The Effect of Labor Market Conditions on Retirement Decisions

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Abstract

How older workers make their retirement decisions and what factors have a strong influence on decision making is always a popular topic. This paper attempts to examine how labor market conditions, a less studied factor, affect retirement decision making. It also attempts to examine the existence of heterogeneous effect among age groups and industries. The author defines six possible retirement transition categories, and uses these six outcomes to construct a multinomial logit model. Using data from Health and Retirement Study, we find that older workers below 62 are more likely to stay in the labor force and less likely to either completely or partly retire. No evidence is found for heterogeneous labor market effects by age group. Many industries consistently demonstrate strong labor force attachment, while two industries showing weaker attachment and higher probability to retire. Only two industries do not demonstrate clear patterns regarding labor force attachment.

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Contents

List of Figures

List of Tables

1. Introduction

As the baby boomer generation gradually approached retirement age, dynamics of the labor market have been dramatically changed, and more and more pressure has been put upon the sustainability of the social security system. It is thus critical to study how older people make their retirement decisions, and more closely, how their retirement decisions may be affected by various economic determinants. Coile (2015) summarizes the four most important and most analyzed determinants, which are public and private pensions, wealth and savings, health and health insurance and labor demand. While the first three categories have been abundantly investigated, very limited literature has looked into the effect of labor demand. A common conclusion, that the unemployment rate has a significant positive effect on retirement decisions for lower-educated individuals and for a certain age group (namely older people over age 62, which is the early retirement age that can first claim social security benefits), has been reached among many papers (Coile and Levine, 2011a, 2011b; Gustman and Steinmeier, 2005). However, considering the huge differences in job characteristics and requirements, it is reasonable to predict that the effects of labor demand shocks on the retirement decisions of older workers will be heterogeneous among various industries. Maestas, Mullen and Powell (2013) raise this point and examine labor market decisions for older workers in service versus non-service industries. The regression results provide evidence for industry-level heterogeneous effects. Friedberg et al. (2017) move further by grouping industries into mining, manufacturing, professional services and non-professional services, and they also draw similar conclusions.

Inspired by the above ideas, I plan to examine the effects of labor market conditions on the retirement decisions of older workers aged 50 to 69. To be more specific, I want to test the existence of age-level and industry-level heterogeneous effects and try to understand the mechanisms that could explain those differences. The dataset used in this paper is the Health and Retirement Study, including 6 waves from 1996 to

2006. Waves after the financial crisis are not included in the sample, because public policy changes (such as unemployment insurance duration) and the way older workers make retirement decisions are systematically different compared with previous waves. The fact that HRS is a panel dataset provides the possibility of looking into the transitions of individuals throughout a relatively long period time.

The paper proceeds as follows: Section 2 summarizes the previous literature on this topic; Section 3 explains the conceptual framework; Section 4 shows the empirical methodology; Section 5 describes the data; Section 6 reports the results; and Section 7 draws conclusions.

2. Literature Review

After the 2008 financial crisis, there are increased studies on how labor market conditions affect retirement decisions of older people. The major approach to conduct research is applying a linear probability model (or more advanced Logit model and Probit model) on a set of independent variables including individual characteristics, or labor market conditions, or both. The justifiability of this approach has been proved by a line of literature. Munnell et al. (2008) find out that state-level variables can explain one-third of the differences of labor force participation among states in terms of men aged from 55 to 64, and the explanatory power is still significant after inclusion of individual characteristics. Coile and Levine (2011a) make a reasonable assumption that labor market conditions around the time of retirement are a draw that is randomly assigned to individuals, which forms the basis of quasi-experimental methods in regression models.

Throughout the years, researchers have devoted lots of efforts to both define more detailed retirement decisions and provide more accurate measures of labor market conditions. The pioneering works in this topic mainly define retirement as a binary variable, and use the state level unemployment rate as a proxy for labor market conditions (Munnell et al., 2008; Coile and Levine, 2011a, 2011b). More recent works take a more nuanced approach to defining retirement than just a binary choice. Friedberg et al. (2017) separate retirement in terms of voluntariness and create five categories of retirement transitions accordingly[1]. This paper will construct six retirement transition categories, namely staying in the same job the respondent held in the prior wave, leaving the job to another one, leaving the job to self-employment, turning unemployed, completely retiring and partly retiring. At the same time, different measures are introduced to describe labor market conditions. Friedberg et al. (2017) use MSA or μSA level unemployment rate instead of state or national

[1] The five transition categories are: stay in the job of the previous year; voluntarily or involuntarily change the job; voluntarily or involuntarily retire.

unemployment rate, which provides more accurate descriptions of the local labor market that older workers face. Maestas, Mullen and Powell (2013) create a Bartik instrument to capture local labor demand shock, which is obtained by interacting national changes in industry employment with cross-sectional differences in industry composition. Disney, Ratcliffe and Smith (2015) use annual percentage changes in unemployment to measure local labor market conditions of the United Kingdom. The above literature proves that labor market conditions do affect the retirement behavior of older population, no matter how labor market conditions are measured.

Some papers have already found very exciting results about how labor market conditions affect retirement decisions from the perspective of heterogeneous individual characteristics. By using data from Current Population Survey and selecting respondents aged 55 to 69, Coile and Levine (2011a) find that retirement decisions of workers age 62 to 69 are responsive to state unemployment rate, while less-educated workers are more sensitive to changes in the state unemployment rate. They confirmed the same results after adding American Community Surveys data on another paper published in 2011. Using data from the Survey of Income and Program Participation from 1996 to 2011 and focusing on job loss and the subsequent unemployment spell, Marmora and Ritter (2015) show that workers who do not receive unemployment insurance benefits retire early in their unemployment spell and the effect is amplified once workers become eligible for early social security benefits, which also provides support for Coile and Levine's findings. They also find that workers without health insurance are more likely to retire at all ages, and those with defined benefit plans are more likely to switch to new jobs.

Although sufficient research has proved that retirement decisions of older workers are sensitive to labor market conditions, and this effect is different among various age groups, very limited research has investigated the question whether this effect is also heterogeneous among various industries. Wachter (2007) finds that growth at industry

level systematically affects the employment of 60-64 years old by using CPS data. Similarly, but using HRS data, Maestas, Mullen and Powell (2013) show that older individuals are especially responsive to local shocks to the service industry, and that service-specific demand shocks increase the probability of working for older workers. They also construct two channels two explain these differences, which is wage and non-pecuniary characteristics of jobs. Friedberg et al. (2017) are not intended to test industry level heterogeneous effects, but they group industries into mining, manufacturing, professional services and non-professional services as control variables. Their regression results show that there exist industry level heterogeneous effects. The above research indicates that retirement decisions are sensitive to the industry which the individual belongs to. However, Wachter and Friedberg only apply industry fixed effect in their models as control variables, without showing how this effect is different among various industries; Maestas et al. (2013) only focus on a binary industry classification, namely service industries and all others, thus cannot provide insight into this effect as well. This paper will examine the specific industry level heterogeneous effect from 4 industries classification and 19 industries classification, and thus contribute to this line of literature.

This paper makes two contributions to the existing literature on retirement decision making. First and foremost, it looks into whether the effect of labor market conditions on retirement decision making is heterogeneous among different industries, and provides possible explanations based on the results. Secondly, the empirical analysis applies the local unemployment rate, as well as more detailed transition categories.

3. Conceptual Framework

The predicted effect of labor market conditions on retirement differs by the current employment status of workers. An economic downturn leads to a dim prospect of the labor market and the difficulty in finding new jobs. As a result, older individuals who are currently employed will be more likely to stay in their current job and less likely to retire voluntarily. This has been proved by previous researchers such as Friedberg et al. (2017).

On the other hand, things are slightly different for those older individuals who are laid-off near retirement age due to the economic downturn. Because of more difficulty in finding the new jobs and the larger earnings losses even finding new jobs (Chan and Stevens, 1999, 2001, 2004, and Couch and Plazcek, 2010), older individuals who are laid-off are more likely to retire compared with their younger counterparts. This can take the form of completely retiring as well as partly retiring, with the latter transition refers to those who work for pay but consider themselves as retired. Since I cannot identify those individuals who were laid off, I will empirically test this effect by the probability of turning retired based on older workers as a whole. There is another important aspect for those workers who have been laid off. To make ends meet, they will need to resort to either their savings or certain benefits (such as unemployment benefits and social security benefits). Compared with unemployment benefits which only lasts around 26 weeks in most states, social security benefits are a more stable supplement of income. It is thus reasonable to predict that age 62, the earliest age to be qualified to claim social security benefits, will play an important role in older workers retirement decision making.

Besides staying in the current position and leaving the job to retirement, there is a third transition category that is worth noticing: switching to a new job or becoming self-employed. Normally speaking, the job becomes more unstable and there are fewer vacancies in times of recession, so we would expect fewer cases of voluntarily

switching to a new job. At the same time, the bad economic conditions are likely to cause more cases of involuntarily leaving the current job to another one. These two contradictory forces make it hard to predict the effect of labor market conditions on the probability of switching to a new job.

Becoming self-employed, from either previous jobs or unemployment, also suffers from two effects that go in opposite directions. Literature (Beckhusen, 2014; Levine and Rubinstein, 2018) has found that it is important to separate entrepreneurs from other self-employed individuals. This is because entrepreneurs have more highly valued human capital compared with other self-employed individuals, and depend more on liquidity constraints. Economic downturn decreases the number of salaried positions and increases the risk of unemployment, which will encourage entering both entrepreneurships and other types of self-employment. On the other hand, recessions make credit less available, thus negatively affect entrepreneurships. Levine and Rubinstein (2018) find that the effect of liquidity constraint outweighs that of unemployment for entrepreneurship, and conclude that entrepreneurship is procyclical, but other types of self-employment are countercyclical. How local labor market conditions affect aggregated self-employment is uncertain.

4. Empirical Methodology

Following the model used by Coile and Levine (2011a), we assume labor market conditions around the time of retirement is a draw that is randomly assigned to individuals, which forms the base of quasi-experimental methods in regression models. The hypothesis we want to test is whether the unemployment rate affects retirement transitions of workers around their retirement age. In order to describe retirement transitions more precisely, six categories of retirement transitions are listed in this project: staying in the same job the respondent held in the prior wave, leaving the job to another one, leaving the job to self-employment, being unemployed, completely retiring and partly retiring.[2] In the following analysis, we use numbers 1 through 6 to refer to the above six retirement transitions.

Multinomial logistic regression is used to examine the hypothesis. The dependent variable, retirement transitions, has the above six possible outcomes. We select the base outcome to be staying in the same job the respondent held in the prior wave, and compare the probability of making the other five transitions with the probability of this base outcome. The model estimated in Stata is demonstrated in equation (1) where n can take values from 2 to 6, and the estimated coefficient can be interpreted in the following way: a one-unit increase in the variable X is associated with a β increase or decrease in the relative log odds of being in outcome n versus the base outcome.[3]

$$\ln\frac{\Pr(\text{outcome}=n)}{\Pr(\text{outcome}=1)} = \alpha^{n} + \beta_1^{n} * \text{Unemployment}_{j,t-1} + \sum_{l=1}^{5}\beta_{2l}^{n} * \text{Agegroup}_l + \sum_k \beta_{3k}^{n} * \text{Industry}_k + \Gamma^{n} * X_{ijt} + \epsilon_{ijt} \quad \textbf{(1)}$$

[2] Partly retiring refers to those workers who are working for pay and report him/herself as retired at the same time.

[3] In industry subscript, k can take on 3 or 18 different values based on two possible industry specifications.

The dependent variable is the log odds ratio of being in outcome n versus being in the base outcome (staying in the previous wave job) for individual i in MSA j and year t. The main independent variable of interest is the unemployment rate. We use the MSA level unemployment rate in the previous wave as a proxy for the local labor market conditions during the two-year period. Agegroup_l contains 6 possible age groups, namely 50 to 55, 56 to 60, 61 to 62, 63 to 64, 65 to 66, and 67 to 69, among which the last group is chosen to be reference group. Industry_k indicates the industry individual i belongs to in year t. We also control for demographic characteristics and other possible determinants of retirement decisions: gender, race, education level, marital status, self-reported health condition, and household income in the previous calendar year (deflated to 1995 dollar by CPI)[4], union membership, firm size and occupation[5]. Year fixed effect is added to capture financial access and credit conditions of each year.

To make the results easier to understand, we exponentiate both sides and obtain equation (2). Using the fact that the six probabilities sum to one, we can solve for the probability of the base outcome, which is shown in equation (3). Then we can plug this back into equation (2) and solve for the probability of the other five outcomes. The final results in equation (4) show the marginal effect of each independent variable on five outcomes.

$$\Pr(outcome = n) = \Pr(outcome = 1) * \exp\big(\alpha^n + \beta_1^n * \text{Unemployment}_{j,t-1} + \sum_{l=1}^{5} \beta_{2l}^n * \text{Agegroup}_l + \sum_k \beta_{3k}^n * \text{Industry}_k + \Gamma^n * X_{ijt} + \epsilon_{ijt}\big) \quad \textbf{(2)}$$

[4] We use the annual, not seasonally adjusted CPI of total all items for the United States.

[5] Occupation is added to control the skill level required by different jobs. Three groups of occupation are generated: managerial or professional, sales or services or teaching, and laborers or operators or production workers.

$$\Pr(\text{outcome} = 1) = \left[1 + \sum_{n=2}^{6} exp\left(\alpha^n + \beta_1^n * \text{Unemployment}_{\text{j,t}-1} + \sum_{\text{l}=1}^{5} \beta_{2\text{l}}^{\text{n}} * \text{Agegroup}_{\text{l}} + \sum_{\text{k}} \beta_{3\text{k}}^{\text{n}} * \text{Industry}_{\text{k}} + \Gamma^{\text{n}} * \text{X}_{\text{ijt}} + \epsilon_{\text{ijt}}\right)\right]^{-1} \quad \textbf{(3)}$$

$$\Pr(\text{outcome} = \text{n}) = \exp\left(\alpha^n + \beta_1^n * \text{Unemployment}_{\text{j,t}-1} + \sum_{\text{l}=1}^{5} \beta_{2\text{l}}^{\text{n}} * \text{Agegroup}_{\text{l}} + \sum_{\text{k}} \beta_{3\text{k}}^{\text{n}} * \text{Industry}_{\text{k}} + \Gamma^{\text{n}} * \text{X}_{\text{ijt}} + \epsilon_{\text{ijt}}\right) * \left[1 + \sum_{n=2}^{6} exp\left(\alpha^n + \beta_1^n * \text{Unemployment}_{\text{j,t}-1} + \sum_{\text{l}=1}^{5} \beta_{2\text{l}}^{\text{n}} * \text{Agegroup}_{\text{l}} + \sum_{\text{k}} \beta_{3\text{k}}^{\text{n}} * \text{Industry}_{\text{k}} + \Gamma^{\text{n}} * \text{X}_{\text{ijt}} + \epsilon_{\text{ijt}}\right)\right]^{-1} \quad \textbf{(4)}$$

In addition to the baseline model shown in equation (1), we also test whether the effects of labor market conditions on retirement decisions differ by age and industry. To do this, we add interaction terms between the unemployment rate and age group indicators, as well as interaction terms between the unemployment rate and industry indicators to the baseline model. The new models are shown in equation (5) and (6).

$$\ln \frac{\Pr(outcome=n)}{\Pr(outcome=1)} = \alpha^n + \beta_1^n * Unemployment_{j,t-1} + \sum_{l=1}^{5} \beta_{2l}^n * Agegroup_l + \sum_k \beta_{3k}^n * Industry_k + \sum_{l=1}^{5} \beta_{4l}^n * Agegroup_l * Unemployment_{j,t-1} + \Gamma^n * X_{ijt} + \epsilon_{ijt} \quad \textbf{(5)}$$

$$\ln \frac{\Pr(outcome=n)}{\Pr(outcome=1)} = \alpha^n + \beta_1^n * Unemployment_{j,t-1} + \sum_{l=1}^{5} \beta_{2l}^n * Agegroup_l + \sum_k \beta_{3k}^n * Industry_k + \sum_k \beta_{5k}^n * Industry_k * Unemployment_{j,t-1} + \Gamma^n * X_{ijt} + \epsilon_{ijt} \quad \textbf{(6)}$$

The estimated coefficient of β_{4l} and β_{5k} shows the effect of local labor market conditions on retirement decisions among different age groups and industries. Testing the differences among them will provide support for the possible age and industry heterogeneous effect.

5. Data

Health and Retirement Study (HRS) is a longitudinal panel study that surveys a representative sample of approximately 20,000 people in America over age 50. It is conducted by the Institute for Social Research at the University of Michigan. The survey is done once every two years and it is the leading resource for data on aging in America. HRS contains 13 waves of survey data from 1992 to 2016 up till now, and this paper uses 6 waves from 1996 to 2006. This choice is based on the following two considerations. First is that the style of the first two waves (1992 and 1994) is still experimental and unfixed, thus has some differences compared with later waves. The second consideration is that the financial crisis has made retirement decision making after 2008 significantly different from that before 2008, so the results will be biased if we use samples from both before and after the financial crisis. The data set records not only the retirement transitions of each individual, but also the demographic characteristics and work-related variables. The survey questions on "labor force status" and "same job title as the previous wave" in 1994 are also used, in order to generate the retirement transition of the first wave (1996). We mainly use the RAND HRS longitudinal file in this paper, which is a cleaned version of HRS contributed by RAND. We also apply the restricted version of HRS to obtain industry information and detailed geocode.

The sample starts with all older workers who were aged 50 to 69 in the previous wave, which consists of 69,397 observations. The first restriction is that the respondents must be in the labor force in the previous wave to be able to make retirement decisions (including unemployed people who are looking for jobs), which drops 41,288 observations. Secondly, we drop those whose geographic identifiers are missing or who live outside a defined Metropolitan Statistical Area or Micropolitan Statistical Area. Thirdly, we also drop the observations where person-level weights are set to zero. The reason is that they are not age-eligible, living outside the U.S., or living in a nursing home. Fourthly, we dropped those individuals who have missing

values for at least one of the independent variables. After four restrictions, we have 9,427 observations. Since the sample so far is dominated by those who are long-attached to the labor force, we randomly choose one observation for each.[6] After all five restrictions, we end up with a sample size of 5,717 observations.

There are two ways to define retirement, including objective measures (hours of work) and subjective measures (self-reported retirement status). Maestas (2007, 2010) has concluded that using pure subjective or objective measures could cause potential identification problems, so the optimal method to define labor force status is to incorporate subjective measures into objective measures. Rand has created a labor force status variable based on hours of work first, and then incorporated self-reported retirement status to separate those who are partly retired. Six retirement transition categories are identified based on previous and current wave labor force status: stay in the previous wave job, leave the previous job to a new one, leave the previous job to become self-employed, become unemployed, partly retire, and completely retire. The third category is aimed at capturing entrepreneurship, which can be different from switching to another job. The fourth category contains those who are unemployed in the current wave.

We separately examine six age groups: 50 to 55, 56 to 60, 61 to 62, 63 to 64, 65 to 66, and 67 to 69, to test the existence of age-level heterogeneous effect. In terms of industry, we used both a narrow 2-digit industry and a broad four category measure. The first one uses the 2007 NAICS two digit industries, and contains 19 main industries. The second one follows the method used in Friedberg et al. (2017) and aggregates the 19 industries into mining, manufacturing, professional services and non-professional services. The second measure has two benefits: each group has more observations to add power to the estimation, and the labor force can move within each group easily. Figure 1 shows the distribution of industries based on these two

[6] In terms of how many waves each individual are observed, the range is from 1 to 6 waves, the mean is 2.3 waves, and the median is 2 waves.

measures.

The unemployment rate at MSA level (2010 census criterion) is obtained from Local Area Unemployment Statistics from BLS. Since the HRS is conducted once every two years, it is important to find an accurate proxy for the labor market conditions through the two years period. We use the annual unemployment rate in the year of the previous interview as a proxy for labor market conditions between the two interviews. Figure 2 depicts the monthly national unemployment rate.

The summary statistics are shown in table 1. The mean of age is 58, and 73% of the sample is aged below 60 in the prior wave. Half of the observations are male. In terms of race, there are 82% white, 14% black and 9% Hispanic. For the highest degree earned, 16% are less than high school, 59% have some college, and 25% have college or above. 75% of the sample is married. In terms of self-reported health conditions, 17% report that their health conditions are either fair or poor. 17% of the observations are covered by a union. The size of firm or business they work in deviates a lot, ranging from small firms with less than 5 employees to those large ones with 325,000 workers. To better interpret the coefficient, I then separate the firm size to different tiers. The mean total household income is $71,640 in 1995 dollar. I aggregate the occupation to three broad groups, the first one is managerial or professional positions, the second one is sales, services and teaching, and the third one is laborers, operators and production workers. The three groups contain 31%, 44% and 25% of the sample respectively.

For industry, 3% of the observations work in agriculture or mining, 27% work in manufacturing, 56% work in professional services and 14% work in non-professional services. The 19 2-digit industries specification is shown in table 2, 9 industries have more than 5% of observations, while the remaining 10 industries have fewer than 5% (agriculture, mining, utilities, wholesale, information, real estate, professional services,

management, arts and accommodation). We select agriculture or mining to be the reference group in the 4 industries specification, and select public administration to be the reference group in the 19 industries specification. This is because they have a considerable amount of observations.

Table 2 shows how many observations belong to each retirement transition category in the 19 industries specification. “Staying in the previous wave job”, “switching to a new job”, “completely retiring” and “partly retiring” have abundant number of observations in each industry except mining, but the sample size of “turning self-employed” and “turning unemployed” is generally too small to give enough power to estimation. As we will find out later, this causes most estimated coefficient of industry indicators to be insignificant when 19 industries specification is used.

6. Results

6.1 The effect of age on retirement decisions

Baseline equation (1) and estimated results in table 3 show how people in different age groups choose retirement transitions on an average level. Compared with people over 67, we find that people below age 60 are more likely to switch to a new job, but less likely to completely or partly retire. The probability of turning self-employed or unemployed is not different compared with the reference group. For people aged from 61 to 66, their preferences for switching to a new job, turning self-employed, turning unemployed and completely retiring do not exhibit significant differences against people over 67. The estimated coefficients on the category of partly retiring are significantly negative at 5% level for people below age 62, but the magnitude decreases as people become older. Since people are categorized into partly retire if and only if they report working for pay and consider themselves as retired at the same time, this phenomenon implies homophily. Younger workers are less likely to consider themselves as retired when they are working for pay, but they are more willing to accept the identity of retiring as they grow older.

Our findings are in line with those of Coile and Levine, since people aged below 60 in the previous wave have lower probability to completely retire compared with base group (people over 67), but those above 60 in the previous wave (and they are turning or already turned 62 during the two year period) do not show significant differences. The results are still robust when we use the 19 industries specification in table 4. These confirm that age 62, as the earliest age which allows older workers to claim social security benefits, plays an important role in retirement decision making.

The next interesting question is to examine whether the effect of local labor market conditions on retirement decisions are heterogeneous among various age groups. Equation (5) is estimated for this purpose, where the interaction terms between the

unemployment rate and age groups are added to the previous regression. The estimated results are shown in table 5. Only the interaction term of the unemployment rate and age group between 61 and 62 is positively significant at 10% significance level (0.0233) for switching to a new job. However, this age group is found to be 8.6% less likely to switch to a new job on average than the reference group. This implies that the aggregate effect will be close to zero when the local unemployment rate exceeds 3.7%, which is the case for almost all of the sample period. All the other interaction terms do not have statistically significant coefficients. In sum, we find the interaction terms between the local unemployment rate and age group indicators are not significant for all retirement transitions categories, which is different from the findings of Coile and Levine (2011a). This could be driven by four possible reasons. Firstly, they use the sample from March CPS between 1980 and 2009, which could bias regression results since they contain the internet boom and financial crisis. Secondly, their outcome variable is only moving out of the labor force, and thus not as comprehensive as the six retirement transition categories used in this paper. Thirdly, they have a much larger sample size of 292,093 observations, which makes it easier to get statistically significant results. Fourthly, the state level unemployment rate used in their paper may not be as accurate as of the MSA or μSA level unemployment rate used in this paper.

6.2 **The effect of industry on retirement decisions**

In this part, we will analyze two potential heterogeneous effects: level effects, which reveal the differences in retirement behavior that is not influenced by labor market conditions; and heterogeneous labor market effects, which refer to how the effects of labor market conditions on retirement decisions may differ by industries. Inspired by Friedberg et al. (2017), we will start the discussion of each effect with a broader 4 industries specification, and then move on to a narrower 19 industries specification.

Level effects can demonstrate the strength of labor force attachment. Strong labor force attachment can be revealed by one or more of the following: a higher probability to stay in the prior wave job, a higher probability to switch to a new job, a higher probability to turn self-employed, a higher probability to turn unemployed, a lower probability to completely retire, or a lower probability to partly retire. Table 3 reveals the estimated level effects when we use 4 industries specification. People working in agriculture or mining are 19.26% less likely to become self-employed and 5.38% more likely to completely retire on average compared with counterparts working in non-professional services. This is because agriculture or mining is featured as low skill levels, slow skill accumulation and high physical requirement, making it harder to be self-employed and easier to retire. We do not find any significant results for manufacturing workers, meaning that their retirement decision making is not significantly different from the reference group. Holding other things equal, workers in professional services have a 2.7% higher probability to switch to a new job compared with those working in non-professional services. This reveals a more frequent labor force movement in professional services. The results lead to the conclusion that workers in agriculture or mining and professional services are strongly attached to the labor force, while those working in manufacturing and non-professional services are not.

Since four industry groups do not disaggregate industries enough, we then use the 19 NAICS 2-digit industries, in order to find which industry or industries within the four groups cause the previous results. Table 4 shows the differences in level effects and public administration is selected to be the reference group. Thirteen out of eighteen industries show evidence of strong labor force attachment (agriculture, mining, utilities, construction, wholesale, retail, transportation, finance, real estate, professional services, management, health, and other services). These include the majority of the industries in agriculture or mining, manufacturing, and professional services. Workers in manufacturing have no statistically significant level effects for all

five outcomes, meaning that their retirement decision making is similar to workers in public administration. Only two industries (education and arts) are shown weakly attached to the labor force and prone to retire, which could be driven by better pension plans in the education industry and the more availability of part-time jobs in both industries. The labor force attachment degree in information and accommodation is puzzling, since they show a higher probability both to switch to new jobs and to partly retire.

Generally speaking, the results from 19 industries specification support the findings from 4 industries specification. All industries in agriculture or mining group, as well as the majority of industries in professional services group, demonstrate strong labor force attachment. Manufacturing group is found not strongly attached to the labor force because the majority of this group belongs to manufacturing industry, which is relatively weakly attached to the labor force.

Next, we will examine whether labor market conditions have a differential impact on older workers retirement decisions across industries. Interaction terms between the unemployment rate and industry indicators are added, and equation (6) is estimated. The results for 4 industries specification are shown in table 6. If we define a 5% significance level, all the interaction terms are not significant for the outcome of "turning self-employed", "turning unemployed", "completely retiring" and "partly retiring", meaning that labor market conditions have similar effects on people's choice into the above four transitions across four industry groups. The interaction term between the unemployment rate and agriculture or mining is positively significant for the outcome of "switching to a new job". This implies that when local unemployed rate raises one percentage point, workers in agriculture or mining are 0.0239 percentage point more likely to switch to a new job compared with those in non-professional services. But the aggregate effect for workers in agriculture or mining to switch to a new job is still significantly negative until local unemployment

rate increases to 5.53%, meaning that there is both an intrinsically lower probability of labor flow and a larger response to labor market conditions in agriculture or mining.

Table 7 shows the results when we estimate the same equation, but with 19 industries specification. All the interaction terms are not significant for the outcomes of "switching to a new job", implying that labor market conditions do not have heterogeneous effects for this outcome. For the outcome of "turning self-employed", we find that workers in transportation and education have a significantly lower coefficient, meaning that bad labor market conditions will gradually offset the original higher probability of self-employment in these two industries. This implies that aggregated self-employment (including both entrepreneurships and other types of self-employment) in transportation and education is procyclical. For the two retirement outcomes, we find that worse labor market conditions will decrease the likelihood for workers in mining to partly retire, and increase the likelihood for workers in arts and accommodation to completely retire. The previous result could be caused by the relative difficulty to find part-time jobs in mining, while the latter result proves that workers in arts and accommodation are weakly attached to the labor force.

To conclude, workers in agriculture or mining and professional services consistently demonstrate strong labor force attachment; only two industries (education and arts) are shown weakly attached to the labor force and prone to retire; and two industries (information and accommodation) are still puzzling in terms of their labor force attachment degree. However, the heterogeneous labor market effects are not the same in the two specifications. In the 19 industries specification, workers in arts and accommodation are more likely to completely retire, while workers in mining are less likely to partly retire when facing bad labor market conditions. We also find that workers in transportation and education are less likely to turn self-employed when the unemployment rate increases. However, in the 4 industries specification, we only

observe agriculture or mining to have a higher probability to switch to new jobs when labor market conditions are bad.

6.3 **The effect of other independent variables on retirement decisions**

We also find some other interesting results. For gender, male workers are less likely to completely retire. Higher education will make labor flow easier by increasing the probability of switching to new jobs. Married people are less likely to switch to new jobs and more likely to completely retire. Being a union member makes a worker less likely to switch to new jobs or become self-employed, and more likely to completely retire. For firm size, workers in medium-sized firms are more likely to switch to new jobs and less likely to completely retire, and workers in firms of all sizes have a lower probability to partly retire compared with workers in firms with less than 5 workers. We also observe that the presence of poor health conditions increases the likelihood to completely retire, and workers with more household income are more likely to turn self-employed and less likely to completely retire.

6.4 Further discussion about 4 industries specification and 19 industries specification

As we can see, the 4 industries specification and 19 industries specification produce similar level effects about labor force attachment, but different heterogeneous labor market effects. It is thus necessary to understand the relative strengths and weaknesses between the two specifications. The broader 4 industries specification has two advantages. Firstly, it is very likely that workers make their retirement decisions beyond their own 2-digit industry since they may consider their labor market to include industries which have similar requirements and payoffs. Secondly, the results from 4 industries specification have more power because of the larger sample size in each retirement transition category.

However, the aggregation process of generating 4 industries groups can cause some potential problems. The results are mainly driven by the larger component within each group, so the retirement transition behavior of workers in relatively smaller industries are generally overlooked in regressions that use the 4 industries specification. Another problem is that the estimated coefficients for industry (or industry indicator interacted with unemployment rate) will be insignificant if workers of two industries within the same group have opposite retirement transition behavior.

7. Conclusion

This paper has shown that patterns of retirement decision making differ by the age and industry of workers, but they are not much impacted by the local labor market conditions because we only document statistically significant relationships when allowing the effect of local unemployment rate to differ by industry. The results confirm the previous findings that people below 62 are more likely to stay in the labor force and less likely to either completely or partly retire compared with those above 62. However, there is no evidence that the effect of labor market conditions on retirement decisions are heterogeneous among various age groups.

For industry, we examine both industry level effects and heterogeneous effects of labor market conditions. We also compare the estimated regression results of each equation from 4 industries specification and 19 industries specification. The level effects are consistent no matter what measure of industry is used. Workers in agriculture or mining and professional services consistently demonstrate strong labor force attachment; only two industries (education and arts) are shown weakly attached to the labor force and prone to retire; and two industries (information and accommodation) are still puzzling in terms of their labor force attachment degree. However, the heterogeneous labor market effects are not the same in the two specifications. In the 19 industries specification, workers in arts and accommodation are more likely to completely retire, while workers in mining are less likely to partly retire when facing bad labor market conditions. We also find that workers in transportation and education are less likely to turn self-employed when the unemployment rate increases. However, in the 4 industries specification, we only observe agriculture or mining to have a higher probability to switch to new jobs when labor market conditions are bad. Future research may utilize larger dataset to have more observations in each transition category and each industry, and to construct panel dataset as well.

Appendix

Figure 1: Industry Distribution

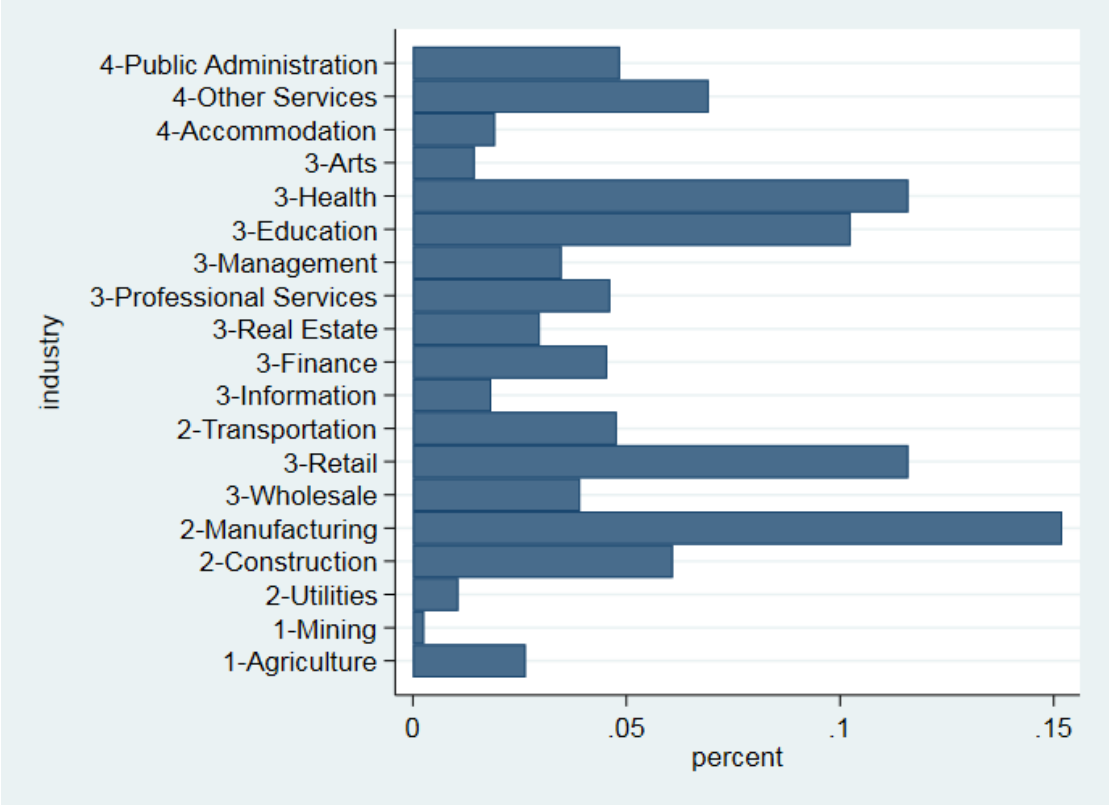

Figure 2: Monthly National Civilian Unemployment Rate

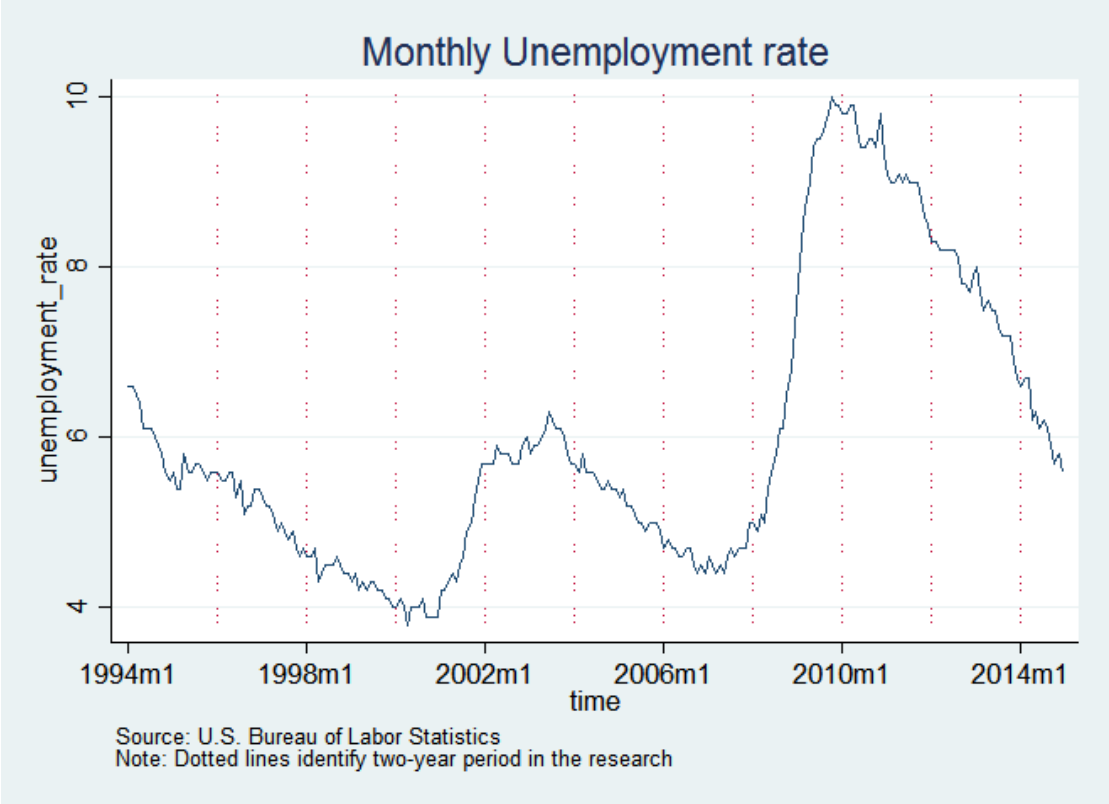

Table 1: Descriptive Statistics

	Mean
Age	57.98
Age between 50 and 55	0.38
Age between 56 and 60	0.35
Age between 61 and 62	0.10
Age between 63 and 64	0.07
Age between 65 and 66	0.04
Age between 67 and 69	0.06
Male	0.50
White	0.82
Black	0.14
Hispanic	0.09
Less than high school	0.16
High-school graduate	0.59
College or above	0.25
Married	0.75
Fair or poor health	0.16
Covered by a union	0.17
Size of firm or business	391.50
Size of firm or business(median)	30.00
Real household income($1000)	71.34
Real household income($1000, median)	49.45
managerial/professional	0.31
sales/services/teaching	0.43
laborers/operators/production workers	0.25
4 Industries	
Agriculture or mining	0.03
Manufacturing	0.27
Professional services	0.56
Non-professional services	0.14
19 Industries	
Agriculture	0.03
Mining	0.00
Utilities	0.01
Construction	0.06

Manufacturing	0.15
Wholesale	0.04
Retail	0.12
Transportation	0.05
Information	0.02
Finance	0.05
Real Estate	0.03
Professional Services	0.05
Management	0.03
Education	0.10
Health	0.12
Arts	0.01
Accommodation	0.02
Other Services	0.07
Public Administration	0.05
Outcome (%)	
Stay in the prior wave job	57.55
Switch to a new job	14.90
Become self-employed	1.36
Become unemployed	2.78
Completely retire	15.38
Partly retire	8.03
Observations	5717

Note: The descriptive statistics is the mean of each variable if not otherwise stated. The median of size of firm or business and real household income are also included in the table.

Table 2: Number of Observations in Each Industry and Retirement Transition category

Industry	Stay	Find new job	Self-employ	Unemploy	Completely retire	Partly retire
1-Agriculture	92	15	<3	<3	36	14
1-Mining	3	4	<3	<3	3	<3
2-Utilities	42	11	<3	<3	8	3
2-Construction	175	50	6	8	67	28
2-Manufacturing	533	126	10	30	129	45
3-Wholesale	140	38	3	8	18	17
3-Retail	343	106	13	23	119	71
2-Transportation	150	42	4	11	45	15
3-Information	51	23	<3	5	12	9
3-Finance	151	51	3	11	32	18
3-Real Estate	97	19	5	4	15	22
3-Professional Services	171	35	<3	3	23	22
3-Management	97	40	11	5	36	17
3-Education	381	64	<3	8	88	41
3-Health	364	130	10	15	93	45
3-Arts	45	12	<3	5	10	12
4-Accommodation	54	15	<3	<3	28	10
4-Other Services	221	36	6	14	79	50
4-Public Administration	180	35	3	5	38	18

Note: Following HRS data disclosure requirements, no cells with less than three observations can be produced. So we suppress these cells and mark them with "<3".

Table 3: Marginal Effect from Multinomial Logistic Regression: Baseline Estimation 1, Equation (1) with 4 Industry Specifications

	(1) change	(2) self_employ	(3) unemploy	(4) complete retire	(5) partly retire
Unemployment rate	-0.0055**	-0.0004	-0.0002	-0.0009	-0.0021
	(-2.19)	(-0.44)	(-0.22)	(-0.40)	(-1.11)
Age between 50 and 55	0.1178***	0.0043	0.0101	-0.1363***	-0.1303***
	(4.51)	(0.59)	(0.97)	(-7.58)	(-9.60)
Age between 56 and 60	0.0910***	0.0020	0.0088	-0.0743***	-0.0931***
	(3.47)	(0.28)	(0.84)	(-4.34)	(-7.76)
Age between 61 and 62	0.0335	-0.0108	0.0006	-0.0061	-0.0477***
	(1.11)	(-1.04)	(0.05)	(-0.32)	(-3.62)
Age between 63 and 64	0.0004	-0.0047	-0.0073	0.0096	-0.0207
	(0.01)	(-0.45)	(-0.49)	(0.45)	(-1.51)
Age between 65 and 66	-0.0128	0.0091	-0.0070	-0.0158	0.0106
	(-0.30)	(0.97)	(-0.37)	(-0.61)	(0.71)
Male	-0.0103	0.0049	-0.0018	-0.0523***	0.0054
	(-0.98)	(1.43)	(-0.38)	(-4.89)	(0.65)
Less than high school	-0.0409**	-0.0034	0.0090	0.0165	-0.0330**

	(-2.27)	(-0.60)	(1.17)	(0.93)	(-2.44)
High-school graduate	-0.0133	-0.0011	-0.0041	0.0030	-0.0098
	(-1.10)	(-0.28)	(-0.68)	(0.22)	(-1.07)
Black	0.0133	0.0067*	-0.0001	-0.0093	-0.0037
	(0.99)	(1.68)	(-0.02)	(-0.70)	(-0.32)
Married	-0.0260**	-0.0002	-0.0006	0.0430***	0.0011
	(-2.40)	(-0.06)	(-0.12)	(3.61)	(0.12)
Covered by a union	-0.0705***	-0.0120*	-0.0045	0.0319**	-0.0277**
	(-5.14)	(-1.95)	(-0.75)	(2.42)	(-2.28)
Firm size between 5 and 19	0.0359**	-0.0024	0.0139**	-0.0229*	-0.0241**
	(2.42)	(-0.55)	(2.11)	(-1.72)	(-2.46)
Firm size between 20 and 99	0.0609***	-0.0002	0.0034	-0.0353**	-0.0335***
	(4.28)	(-0.04)	(0.47)	(-2.55)	(-3.31)
Firm size between 100 and 499	0.0575***	-0.0084	0.0104	-0.0360**	-0.0497***
	(3.78)	(-1.45)	(1.53)	(-2.39)	(-4.12)

Firm size larger than 499	0.0211	-0.0114*	0.0092	0.0006	-0.0350***
	(1.18)	(-1.71)	(1.14)	(0.03)	(-2.70)
managerial/professional	-0.0142	0.0006	0.0110*	-0.0090	0.0027
	(-0.95)	(0.11)	(1.74)	(-0.58)	(0.22)
sales/services/teaching	-0.0063	0.0018	-0.0036	0.0086	0.0128
	(-0.45)	(0.38)	(-0.58)	(0.62)	(1.08)
Fair or poor health	-0.0147	0.0038	0.0117**	0.0851***	-0.0008
	(-1.13)	(0.99)	(2.25)	(7.82)	(-0.08)
Real household income($1000)	-0.0001	0.0000***	-0.0001**	-0.0008***	0.0001
	(-0.95)	(2.66)	(-2.26)	(-4.40)	(1.50)
Agriculture or mining	0.0171	-0.1926***	0.0021	0.0538*	-0.0112
	(0.48)	(-8.34)	(0.12)	(1.93)	(-0.47)
Manufacturing	0.0229	0.0004	0.0116	0.0095	-0.0023
	(1.35)	(0.07)	(1.40)	(0.61)	(-0.17)
Professional services	0.0270*	0.0007	0.0062	-0.0192	0.0040
	(1.81)	(0.15)	(0.83)	(-1.41)	(0.38)
Observations	5717	5717	5717	5717	5717

Note: The sample is 1996 to 2006 HRS respondents who are aged between 50 and 69, as well as do not have missing values for any independent

variable. The base category for multinomial logistic regression is “staying in the previous wave job”; the reference group for age is those aged between 67 and 69 in the previous wave; the reference group for education is those with college degree or above; the reference group for industry is non-professional services; the reference group for firm size is those firms whose firm size is smaller than 5; and the reference group for occupation is those working as laborers, operators or production workers. The unit of observation is person. T-statistics are reported in parentheses and statistical significance is indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Marginal Effect from Multinomial Logistic Regression: Baseline Estimation 2, Equation (1) with 19 Industry Specifications

	(1) change	(2) self_employ	(3) unemploy	(4) complete retire	(5) partly retire
Unemployment rate	-0.0056**	-0.0002	-0.0001	-0.0009	-0.0023
	(-2.20)	(-0.20)	(-0.10)	(-0.41)	(-1.19)
Age between 50 and 55	0.1167***	0.0046	0.0102	-0.1367***	-0.1305***
	(4.47)	(0.63)	(0.98)	(-7.61)	(-9.51)
Age between 56 and 60	0.0894***	0.0025	0.0093	-0.0735***	-0.0929***
	(3.40)	(0.35)	(0.88)	(-4.30)	(-7.66)
Age between 61 and 62	0.0346	-0.0109	0.0008	-0.0041	-0.0477***
	(1.14)	(-1.05)	(0.07)	(-0.22)	(-3.60)
Age between 63 and 64	-0.0006	-0.0044	-0.0062	0.0110	-0.0192
	(-0.02)	(-0.43)	(-0.42)	(0.51)	(-1.39)
Age between 65 and 66	-0.0134	0.0089	-0.0069	-0.0147	0.0116
	(-0.31)	(0.95)	(-0.37)	(-0.57)	(0.77)
Male	-0.0155	0.0036	-0.0045	-0.0490***	0.0065
	(-1.43)	(0.99)	(-0.92)	(-4.43)	(0.75)
Less than high school	-0.0463**	-0.0078	0.0058	0.0193	-0.0359***

	(-2.52)	(-1.26)	(0.77)	(1.09)	(-2.63)
High-school graduate	-0.0197	-0.0047	-0.0081	0.0063	-0.0107
	(-1.60)	(-1.16)	(-1.42)	(0.46)	(-1.15)
Black	0.0122	0.0072*	0.0008	-0.0124	-0.0036
	(0.91)	(1.76)	(0.13)	(-0.93)	(-0.32)
Married	-0.0267**	0.0005	-0.0006	0.0407***	0.0005
	(-2.46)	(0.13)	(-0.11)	(3.41)	(0.06)
Covered by a union	-0.0655***	-0.0091	-0.0006	0.0228*	-0.0288**
	(-4.58)	(-1.51)	(-0.10)	(1.69)	(-2.32)
Firm size between 5 and 19	0.0366**	-0.0018	0.0131*	-0.0267**	-0.0235**
	(2.45)	(-0.40)	(1.91)	(-1.96)	(-2.37)
Firm size between 20 and 99	0.0636***	0.0027	0.0041	-0.0436***	-0.0344***
	(4.37)	(0.59)	(0.55)	(-2.97)	(-3.33)
Firm size between 100 and 499	0.0612***	-0.0064	0.0102	-0.0448***	-0.0513***
	(3.88)	(-1.09)	(1.42)	(-2.82)	(-4.10)

Firm size larger than 499	0.0225	-0.0083	0.0081	-0.0047	-0.0350**
	(1.21)	(-1.15)	(0.94)	(-0.27)	(-2.58)
managerial/professional	-0.0120	0.0021	0.0141**	-0.0135	0.0025
	(-0.79)	(0.41)	(2.26)	(-0.85)	(0.21)
sales/services/teaching	-0.0067	0.0014	-0.0034	0.0060	0.0143
	(-0.47)	(0.29)	(-0.56)	(0.43)	(1.22)
Fair or poor health	-0.0169	0.0034	0.0116**	0.0843***	-0.0022
	(-1.30)	(0.88)	(2.21)	(7.79)	(-0.22)
Real household income($1000)	-0.0001	0.0000***	-0.0001**	-0.0008***	0.0001*
	(-0.87)	(3.12)	(-2.30)	(-4.23)	(1.94)
Agriculture	0.0231	-0.1981***	0.0033	0.0121	0.0142
	(0.53)	(-8.13)	(0.15)	(0.34)	(0.45)
Mining	0.0988	-0.1983***	0.0373	0.0544	0.0458
	(1.19)	(-8.03)	(1.14)	(0.63)	(0.66)
Utilities	0.0768	-0.2001***	0.0056	-0.0513	0.0369
	(1.57)	(-8.21)	(0.19)	(-0.80)	(0.79)
Construction	0.0587*	0.0084	0.0150	-0.0194	0.0300

	(1.93)	(0.89)	(0.99)	(-0.67)	(1.15)
Manufacturing	0.0171	0.0007	0.0189	-0.0313	0.0287
	(0.65)	(0.08)	(1.42)	(-1.26)	(1.23)
Wholesale	0.0650**	-0.0070	0.0282*	-0.1006***	0.0218
	(2.11)	(-0.58)	(1.75)	(-2.84)	(0.81)
Retail	0.0319	0.0093	0.0169	-0.0433*	0.0355
	(1.19)	(1.16)	(1.22)	(-1.71)	(1.57)
Transportation	0.0555*	-0.0061	0.0240	-0.0059	0.0037
	(1.83)	(-0.52)	(1.58)	(-0.20)	(0.13)
Information	0.0799**	0.0082	0.0255	-0.0122	0.0757**
	(2.23)	(0.76)	(1.48)	(-0.29)	(2.53)
Finance	0.0438	-0.0091	0.0240	-0.0607*	0.0177
	(1.45)	(-0.78)	(1.59)	(-1.95)	(0.67)
Real Estate	0.0182	0.0077	0.0119	-0.1041***	0.0185
	(0.50)	(0.76)	(0.66)	(-2.73)	(0.67)
Professional Services	0.0136	-0.0103	-0.0086	-0.1071***	0.0147
	(0.42)	(-0.87)	(-0.44)	(-2.98)	(0.57)

Management	0.0547*	0.0168*	0.0122	-0.0444	0.0258
	(1.67)	(1.88)	(0.73)	(-1.34)	(0.94)
Education	0.0037	-0.0190	-0.0060	-0.0201	0.0398*
	(0.13)	(-1.55)	(-0.40)	(-0.79)	(1.68)
Health	0.0517**	-0.0012	0.0055	-0.0446*	0.0259
	(2.01)	(-0.14)	(0.40)	(-1.77)	(1.13)
Arts	0.0571	-0.1973***	0.0335*	-0.0520	0.0763**
	(1.28)	(-8.20)	(1.78)	(-1.16)	(2.39)
Accommodation	0.1078***	0.0018	-0.3849***	0.0526	0.0593*
	(2.71)	(0.12)	(-11.59)	(1.48)	(1.87)
Other Services	0.0083	0.0029	0.0157	-0.0586**	0.0340
	(0.27)	(0.31)	(1.05)	(-2.11)	(1.41)
Observations	5717	5717	5717	5717	5717

Note: The sample is 1996 to 2006 HRS respondents who are aged between 50 and 69, as well as do not have missing values for any independent variable. The base category for multinomial logistic regression is "staying in the previous wave job"; the reference group for age is those aged between 67 and 69 in the previous wave; the reference group for education is those with college degree or above; the reference group for industry is non-professional services; the reference group for firm size is those firms whose firm size is smaller than 5; and the reference group for occupation is those working as laborers, operators or production workers. The unit of observation is person. T-statistics are reported in parentheses and statistical significance is indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Marginal Effect from Multinomial Logistic Regression: Adding Interaction Terms between Age Groups and Unemployment Rate, Equation (5) with 4 Industry Specifications

	(1) change	(2) self_employ	(3) unemploy	(4) complete retire	(5) partly retire
Unemployment rate	-0.0159	-0.0006	0.0018	0.0065	-0.0018
	(-1.27)	(-0.21)	(0.95)	(0.96)	(-0.33)
Age between 50 and 55	0.0747	-0.0002	0.0296*	-0.1315***	-0.1408***
	(1.09)	(-0.01)	(1.76)	(-2.84)	(-3.87)
Age between 56 and 60	0.0383	0.0139	0.0229	-0.0073	-0.0857**
	(0.56)	(0.71)	(1.41)	(-0.17)	(-2.52)
Age between 61 and 62	-0.0860	0.0039	-0.0090	0.0394	-0.0623
	(-1.16)	(0.13)	(-0.51)	(0.77)	(-1.57)
Age between 63 and 64	-0.0240	0.0017	-0.0149	0.0114	0.0033
	(-0.26)	(0.08)	(-0.66)	(0.19)	(0.07)
Age between 65 and 66	0.0865	-0.0222	-0.0189	0.0675	-0.0119
	(0.60)	(-1.01)	(-0.82)	(0.93)	(-0.24)
Unemployment rate * Age between 50 and 55	0.0089	0.0008	-0.0039	-0.0011	0.0019
	(0.69)	(0.25)	(-1.52)	(-0.14)	(0.30)

Unemployment rate * Age between 56 and 60	0.0108	-0.0024	-0.0028	-0.0124	-0.0014
	(0.83)	(-0.67)	(-1.16)	(-1.64)	(-0.23)
Unemployment rate * Age between 61 and 62	0.0233*	-0.0030	0.0015	-0.0086	0.0026
	(1.70)	(-0.50)	(0.60)	(-0.96)	(0.37)
Unemployment rate * Age between 63 and 64	0.0052	-0.0013	0.0013	-0.0005	-0.0046
	(0.31)	(-0.33)	(0.42)	(-0.05)	(-0.52)
Unemployment rate * Age between 65 and 66	-0.0190	0.0051	0.0020	-0.0149	0.0043
	(-0.68)	(1.45)	(0.77)	(-1.16)	(0.49)
Male	-0.0098	0.0047	-0.0017	-0.0525***	0.0054
	(-0.94)	(1.39)	(-0.35)	(-4.93)	(0.64)
Less than high school	-0.0413**	-0.0032	0.0092	0.0162	-0.0333**
	(-2.29)	(-0.55)	(1.19)	(0.92)	(-2.46)
High-school graduate	-0.0130	-0.0010	-0.0038	0.0024	-0.0098
	(-1.08)	(-0.26)	(-0.63)	(0.18)	(-1.07)

Black	0.0138	0.0069*	-0.0002	-0.0099	-0.0033
	(1.03)	(1.71)	(-0.03)	(-0.74)	(-0.29)
Married	-0.0260**	-0.0002	-0.0005	0.0429***	0.0015
	(-2.40)	(-0.06)	(-0.10)	(3.58)	(0.17)
Covered by a union	-0.0705***	-0.0116*	-0.0044	0.0320**	-0.0279**
	(-5.14)	(-1.90)	(-0.74)	(2.43)	(-2.29)
Firm size between 5 and 19	0.0358**	-0.0021	0.0136**	-0.0217	-0.0237**
	(2.41)	(-0.49)	(2.07)	(-1.63)	(-2.42)
Firm size between 20 and 99	0.0610***	-0.0002	0.0027	-0.0347**	-0.0334***
	(4.29)	(-0.04)	(0.37)	(-2.51)	(-3.28)
Firm size between 100 and 499	0.0576***	-0.0081	0.0099	-0.0351**	-0.0491***
	(3.79)	(-1.40)	(1.46)	(-2.33)	(-4.06)
Firm size larger than 499	0.0211	-0.0112*	0.0086	0.0007	-0.0349***
	(1.19)	(-1.68)	(1.06)	(0.04)	(-2.68)
managerial/professional	-0.0146	0.0007	0.0111*	-0.0096	0.0027
	(-0.97)	(0.13)	(1.75)	(-0.62)	(0.23)

sales/services/teaching	-0.0061	0.0016	-0.0036	0.0082	0.0129
	(-0.43)	(0.35)	(-0.58)	(0.59)	(1.09)
Fair or poor health	-0.0146	0.0040	0.0118**	0.0853***	-0.0007
	(-1.12)	(1.05)	(2.26)	(7.85)	(-0.07)
Real household income($1000)	-0.0001	0.0000***	-0.0001**	-0.0008***	0.0001
	(-0.94)	(2.70)	(-2.23)	(-4.41)	(1.51)
Agriculture or mining	0.0139	-0.1876***	-0.0013	0.0573**	-0.0115
	(0.39)	(-8.23)	(-0.07)	(2.05)	(-0.47)
Manufacturing	0.0227	0.0006	0.0115	0.0081	-0.0024
	(1.33)	(0.12)	(1.39)	(0.52)	(-0.18)
Professional services	0.0270*	0.0008	0.0062	-0.0207	0.0040
	(1.81)	(0.18)	(0.83)	(-1.52)	(0.39)
Observations	5717	5717	5717	5717	5717

Note: The sample is 1996 to 2006 HRS respondents who are aged between 50 and 69, as well as do not have missing values for any independent variable. The base category for multinomial logistic regression is "staying in the previous wave job"; the reference group for age is those aged between 67 and 69 in the previous wave; the reference group for education is those with college degree or above; the reference group for industry is non-professional services; the reference group for firm size is those firms whose firm size is smaller than 5; and the reference group for occupation is those working as laborers, operators or production workers. The unit of observation is person. T-statistics are reported in parentheses and statistical significance is indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Marginal Effect from Multinomial Logistic Regression: Adding Interaction Terms between Industry and Unemployment Rate, Equation (6) with 4 Industry Specifications

	(1) change	(2) self_employ	(3) unemploy	(4) complete retire	(5) partly retire
Unemployment rate	-0.0100	0.0013**	0.0018	0.0002	-0.0011
	(-1.58)	(2.30)	(1.43)	(0.05)	(-0.32)
Age between 50 and 55	0.1168***	0.0043	0.0100	-0.1349***	-0.1297***
	(4.48)	(0.58)	(0.97)	(-7.52)	(-9.55)
Age between 56 and 60	0.0896***	0.0018	0.0088	-0.0722***	-0.0925***
	(3.41)	(0.25)	(0.84)	(-4.23)	(-7.69)
Age between 61 and 62	0.0318	-0.0109	0.0007	-0.0040	-0.0468***
	(1.05)	(-1.05)	(0.06)	(-0.21)	(-3.55)
Age between 63 and 64	-0.0003	-0.0047	-0.0072	0.0105	-0.0204
	(-0.01)	(-0.46)	(-0.49)	(0.50)	(-1.49)
Age between 65 and 66	-0.0147	0.0088	-0.0071	-0.0141	0.0108
	(-0.34)	(0.94)	(-0.38)	(-0.55)	(0.72)
Male	-0.0103	0.0049	-0.0019	-0.0520***	0.0057
	(-0.99)	(1.43)	(-0.38)	(-4.86)	(0.68)

Less than high school	-0.0422**	-0.0036	0.0090	0.0180	-0.0318**
	(-2.33)	(-0.62)	(1.16)	(1.02)	(-2.36)
High-school graduate	-0.0132	-0.0011	-0.0041	0.0029	-0.0098
	(-1.09)	(-0.27)	(-0.68)	(0.21)	(-1.07)
Black	0.0133	0.0068*	-0.0002	-0.0099	-0.0038
	(0.99)	(1.70)	(-0.03)	(-0.74)	(-0.34)
Married	-0.0253**	-0.0001	-0.0006	0.0417***	0.0007
	(-2.34)	(-0.02)	(-0.11)	(3.50)	(0.08)
Covered by a union	-0.0699***	-0.0120*	-0.0045	0.0315**	-0.0277**
	(-5.10)	(-1.95)	(-0.75)	(2.39)	(-2.28)
Firm size between 5 and 19	0.0336**	-0.0022	0.0143**	-0.0212	-0.0236**
	(2.26)	(-0.50)	(2.15)	(-1.59)	(-2.40)
Firm size between 20 and 99	0.0585***	0.0000	0.0038	-0.0334**	-0.0329***
	(4.10)	(0.01)	(0.53)	(-2.40)	(-3.23)
Firm size between 100 and 499	0.0550***	-0.0082	0.0109	-0.0340**	-0.0490***
	(3.63)	(-1.41)	(1.58)	(-2.25)	(-4.05)

Firm size larger than 499	0.0186	-0.0112*	0.0095	0.0020	-0.0344***
	(1.04)	(-1.67)	(1.17)	(0.12)	(-2.64)
managerial/professional	-0.0141	0.0005	0.0109*	-0.0093	0.0025
	(-0.93)	(0.10)	(1.72)	(-0.60)	(0.20)
sales/services/teaching	-0.0061	0.0018	-0.0038	0.0076	0.0123
	(-0.44)	(0.39)	(-0.62)	(0.55)	(1.05)
Fair or poor health	-0.0155	0.0038	0.0118**	0.0854***	-0.0010
	(-1.19)	(1.00)	(2.26)	(7.87)	(-0.10)
Real household income($1000)	-0.0001	0.0000***	-0.0001**	-0.0008***	0.0001
	(-0.98)	(2.67)	(-2.25)	(-4.39)	(1.52)
Agriculture or mining	-0.1321**	-0.1935***	0.0239	0.1369**	0.0911
	(-2.00)	(-8.23)	(0.88)	(2.26)	(1.58)
Manufacturing	0.0185	0.0086	0.0261*	0.0307	0.0252
	(0.42)	(0.79)	(1.94)	(0.79)	(0.73)
Professional services	0.0076	0.0160*	0.0172	-0.0371	-0.0010
	(0.19)	(1.71)	(1.46)	(-1.12)	(-0.04)

Unemployment rate * Agriculture or mining	0.0239***	-0.0010	-0.0034	-0.0124	-0.0198*
	(2.76)	(-1.42)	(-0.99)	(-1.32)	(-1.78)
Unemployment rate * Manufacturing	0.0011	-0.0014	-0.0027	-0.0040	-0.0052
	(0.13)	(-0.84)	(-1.32)	(-0.61)	(-0.85)
Unemployment rate * Professional services	0.0038	-0.0028*	-0.0020	0.0032	0.0009
	(0.53)	(-1.72)	(-1.17)	(0.59)	(0.23)
Observations	5717	5717	5717	5717	5717

Note: The sample is 1996 to 2006 HRS respondents who are aged between 50 and 69, as well as do not have missing values for any independent variable. The base category for multinomial logistic regression is "staying in the previous wave job"; the reference group for age is those aged between 67 and 69 in the previous wave; the reference group for education is those with college degree or above; the reference group for industry is non-professional services; the reference group for firm size is those firms whose firm size is smaller than 5; and the reference group for occupation is those working as laborers, operators or production workers. The unit of observation is person. T-statistics are reported in parentheses and statistical significance is indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: Marginal Effect from Multinomial Logistic Regression: Adding Interaction Terms between Industry and Unemployment Rate, Equation (6) with 19 Industry Specifications

	(1) change	(2) self_employ	(3) unemploy	(4) complete retire	(5) partly retire
Unemployment rate	0.0022	0.0012	-0.0013	-0.0034	0.0048
	(0.22)	(1.52)	(-0.42)	(-0.30)	(0.40)
Age between 50 and 55	0.1163***	0.0054	0.0101	-0.1367***	-0.1302***
	(4.45)	(0.72)	(0.97)	(-7.63)	(-9.46)
Age between 56 and 60	0.0875***	0.0029	0.0090	-0.0709***	-0.0928***
	(3.34)	(0.38)	(0.85)	(-4.16)	(-7.61)
Age between 61 and 62	0.0336	-0.0109	0.0011	-0.0039	-0.0469***
	(1.11)	(-1.02)	(0.09)	(-0.21)	(-3.55)
Age between 63 and 64	-0.0008	-0.0035	-0.0055	0.0098	-0.0182
	(-0.02)	(-0.33)	(-0.38)	(0.46)	(-1.32)
Age between 65 and 66	-0.0154	0.0093	-0.0075	-0.0133	0.0105
	(-0.36)	(0.98)	(-0.41)	(-0.52)	(0.69)
Male	-0.0153	0.0029	-0.0050	-0.0494***	0.0067
	(-1.40)	(0.80)	(-1.01)	(-4.47)	(0.77)

Less than high school	-0.0472**	-0.0081	0.0068	0.0194	-0.0339**
	(-2.56)	(-1.32)	(0.91)	(1.08)	(-2.50)
High-school graduate	-0.0194	-0.0052	-0.0082	0.0060	-0.0099
	(-1.57)	(-1.28)	(-1.42)	(0.44)	(-1.06)
Black	0.0121	0.0075*	0.0004	-0.0133	-0.0036
	(0.90)	(1.84)	(0.07)	(-1.00)	(-0.31)
Married	-0.0263**	0.0002	-0.0004	0.0380***	0.0003
	(-2.42)	(0.04)	(-0.08)	(3.19)	(0.03)
Covered by a union	-0.0656***	-0.0089	0.0006	0.0233*	-0.0290**
	(-4.58)	(-1.49)	(0.09)	(1.73)	(-2.33)
Firm size between 5 and 19	0.0348**	-0.0020	0.0136*	-0.0256*	-0.0233**
	(2.32)	(-0.44)	(1.96)	(-1.88)	(-2.34)
Firm size between 20 and 99	0.0612***	0.0024	0.0055	-0.0420***	-0.0339***
	(4.20)	(0.52)	(0.72)	(-2.84)	(-3.25)
Firm size between 100 and 499	0.0588***	-0.0075	0.0106	-0.0430***	-0.0503***
	(3.74)	(-1.25)	(1.45)	(-2.70)	(-3.99)

Firm size larger than 499	0.0203	-0.0084	0.0081	-0.0051	-0.0341**
	(1.10)	(-1.16)	(0.92)	(-0.29)	(-2.50)
managerial/professional	-0.0117	0.0017	0.0151**	-0.0154	0.0024
	(-0.76)	(0.33)	(2.39)	(-0.97)	(0.19)
sales/services/teaching	-0.0068	0.0008	-0.0036	0.0047	0.0137
	(-0.47)	(0.17)	(-0.59)	(0.33)	(1.18)
Fair or poor health	-0.0175	0.0037	0.0120**	0.0855***	-0.0018
	(-1.35)	(0.96)	(2.28)	(7.92)	(-0.18)
Real household income($1000)	-0.0001	0.0000**	-0.0001**	-0.0007***	0.0001**
	(-0.96)	(2.31)	(-2.30)	(-4.15)	(2.00)
Agriculture	-0.0797	-0.1748***	0.0092	0.0682	0.1378
	(-0.98)	(-7.82)	(0.23)	(0.82)	(1.58)
Mining	-0.0356	-0.1713***	0.0076	0.1591	0.2848**
	(-0.13)	(-6.85)	(0.19)	(0.71)	(2.23)
Utilities	0.1482	-0.1715***	-0.1681***	0.2410	0.0261
	(0.99)	(-7.36)	(-3.76)	(1.10)	(0.15)

Construction	0.1291*	0.0187	0.0036	-0.0364	0.0736
	(1.77)	(1.09)	(0.13)	(-0.48)	(0.90)
Manufacturing	0.0610	-0.0005	0.0380	-0.0180	0.1208
	(0.93)	(-0.03)	(1.58)	(-0.25)	(1.63)
Wholesale	0.1272*	-0.0031	0.0287	-0.1746*	0.0693
	(1.65)	(-0.24)	(1.11)	(-1.66)	(0.86)
Retail	0.0873	0.0271	0.0221	-0.1315*	0.0811
	(1.28)	(1.54)	(0.82)	(-1.87)	(1.07)
Transportation	0.1165	0.0508***	0.0072	-0.0027	0.0175
	(1.35)	(3.03)	(0.28)	(-0.03)	(0.18)
Information	0.1404	0.0373	0.0246	-0.1163	0.1331
	(1.54)	(0.76)	(0.73)	(-0.93)	(1.58)
Finance	0.0223	-0.0134	0.0207	-0.0366	0.1025
	(0.28)	(-0.69)	(0.69)	(-0.35)	(1.15)
Real Estate	0.0354	-0.0132	0.0026	-0.0855	-0.0188
	(0.37)	(-0.70)	(0.09)	(-0.82)	(-0.23)
Professional Services	0.1272	-0.0147	0.0322	0.0538	0.0065
	(1.37)	(-1.08)	(0.39)	(0.40)	(0.08)

Management	0.1726*	0.0342*	0.0674	-0.1074	0.0497
	(1.92)	(1.73)	(1.57)	(-1.27)	(0.56)
Education	-0.0068	0.1712***	-0.0247	-0.0686	0.0282
	(-0.09)	(3.08)	(-0.98)	(-0.94)	(0.38)
Health	0.0841	0.0135	-0.0156	-0.0188	0.0398
	(1.25)	(1.11)	(-0.63)	(-0.25)	(0.55)
Arts	0.1548	-0.1619***	-0.0339	-0.2833**	0.1254
	(1.04)	(-7.16)	(-1.08)	(-2.48)	(1.20)
Accommodation	0.2321**	-0.0012	-0.3476***	-0.0970	0.0294
	(2.11)	(-0.07)	(-9.70)	(-1.05)	(0.36)
Other Services	0.0846	-0.0006	-0.0015	-0.0532	0.0861
	(1.09)	(-0.06)	(-0.06)	(-0.74)	(1.20)
Unemployment rate * Agriculture	0.0126	-0.0007	-0.0004	-0.0078	-0.0243
	(1.08)	(-0.83)	(-0.06)	(-0.57)	(-1.51)
Unemployment rate * Mining	0.0244	-0.0011	0.0060	-0.0204	-0.0491**
	(0.59)	(-0.51)	(1.16)	(-0.51)	(-2.28)

Unemployment rate * Utilities	-0.0132	-0.0016	0.0287***	-0.0598	0.0026
	(-0.47)	(-0.85)	(4.33)	(-1.27)	(0.09)
Unemployment rate * Construction	-0.0137	-0.0018	0.0022	0.0033	-0.0085
	(-1.08)	(-0.70)	(0.54)	(0.26)	(-0.58)
Unemployment rate * Manufacturing	-0.0084	0.0002	-0.0037	-0.0021	-0.0179
	(-0.71)	(0.09)	(-0.94)	(-0.17)	(-1.34)
Unemployment rate * Wholesale	-0.0121	-0.0007	0.0001	0.0134	-0.0090
	(-0.90)	(-0.70)	(0.03)	(0.77)	(-0.64)
Unemployment rate * Retail	-0.0110	-0.0033	-0.0009	0.0161	-0.0087
	(-0.90)	(-1.06)	(-0.20)	(1.32)	(-0.64)
Unemployment rate * Transportation	-0.0118	-0.0123***	0.0035	-0.0002	-0.0027
	(-0.74)	(-5.03)	(0.87)	(-0.02)	(-0.16)
Unemployment rate *	-0.0118	-0.0056	0.0003	0.0187	-0.0108

Information					
	(-0.73)	(-0.56)	(0.05)	(0.89)	(-0.73)
Unemployment rate * Finance	0.0040	0.0007	0.0007	-0.0046	-0.0167
	(0.28)	(0.24)	(0.14)	(-0.24)	(-1.00)
Unemployment rate * Real Estate	-0.0035	0.0036	0.0020	-0.0038	0.0071
	(-0.20)	(1.48)	(0.39)	(-0.20)	(0.51)
Unemployment rate * Professional Services	-0.0225	0.0008	-0.0091	-0.0326	0.0022
	(-1.27)	(0.76)	(-0.47)	(-1.20)	(0.15)
Unemployment rate * Management	-0.0238	-0.0032	-0.0125	0.0129	-0.0043
	(-1.40)	(-0.92)	(-1.36)	(0.89)	(-0.27)
Unemployment rate * Education	0.0046	-0.0532***	0.0041	0.0112	0.0031
	(0.32)	(-2.64)	(1.02)	(0.86)	(0.24)
Unemployment rate * Health	-0.0065	-0.0028	0.0040	-0.0046	-0.0030
	(-0.55)	(-1.53)	(1.04)	(-0.34)	(-0.24)

Unemployment rate * Arts	-0.0197	-0.0031	0.0123**	0.0427**	-0.0097
	(-0.68)	(-1.59)	(2.43)	(2.13)	(-0.50)
Unemployment rate * Accommodation	-0.0268	0.0005	0.0000	0.0258*	0.0047
	(-1.35)	(0.43)	(0.01)	(1.66)	(0.33)
Unemployment rate * Other Services	-0.0148	0.0005	0.0032	-0.0004	-0.0098
	(-1.09)	(0.51)	(0.94)	(-0.03)	(-0.79)
Observations	5717	5717	5717	5717	5717

Note: The sample is 1996 to 2006 HRS respondents who are aged between 50 and 69, as well as do not have missing values for any independent variable. The base category for multinomial logistic regression is "staying in the previous wave job"; the reference group for age is those aged between 67 and 69 in the previous wave; the reference group for education is those with college degree or above; the reference group for industry is non-professional services; the reference group for firm size is those firms whose firm size is smaller than 5; and the reference group for occupation is those working as laborers, operators or production workers. The unit of observation is person. T-statistics are reported in parentheses and statistical significance is indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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