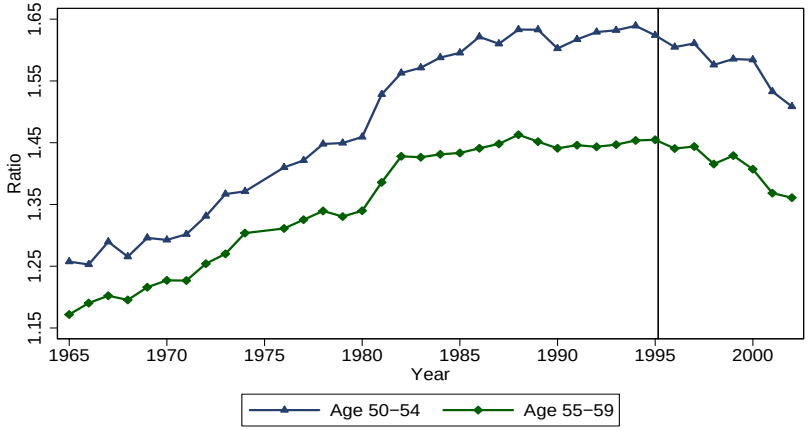
Figure 0: Trends in Labor Force Participation and Employment for Older Men

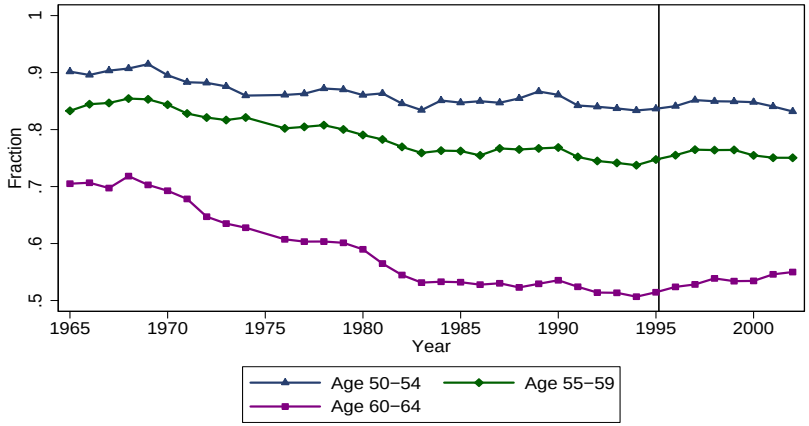
Panel A: Labor Force Participation Rate by Age−Group, Men



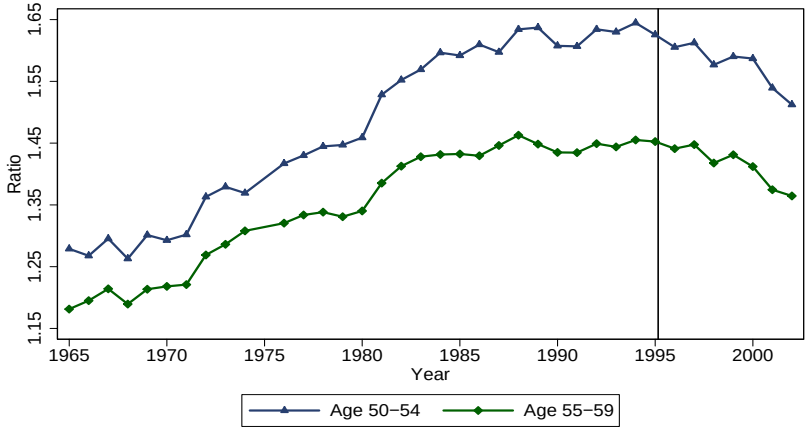
Panel B: Labor Force Participation Rate of Younger Workers Relative to 60−64 Men



Panel C: Employment−Population Ratio by Age−Group, Men



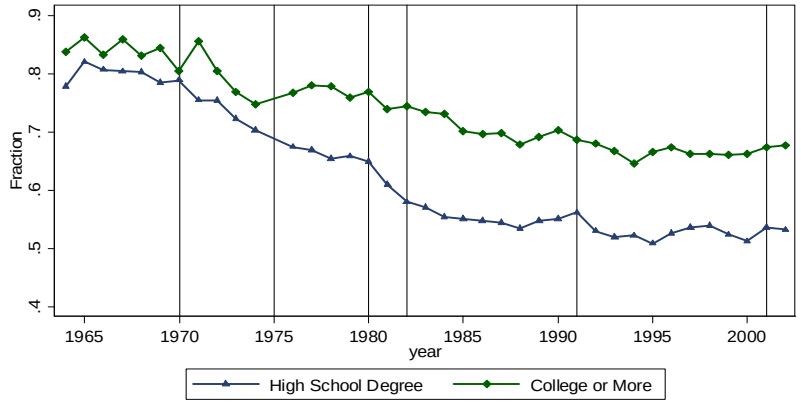
Panel D: Employment−Population Ratio of Younger Workers Relative to 60−64 Men



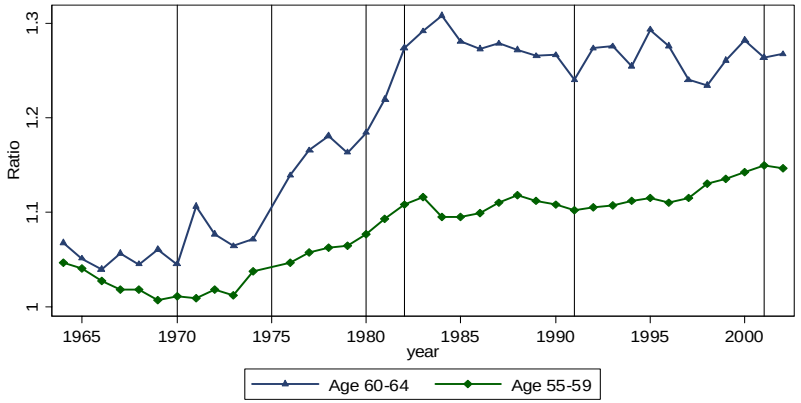
Source: Current Population Survey

Figure 1: Labor Force Participation and Employment-Population Ratio By Education Group, Older Men

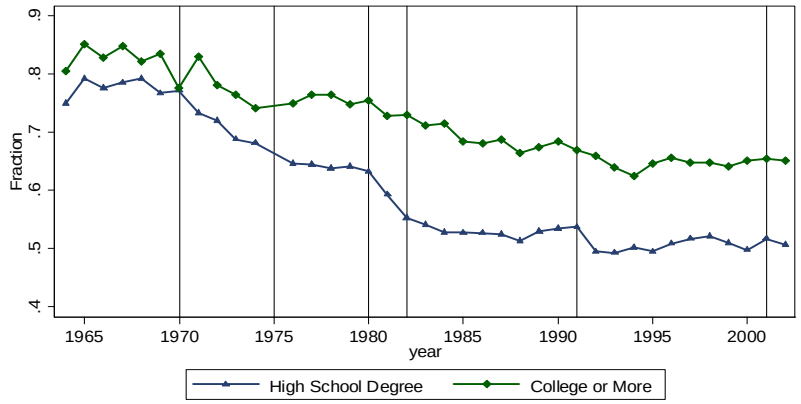
Panel A: Labor Force Participation Rate by Education Group, Men 60-64



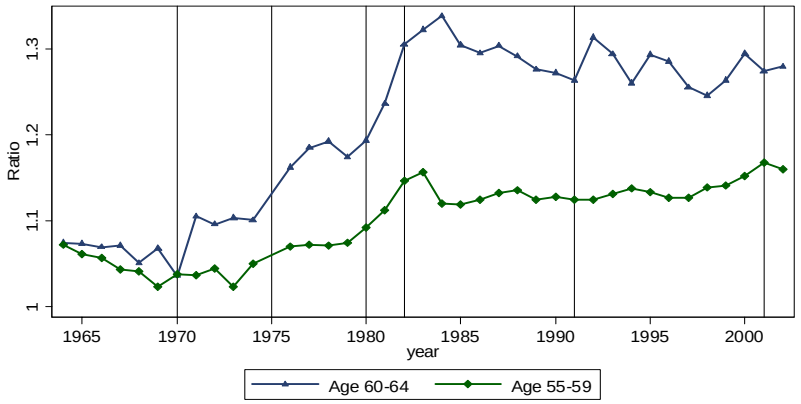
Panel B: Relative Labor Force Participation of College vs. High School, Men



Panel C: Employment-Population Ratio by Age-Group, Men 60-64



Panel D: Relative Employment-Population Ratio College vs. High School, Men



Source: Current Population Survey

Figure 2: Relative Annual Earnings College vs. High School Graduates
Various Age-Groups

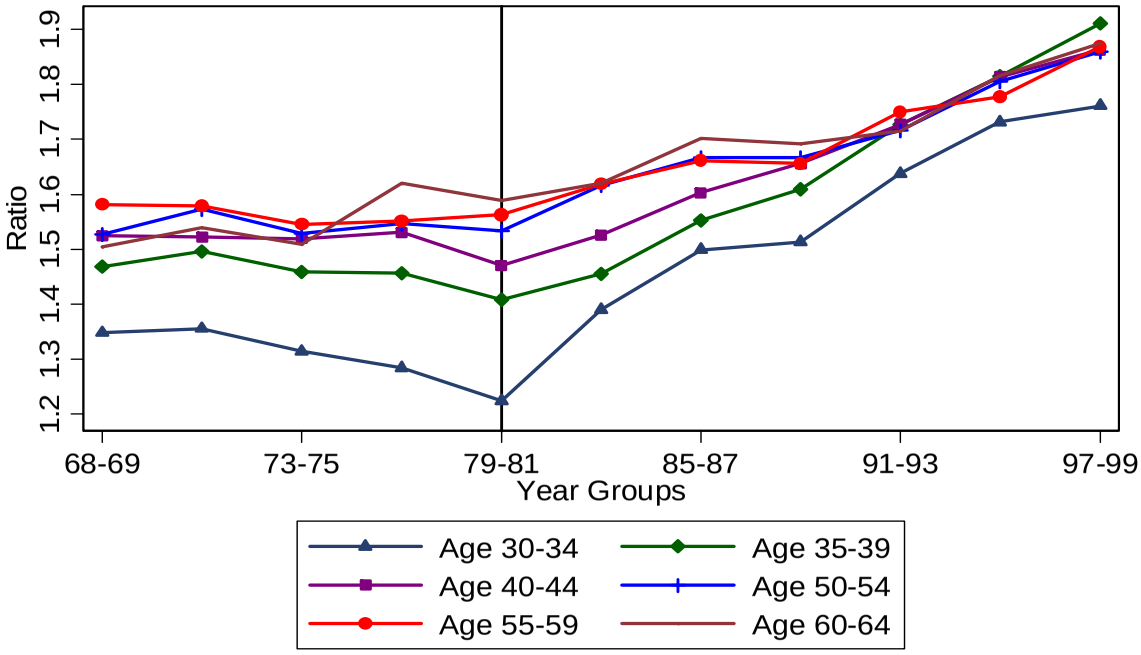
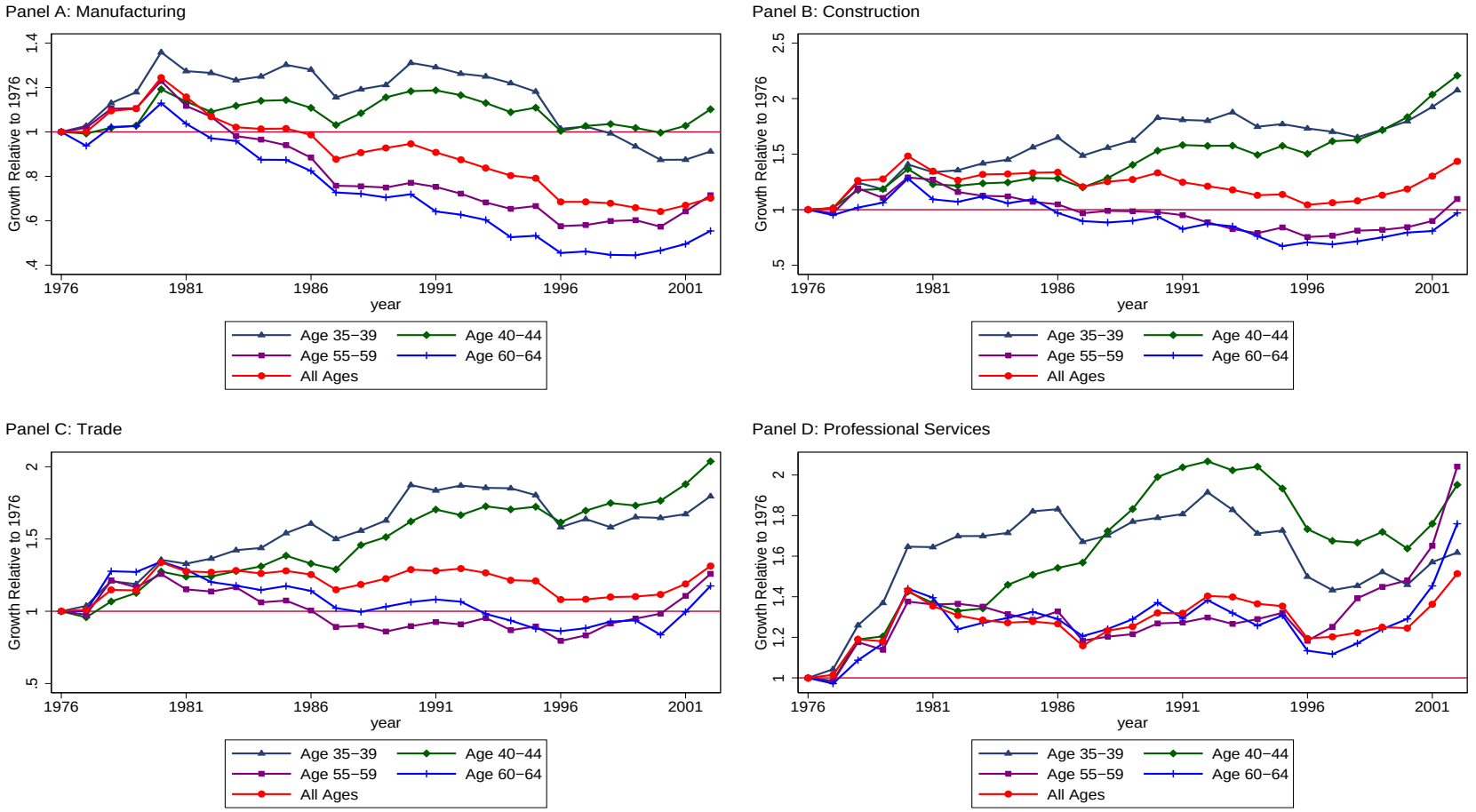
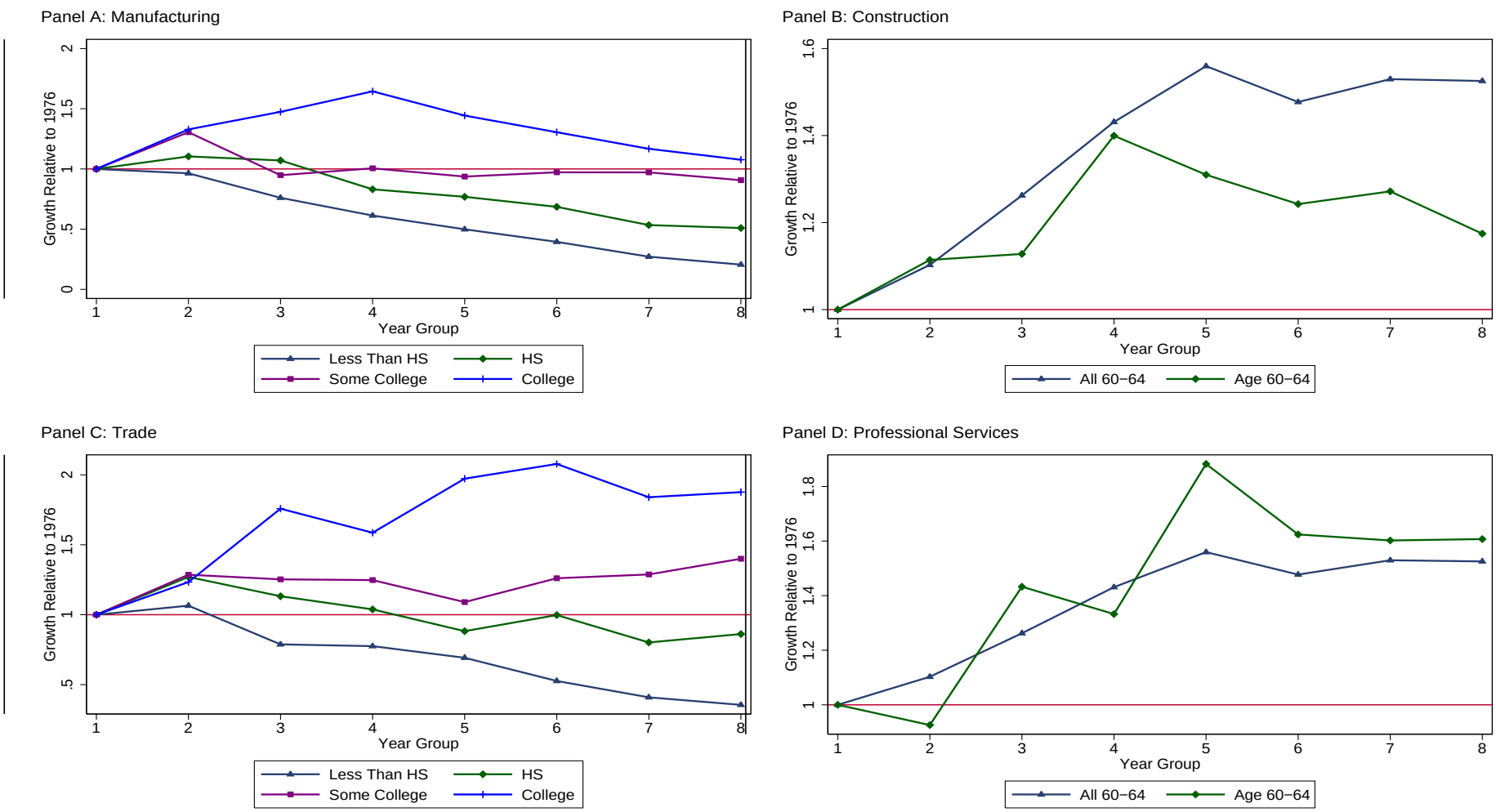


Figure 2: Employment Growth Relative to 1976 by Major Sector
Various Age Groups, Older Men



Source: Current Population Survey

Figure 3: Employment Growth of College vs. High School Workers Relative to 1976, By Major Sector, Various Age and Year Groups, Older Men



Source: Current Population Survey; Year Group 1=1976−79, ..., Year Group 8=1997−1999

Figure 5: Counterfactual Relative College-High School Employment
Alternative Assumptions on Industry Shares, Men, Age 60-64

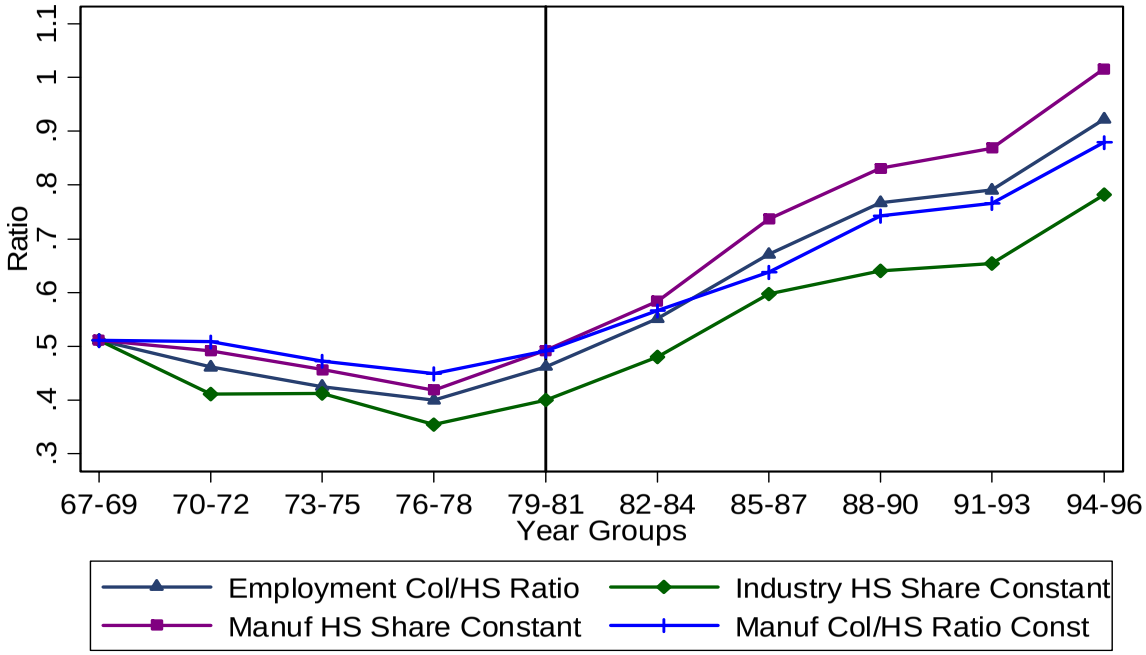


Figure 6A: Population Fraction College vs. High School Graduates
Older vs. Younger

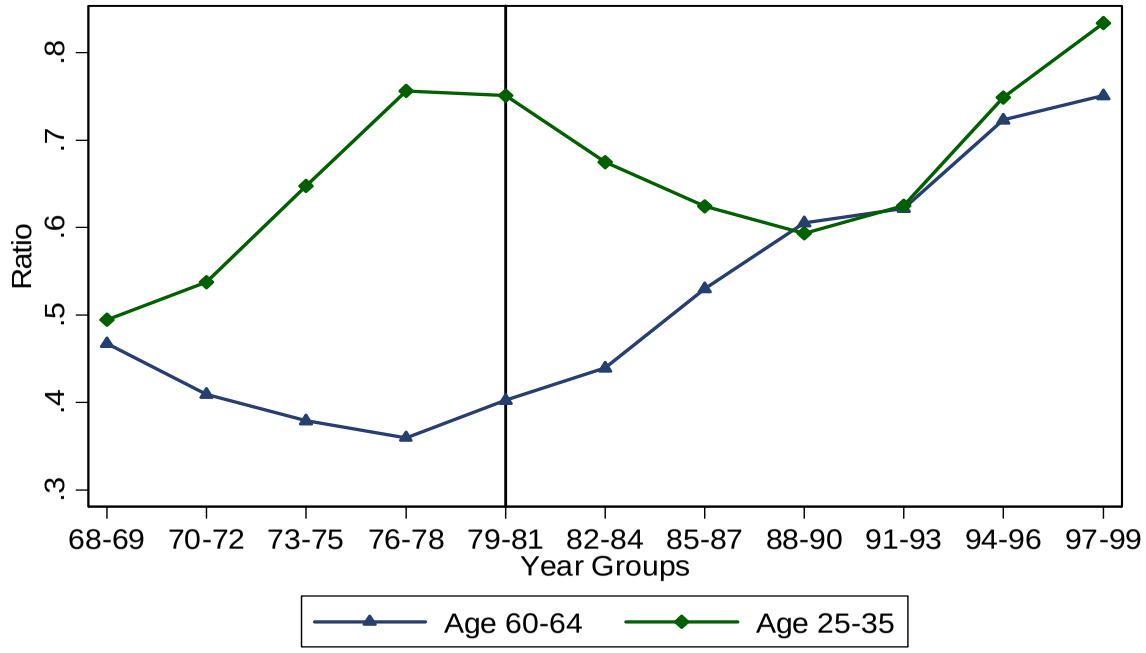


Figure 6B: Employment Fraction College vs. High School Graduates
Older vs. Younger

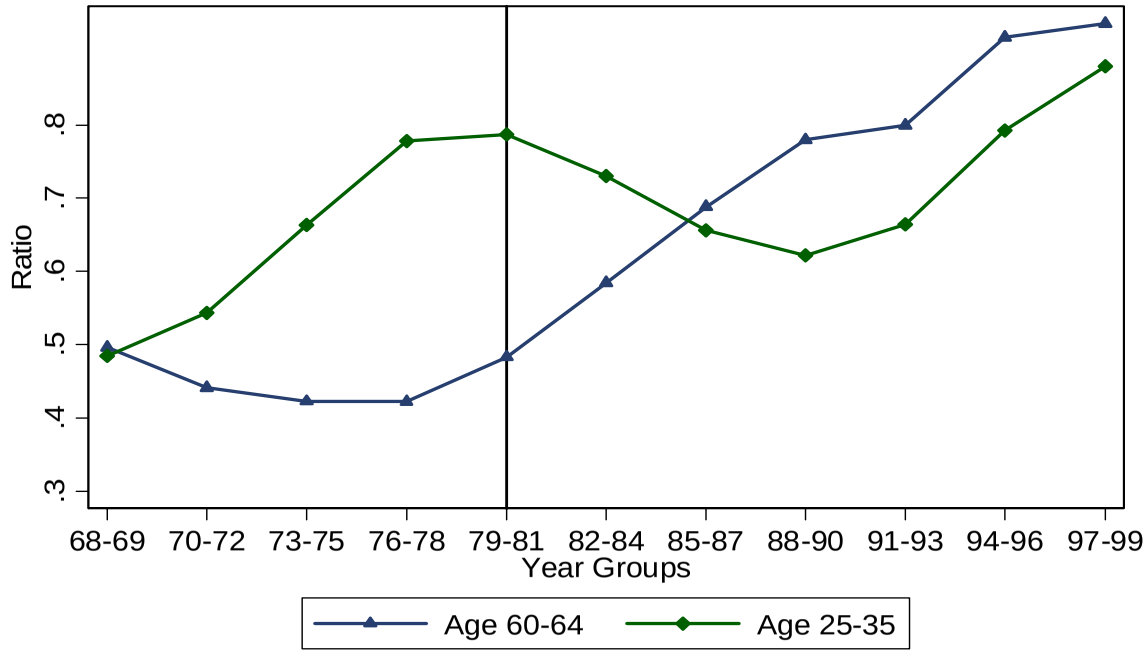


Table 1: Reemployment and Earnings After Job Displacement for Older Men and By Education 1984-2006

	All Workers			Less Than HS			High School			Some College			College or More		
Year	**50-54**	**55-59**	**60-64**	**50-54**	**55-59**	**60-64**	**50-54**	**55-59**	**60-64**	**50-54**	**55-59**	**60-64**	**50-54**	**55-59**	**60-64**
A. Fraction of Job Losers Reemployed at Survey Date															
1984	0.63	0.51	0.35	0.49	0.38	0.28	0.53	0.53	0.36	0.62	0.54	0.42	0.76	0.54	0.45
1986	0.64	0.61	0.44	0.49	0.49	0.35	0.64	0.57	0.4	0.58	0.62	0.41	0.82	0.79	0.77
1988	0.64	0.64	0.46	0.5	0.59	0.35	0.64	0.56	0.44	0.72	0.66	0.47	0.72	0.83	0.52
1990	0.75	0.66	0.49	0.54	0.47	0.28	0.72	0.6	0.49	0.72	0.66	0.6	0.85	0.8	0.69
1992	0.61	0.58	0.44	0.44	0.51	0.36	0.56	0.55	0.39	0.62	0.62	0.51	0.78	0.71	0.59
1994	0.47	0.38	0.25	0.38	0.24	0.15	0.32	0.38	0.22	0.39	0.38	0.15	0.52	0.4	0.33
1996	0.73	0.62	0.47	0.56	0.44	0.19	0.61	0.55	0.47	0.71	0.6	0.42	0.81	0.71	0.51
1998	0.73	0.65	0.46	0.57	0.54	0.34	0.69	0.67	0.42	0.71	0.65	0.45	0.72	0.66	0.42
2000	0.73	0.65	0.54	0.63	0.41	0.3	0.66	0.59	0.54	0.68	0.63	0.52	0.81	0.69	0.6
2002	0.65	0.59	0.46	0.38	0.32	0.42	0.64	0.52	0.39	0.62	0.5	0.57	0.75	0.68	0.49
2004	0.65	0.65	0.4	0.47	0.47	0.35	0.63	0.6	0.39	0.63	0.6	0.51	0.7	0.68	0.49
2006	0.72	0.64	0.5	0.46	0.5	0.39	0.69	0.56	0.42	0.65	0.61	0.49	0.82	0.68	0.57
Total	*0.66*	*0.6*	*0.43*	*0.49*	*0.45*	*0.31*	*0.61*	*0.55*	*0.41*	*0.63*	*0.59*	*0.46*	*0.75*	*0.68*	*0.52*
B. Average Wage Loss of Job Losers Reemployed at Survey Date															
1984	-0.11	-0.04	-0.41	-0.26	-0.18	-0.51	-0.08	-0.01	-0.49	0.03	-0.09	-0.12	0.43	-0.25	0.06
1986	-0.18	-0.17	-0.33	-0.19	-0.32	-0.29	-0.17	-0.14	-0.26	-0.18	-0.13	-0.88	-0.1	-0.4	-0.16
1988	-0.22	-0.27	-0.4	-0.27	-0.26	-0.62	-0.23	-0.25	-0.33	-0.06	-0.11	-0.28	-0.26	-0.06	-0.88
1990	-0.22	-0.14	-0.28	-0.14	-0.27	-0.3	-0.25	-0.06	-0.28	-0.18	-0.24	-0.42	0.04	-0.09	0.22
1992	-0.15	-0.25	-0.48	-0.14	-0.12	-0.25	-0.21	-0.29	-0.4	-0.17	-0.33	-0.43	-0.13	-0.49	-0.33
1994	-0.22	-0.35	-0.52	0.02	-0.38	-0.51	-0.18	-0.36	-0.3	-0.27	-0.4	-1.03	-0.48	-0.29	-0.14
1996	-0.18	-0.3	-0.27	-0.02	0.03	0.24	-0.18	-0.19	-0.23	-0.06	-0.44	-0.42	-0.32	-0.45	-0.54
1998	-0.13	-0.3	-0.25	-0.03	-0.28	-0.49	-0.12	0	-0.46	-0.04	-0.17	-0.23	-0.12	-0.26	-1.45
2000	-0.11	-0.17	-0.08	-0.69	-0.24	-0.01	-0.08	0.15	-0.31	-0.12	-0.27	-0.4	-0.25	-0.34	-1.26
2002	-0.14	-0.32	-0.31	-0.01	-1.12	-0.25	-0.14	-0.11	-0.59	-0.24	-0.13	-0.29	-0.57	-0.08	0.09
2004	-0.38	-0.3	-0.3	-0.06	-0.29	-0.53	-0.28	-0.35	-0.08	-0.45	-0.14	-0.64	-0.46	-0.61	-1.6
2006	-0.32	-0.28	-0.22	-0.23	-0.41	-1.15	-0.16	-0.23	-0.23	-0.28	-0.44	-0.82	-0.39	-0.3	0.22
Total	*-0.2*	*-0.24*	*-0.33*	*-0.18*	*-0.27*	*-0.4*	*-0.18*	*-0.17*	*-0.32*	*-0.2*	*-0.25*	*-0.49*	*-0.29*	*-0.33*	*-0.59*

Notes: Entries in the table are averages A5obtained from Displaced Worker Survey. A job displacement is defined as the permanent loss of a job due to plant closing, slack work, or position abolished in the three years preceding the survey date. Wage loss refer to the log difference in hourly earnings. To raise sample sizes, tabulations by education are done for men and women.

Table 2: Regressions of Trend Employment Growth Relative to 1976 on Industry Growth by Age, Education, and Year Groups

Age Group	All Workers				Education Equal to High School				Education College Degree or More			
	All	1976-1983	1984-1992	1993-1997	All	1976-1983	1984-1992	1993-1997	All	1976-1983	1984-1992	1993-1997
Effect of Changes in Trend of Industry GSP												
45-49	0.219	0.283	0.205	0.043	0.058	0.216	0.108	0.001	0.107	0.276	0.427	0.046
	(0.010)	(0.051)	(0.017)	(0.040)	(0.021)	(0.057)	(0.031)	(0.014)	(0.031)	(0.051)	(0.056)	(0.018)
50-54	0.174	0.312	0.124	0.127	0.048	0.141	0.053	0.017	-0.021	0.335	0.207	-0.126
	(0.007)	(0.038)	(0.015)	(0.024)	(0.018)	(0.051)	(0.034)	(0.011)	(0.029)	(0.042)	(0.020)	(0.030)
55-59	0.145	0.322	0.093	0.095	0.025	0.082	-0.056	-0.001	0.011	0.569	0.056	-0.087
	(0.008)	(0.055)	(0.012)	(0.021)	(0.019)	(0.071)	(0.024)	(0.008)	(0.024)	(0.056)	(0.030)	(0.014)
60-64	0.150	0.225	0.148	-0.021	0.044	0.181	-0.040	0.005	0.077	0.604	0.136	-0.007
	(0.009)	(0.054)	(0.021)	(0.026)	(0.019)	(0.064)	(0.024)	(0.012)	(0.030)	(0.080)	(0.060)	(0.009)
Effect of Changes in Log Industry GSP												
45-49	0.993	0.546	0.828	1.011	0.122	0.805	0.290	0.000	0.314	0.412	1.579	0.140
	(0.054)	(0.107)	(0.095)	(0.326)	(0.049)	(0.129)	(0.097)	(0.032)	(0.087)	(0.070)	(0.167)	(0.051)
50-54	0.781	0.643	0.487	0.335	0.120	0.672	0.135	0.058	-0.027	0.492	0.716	-0.364
	(0.039)	(0.078)	(0.078)	(0.274)	(0.040)	(0.096)	(0.101)	(0.023)	(0.083)	(0.057)	(0.074)	(0.092)
55-59	0.696	0.614	0.431	0.522	0.057	0.833	-0.193	0.001	0.114	0.845	0.160	-0.241
	(0.037)	(0.115)	(0.055)	(0.224)	(0.044)	(0.123)	(0.070)	(0.018)	(0.067)	(0.069)	(0.107)	(0.051)
60-64	0.741	0.426	0.689	-0.008	0.101	0.838	-0.165	-0.007	0.285	0.897	0.472	-0.020
	(0.042)	(0.110)	(0.100)	(0.239)	(0.046)	(0.130)	(0.071)	(0.031)	(0.084)	(0.107)	(0.209)	(0.028)
Effect of Changes in Trend of Total Industry Employment												
45-49	1.349	0.800	1.181	1.695	0.834	0.805	0.701	0.359	1.344	0.935	3.415	2.546
	(0.041)	(0.066)	(0.106)	(0.105)	(0.097)	(0.129)	(0.349)	(0.454)	(0.272)	(0.182)	(1.169)	(0.534)
50-54	1.108	0.601	0.798	1.503	0.671	0.672	0.568	1.083	1.193	1.147	1.921	-2.800
	(0.042)	(0.068)	(0.085)	(0.111)	(0.079)	(0.096)	(0.326)	(0.254)	(0.223)	(0.144)	(0.507)	(1.809)
55-59	0.899	0.801	0.684	1.105	0.730	0.833	0.197	0.277	1.284	1.727	1.424	-2.131
	(0.032)	(0.082)	(0.057)	(0.104)	(0.077)	(0.123)	(0.270)	(0.243)	(0.143)	(0.277)	(0.307)	(1.045)
60-64	0.865	0.531	1.141	1.039	0.772	0.838	0.472	-0.257	1.662	1.707	2.151	-0.054
	(0.032)	(0.091)	(0.101)	(0.093)	(0.080)	(0.130)	(0.238)	(0.432)	(0.211)	(0.384)	(0.734)	(0.402)

Notes: Entries represent coefficient estimates from separate regressions of employment growth at the cell level by age, year, and education group. All models include industry fixed effects, as well as the appropriate education and year fixed effects. All regression weighted by initial cell size. Standard errors in parentheses. State GSP was used until 1997, total employment until 2002.

Table 3: Regressions of Employment Population Rates on State Unemployment Rate and Gross Social Product by Age, Education, and Year Groups

Age Group	All Workers				Education Equal to High School				Education College Degree or More			
	All	1976-1983	1984-1992	1993-2002	All	1976-1983	1984-1992	1993-2002	All	1976-1983	1984-1992	1993-2002
Effect of Changes in State Unemployment Rate												
45-49	-0.006	-0.005	-0.007	-0.007	-0.008	-0.004	-0.009	-0.003	-0.003	-0.001	-0.004	-0.006
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.004)	(0.001)	(0.001)	(0.001)	(0.002)
50-54	-0.006	-0.006	-0.008	-0.009	-0.007	-0.006	-0.009	-0.009	-0.003	-0.003	-0.007	-0.001
	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.002)	(0.002)	(0.005)	(0.001)	(0.002)	(0.001)	(0.003)
55-59	-0.006	-0.006	-0.007	-0.015	-0.005	-0.007	-0.006	-0.013	-0.002	-0.002	-0.001	-0.012
	(0.001)	(0.001)	(0.001)	(0.004)	(0.001)	(0.002)	(0.002)	(0.006)	(0.001)	(0.002)	(0.002)	(0.006)
60-64	-0.007	-0.009	-0.005	-0.010	-0.009	-0.013	-0.009	-0.007	-0.003	-0.011	-0.004	0.000
	(0.001)	(0.002)	(0.002)	(0.004)	(0.002)	(0.003)	(0.003)	(0.007)	(0.002)	(0.004)	(0.004)	(0.009)
Effect of Changes in Log State GSP												
45-49	0.031	0.066	-0.001	0.097	0.037	0.084	0.035	-0.022	0.020	-0.002	0.014	0.171
	(0.007)	(0.018)	(0.020)	(0.066)	(0.011)	(0.026)	(0.029)	(0.098)	(0.008)	(0.024)	(0.021)	(0.058)
50-54	0.052	0.057	0.054	0.126	0.050	0.046	0.024	0.151	0.011	0.001	0.068	0.095
	(0.008)	(0.020)	(0.023)	(0.074)	(0.013)	(0.031)	(0.037)	(0.130)	(0.011)	(0.028)	(0.029)	(0.086)
55-59	0.086	0.123	0.070	0.170	0.071	0.077	0.039	0.294	0.014	0.062	-0.082	-0.059
	(0.010)	(0.024)	(0.027)	(0.099)	(0.016)	(0.039)	(0.041)	(0.174)	(0.017)	(0.043)	(0.046)	(0.147)
60-64	0.090	0.137	0.140	0.330	0.073	0.263	0.088	-0.018	0.119	0.150	0.141	0.057
	(0.013)	(0.033)	(0.035)	(0.117)	(0.022)	(0.056)	(0.056)	(0.188)	(0.029)	(0.080)	(0.072)	(0.217)
Effect of Changes in Trend of Total State Employment												
45-49	0.708	0.581	0.650	0.780	0.707	0.508	0.801	0.601	0.425	0.457	0.319	0.397
	(0.020)	(0.035)	(0.033)	(0.043)	(0.050)	(0.086)	(0.085)	(0.166)	(0.051)	(0.115)	(0.085)	(0.106)
50-54	0.697	0.566	0.691	0.702	0.738	0.661	0.673	1.164	0.690	0.699	0.695	0.768
	(0.022)	(0.039)	(0.037)	(0.049)	(0.061)	(0.101)	(0.110)	(0.211)	(0.070)	(0.134)	(0.126)	(0.151)
55-59	0.700	0.618	0.765	0.721	0.849	0.621	0.780	0.990	1.099	0.811	1.125	1.166
	(0.026)	(0.045)	(0.042)	(0.063)	(0.076)	(0.126)	(0.124)	(0.298)	(0.110)	(0.203)	(0.189)	(0.258)
60-64	0.780	0.841	0.873	0.789	1.370	1.454	1.321	1.901	2.259	1.994	1.954	2.458
	(0.033)	(0.064)	(0.052)	(0.073)	(0.098)	(0.175)	(0.161)	(0.306)	(0.169)	(0.364)	(0.284)	(0.357)

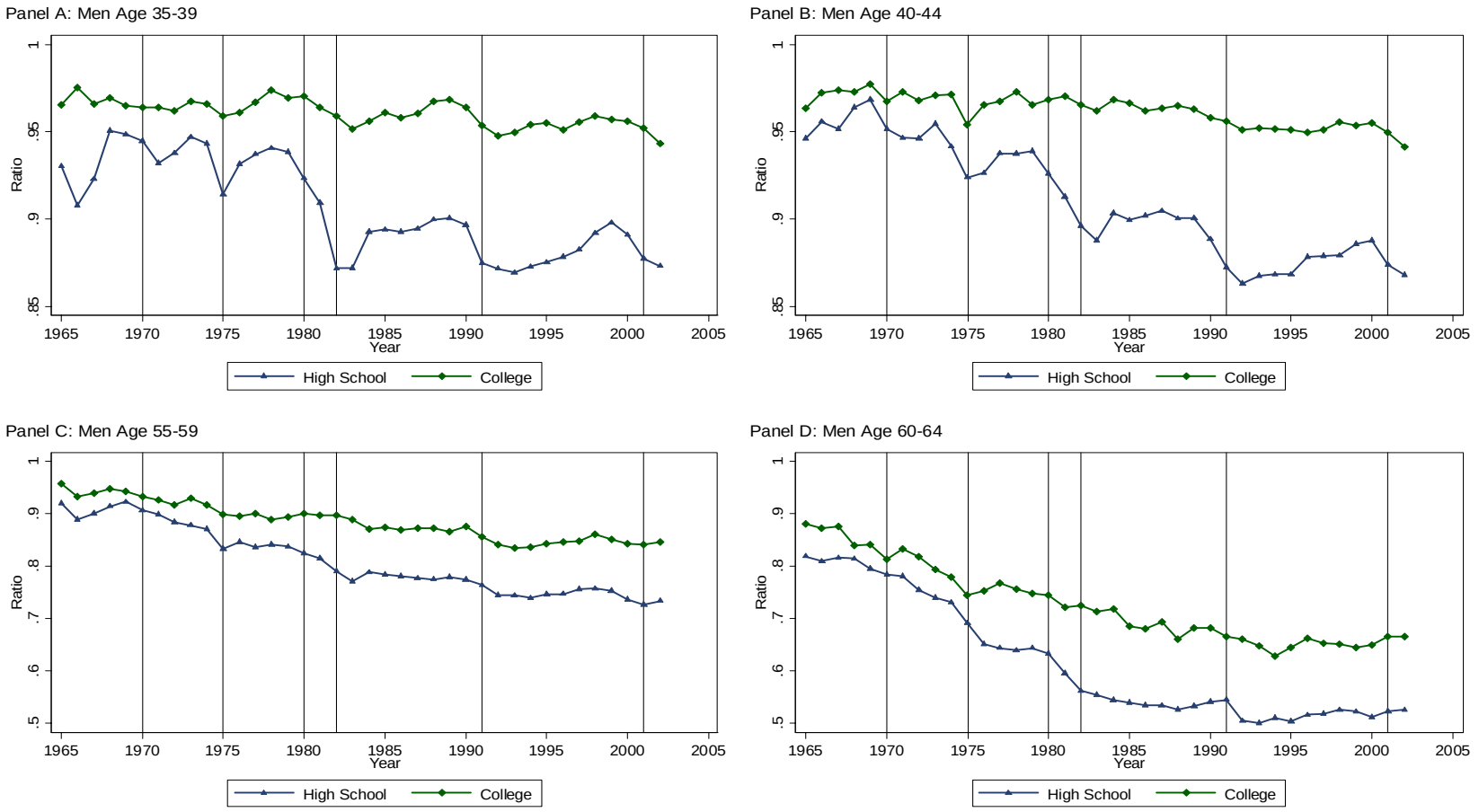
Notes: Entries represent coefficient estimates from separate regressions of employment population ratios at the state-cell level by age, year, and education group. All models include state fixed effects, as well as the appropriate education and year fixed effects. All regression weighted by initial cell size. Standard errors in parentheses. State GSP was used until 1997, state UR until 1999, state employment until 2002.

Table 4: The Effect of Changes in Relative Supply of College and High School Graduates on Relative Earnings and Relative Employment of Younger and Older Workers

		Ratio of College to High School Graduates in Population	Ratio of College to High School Graduates in Employment	Ratio of College to High School Graduates in Population, Age 35-45 or 25-35	Ratio of College to High School Graduates in Employment, 35-45 or 25-35
(1)	**Relative Annual Earnings of College vs. High School Graduates**	-0.242 (0.053)	-0.212 (0.048)	-- --	-- --
(2)	**Relative Hourly Wages of College vs. High School Graduates**	-0.210 (0.099)	-0.183 (0.089)	-- --	-- --
(3)	**Relative Weekly Wages of College vs. High School Graduates**	-0.253 (0.067)	-0.229 (0.060)	-- --	-- --
(4)	**Relative Annual Earnings of College vs. High School Graduates, Age 50+**	-0.135 (0.350)	-0.017 (0.274)	-- --	-- --
(5)	**Relative Employment Rates of College vs. High School Graduates**	0.024 (0.026)	0.029 (0.023)	-- --	-- --
(6)	**Relative Employment Rates of College vs. High School Graduates, Age 50+**	-0.153 (0.242)	0.077 (0.197)	-- --	-- --
(7)	**Relative Employment Rates, Controling for Relative Weekly Wage**	0.020 (0.028)	0.026 (0.025)	-- --	-- --
(8)	**Relative Employment Rates of College vs. High School Graduates, Age 50+**	-0.047 (0.240)	0.201 (0.181)	0.238 (0.139)	0.304 (0.115)
(9)	**Relative Employment Rates, Age 50+, Controling for Relative Weekly Wage**	-0.059 (0.239)	0.181 (0.181)	0.252 (0.139)	0.311 (0.115)
(10)	**Relative Employment Rates of College vs. High School Graduates, Age 50+**	-0.068 (0.267)	0.183 (0.215)	-0.215 (0.184)	-0.249 (0.169)
(11)	**Relative Employment Rates, Age 50+, Controling for Relative Weekly Wage**	-0.076 (0.268)	0.179 (0.220)	-0.381 (0.256)	-0.317 (0.246)

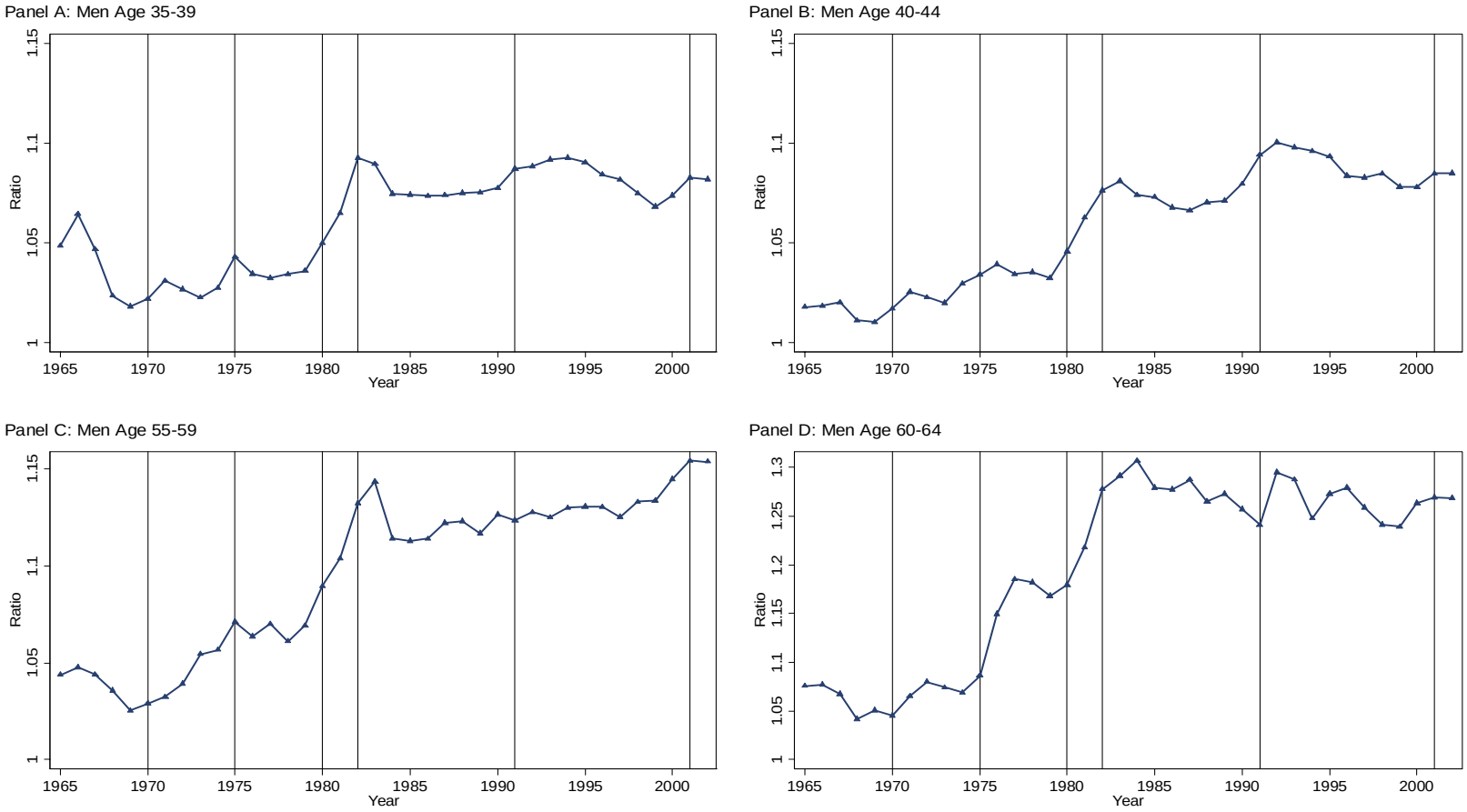
Notes: Entries in the table are coefficients in linear regression models based on cells of nine age-groups and nine year-groups. All models include year-group and age-group dummies and are weighted by the cell size. Standard errors in parentheses. The last two rows include relative supply measures for 25-35 year olds.

Appendix Figure 1: Employment-Population Ratio, College and High School Vertical Lines at Cycle Through Years



Source: Current Population Survey

Appendix Figure 2: Relative Employment-Population Ratio College vs. High School Graduates, Vertical Lines at Cycle Through Years



Source: Current Population Survey

Appendix Table 1: Rates of Job Displacement for Older Men and By Education 1984-2006

	All Workers			Less Than HS			High School			Some College			College or More		
Year	**50-54**	**55-59**	**60-64**	**50-54**	**55-59**	**60-64**	**50-54**	**55-59**	**60-64**	**50-54**	**55-59**	**60-64**	**50-54**	**55-59**	**60-64**
1984	0.09	0.083	0.066	0.09	0.079	0.052	0.072	0.064	0.056	0.081	0.053	0.043	0.052	0.048	0.036
1986	0.096	0.085	0.064	0.086	0.087	0.053	0.071	0.063	0.05	0.08	0.049	0.055	0.059	0.053	0.037
1988	0.09	0.079	0.058	0.073	0.063	0.041	0.073	0.06	0.048	0.074	0.072	0.042	0.056	0.048	0.044
1990	0.073	0.068	0.053	0.071	0.053	0.038	0.066	0.062	0.046	0.064	0.067	0.045	0.045	0.041	0.032
1992	0.113	0.1	0.069	0.1	0.072	0.047	0.082	0.077	0.056	0.108	0.079	0.049	0.072	0.068	0.052
1994	0.087	0.08	0.063	0.07	0.053	0.038	0.071	0.065	0.044	0.08	0.073	0.049	0.069	0.052	0.062
1996	0.096	0.083	0.06	0.061	0.063	0.034	0.079	0.066	0.049	0.101	0.091	0.06	0.08	0.08	0.063
1998	0.08	0.083	0.055	0.068	0.073	0.041	0.07	0.061	0.045	0.083	0.086	0.051	0.059	0.058	0.043
2000	0.082	0.073	0.057	0.061	0.051	0.036	0.06	0.068	0.042	0.092	0.077	0.056	0.069	0.061	0.058
2002	0.096	0.069	0.067	0.088	0.057	0.045	0.079	0.063	0.052	0.095	0.073	0.056	0.076	0.056	0.054
2004	0.088	0.08	0.066	0.068	0.082	0.043	0.077	0.064	0.063	0.095	0.083	0.066	0.076	0.075	0.054
2006	0.077	0.064	0.051	0.05	0.057	0.03	0.069	0.058	0.04	0.08	0.066	0.048	0.063	0.056	0.052
Total	0.089	0.079	0.061	0.077	0.068	0.043	0.073	0.064	0.05	0.088	0.073	0.052	0.066	0.059	0.049

Notes: Entries in the table are averages obtained from Displaced Worker Survey. A job displacement is defined as the permanent loss of a job due to plant closing, slack work, or position abolished in the three years preceding the survey date. To raise sample sizes, tabulations by education are done for men and women.