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ABSTRACT

Measuring Heterogeneity in Job Finding Rates Among the Nonemployed Using Labor Force Status Histories*

We use a novel approach to studying the heterogeneity in the job finding rates of the nonemployed by classifying the nonemployed by labor force status (LFS) histories, instead of using only one-month LFS. Job finding rates differ substantially across LFS histories: they are 25-30% among those currently out of the labor force (OLF) with recent employment, 10% among those currently OLF who have been unemployed but not employed in the previous two months, and 2% among those who have been OLF in all three previous months. This heterogeneity cannot be deduced from the one-month LFS or from one-month responses to the CPS survey questions about desire to work or recent search activity. We conclude that LFS histories is an important predictor of the nonemployed's job finding probability, particularly for those OLF.

JEL Classification: E24, E32, J21, J22, J30, J41, J60, J63, J64

Keywords: job finding rate, search process, out of the labor force (OLF), heterogeneity, unemployment

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1. Introduction

Until recently, the search and matching literature exploring the dynamics of the U.S. labor market has ignored the large share of the working age population that in the official statistics is counted out of the labor force (OLF).[1] Central to models in this literature is the theoretical construct of "job seekers." Quantitative research has typically used official unemployment as the empirical counterpart for this construct.[2] The nonemployed population however consists both of the unemployed and those OLF. Surprisingly maybe, a majority of new employment relationships are filled not by the unemployed but rather by those OLF: Since 1976, 56 - 70% of all transitions into employment by individuals who were nonemployed in a given month can be attributed to individuals who were OLF rather than unemployed (Figure 1). Consequently, accounting for job finding rates among those OLF is important for understanding the dynamics of the labor market.[3]

This paper uses a novel approach to studying the transitions from nonemployment (unemployment and OLF) to employment (i.e., the job finding rate). In particular, we use the sequence of observed labor force status over a few consecutive months, which we call the "LFS history," to distinguish between different nonemployed groups. For example, we distinguish between those who were OLF during each of the last three months and those who were OLF in the most recent month but unemployed or employed in one of the previous two months. This contrasts with the existing approach by the Bureau of Labor Statistics (BLS) or the literature, which classify the nonemployed in month t using only the respondents' most recent labor force status (LFS).[4]

The LFS history leading up to the LFS in month t is an important predictor of the job finding rate both for theoretical and empirical reasons. From a theoretical point of view, it is not necessary to actively search in *every* period to find a job. The stock-flow search model of Coles and Smith (1998) and a "waiting at the airport" example of Hall (1983) illustrate that simply "waiting" without engaging in active search is a

[1] Veracietro (2008) is a notable exception.

[2] Only recently has the literature started to consider those OLF when exploring the dynamics of job finding rates in the U.S. labor market. Empirical works include Elsby, Hobijn, Sahin (2012); Hornstein (2012); Hall and Schulhofer-Wohl (2013); Farber and Valetta (2013); Kroft, Lange, Notowidigdo, and Katz (2014); Rothstein (2012). Krusell, Mukoyama, Rogerson, Sahin (2012) study OLF in a model of labor supply.

[3] Kroft, Lange, Notowidigdo, and Katz (2014) make this point when calibrating a matching function that accounts for transitions between all three labor force states to explore the dynamics of unemployment and long-term unemployment over the Great Recession.

[4] The status is determined from the individual's answers to the CPS questions about the individuals' desire and availability for work and whether the individual has engaged in active job search activity in that month. The Bureau of Labor Statistic defines a nonemployed individual to be unemployed in period t if they are actively searching for work in t, while those who are not actively searching in t are classified as OLF.

type of productive activity in obtaining a job. Furthermore, those seeking work might not search with the same intensity in each month. The official definition into unemployment might capture only those whose search intensity is above some threshold, while missing search among those who search at a lower intensity. There are several empirical reasons that motivate us to reject a sharp distinction between search activity of unemployed and those nonemployed comes from the literature on misclassification error in labor force status in the CPS. Using re-interview data, Poterba and Summers (1986) show that respondents frequently "correct" their status between unemployment and OLF. These corrections suggest that respondents to the CPS do not draw as sharp a distinction between unemployment and OLF as is common practice among labor analysts. Additional evidence comes from the observations that individuals who transition from OLF into unemployment often report durations of unemployment that far exceeds one month (Elsby, Hobijn, Sahin, and Valetta, 2012). Given this evidence, we believe it plausible that search activity cannot be easily categorized using exhaustive categories such as unemployment or OLF. Instead, it is likely that different individuals search at different intensity levels and that this intensity varies over time. LFS histories can inform us about these intensities of search.

We use micro data from the Current Population Survey (CPS) to construct four-month labor force status sequences. We then relate the rate of transitioning into employment between the third and the fourth month to LFS histories from months one through three. Since we are interested in studying transitions from nonemployment to employment, we focus on the histories that end in either unemployment or OLF in the third month. Using this approach, we identify six different subpopulations of the nonemployed based on the LFS histories: (1) unemployed, recently employed ("U, recent E"); (2) unemployed, not recently employed ("U, no recent E"); (3) unemployed in the three consecutive months ("U-U-U"); (4) OLF, recently employed ("OLF, recent E"); (5) OLF, not recently employed ("OLF, no recent E"); (6) OLF in the three consecutive months ("OLF-OLF-OLF"). This classification scheme captures much of the heterogeneity in job finding rates across LFS histories.

We find significant heterogeneity in job finding rates across LFS histories. Job finding rates are highest for those who were recently employed, regardless of whether they are currently unemployed or OLF. In particular, among the unemployed, the monthly job finding rates of those with recent employment fluctuate between 30 and 50%, and among those OLF with recent employment the rates vary between 25 and 30%. Those unemployed with no recent employment have the next highest job finding rates (10-20%). Finally, the job finding rates among those OLF who have been unemployed but not employed at any time in the previous two months fluctuate around 10%, while job finding rates among those who have been OLF in all three previous months are only about 2%.

Our results on how job finding rates differ with LFS histories challenge a practice in the literature that treats frequent changes between unemployment and OLF as a measurement error (for example, Abowd and Zellner (1985), Poterba and Summers (1986), Elsby, Hobijn and Sahin (2013)). The hypothesis that frequent switching between labor force statuses represents pure classification error can be tested by comparing the job finding rates of the nonemployment segments with different LFS histories. We find that those groups with histories "OLF-U-OLF" have a five times higher job finding rate than those with histories "OLF-OLF-OLF". The histories "U-OLF-U" and "U-U-U" have similar job finding rates but different wage outcomes upon reemployment. Thus, there are important differences in outcomes for these different histories that rule out pure classification error to explain the observed histories. Consequently, "OLF-U-OLF" and "U-OLF-U" segments do not appear to be erroneous versions of "OLF-OLF-OLF" and "U-U-U," respectively. An alternative interpretation, which we favor, is that frequent status changes between unemployment and OLF inform about the job seeker's search intensity and/or the job seekers' type.

The BLS already distinguishes between those OLF using respondents answers in the CPS to questions on the desire to work. Similarly, the BLS distinguishes between the unemployed based on the duration of unemployment. In particular, the BLS classifies those OLF into "marginal attached", "discouraged", and other subgroups, and distinguishes between short-term and long-term unemployed. An important question is therefore whether the LFS-History classification can explain some additional heterogeneity in job finding rates over and beyond that accounted for by the BLS schemes. Using the CPS questionnaire, we classify the nonemployed into nine categories, two of which are for the unemployed by unemployment duration and the remaining seven are for OLF by their desire to work, recent search activity, reason for not actively looking for job, etc.. We find that LFS histories explain 25% more of the variation in job finding rates than do BLS classifications. The explanatory power is mainly driven by the LFS histories within those OLF.

We thus conclude that the one-month OLF status masks at least two types of the individual's status in terms of the individual's attachment to the labor force – the unattached (OLF^O) and the attached who is not actively searching in the current month (OLF^U) - that cannot be identified from the individual's one-month responses to survey questions about desire to work, recent search activity, reason for not actively looking for job, etc..

The paper next explores the differences in employment outcomes across different LFS-History categories. We find large differences in wages in new jobs across LFS histories. Those with recent employment ("U, recent E" and "OLF, recent E") and those who are consistently actively searching for work ("UUU") tend

to transition into new employment with wages that are around one to one-and-a-half dollar larger than the wages received by those who transition out of either persistent periods of OLF or who have cycled between U and OLF in the last three months. Based on preliminary analysis, we, however, cannot link these differences across LFS histories to the occupations that individuals transition into.[5]

Finally, we ask whether estimates of the degree of (under)utilization of the labor resources at any moment in time need to be substantially revised when accounting for heterogeneity among the nonemployed. We compare the standard unemployment rate with an index of labor utilization that accounts for the differences in the job finding rates by LFS-History classification. This nonemployment index is a weighted average of the various categories of nonemployed, where the weight for each category is given by the sample average of its job finding rate. We show that the nonemployed index and unemployment behave very similarly over time and across the cycle. Whether one examines the nonemployment index or unemployment makes little difference for determining the utilization of the resources in the labor market relative to the long run averages.

The paper is structured as follows. Section 2 describes the data used in the analysis. Section 3 describes the job finding rates. Section 4 characterizes the various categories of the nonemployed. Section 5 describes the nonemployment index. Section 6 concludes.

2. Data and Classification of the Nonemployed

The data in the analysis are from the Current Population Survey (CPS) basic monthly files from January 1976 to December 2013. This section describes the framework for classifying the nonemployed based on their labor force status histories. It then describes the classification based on the official BLS definition of unemployment and OLF and the respondents' answers to the questions about their unemployment duration or their desire and availability for work.

2.1. Classification of Nonemployed Based on Labor Force Status Histories

In the CPS, a nonemployed person in any month t is a person whose labor force status in month t is either "unemployed" (U) or "out of the labor force" (OLF). Potentially different labor force status histories can precede the nonemployment status in month t. For example, prior to nonemployment in month t, an individual can be unemployed for a few months, an individual can be employed for a few months, or his status can switch between employment, unemployment, and out of the labor force. Nothing in the official CPS approach to the labor force status classification precludes such histories of labor market statuses. The CPS classification into employment (E), U, or OLF in any month t is independent of the individuals'

[5] More research is needed here. Currently, we use occupation codes aggregated to 1-digit classification.

classification in month t-1.[6] However, the probability to transition into employment might differ between those nonemployed in month t who were recently employed and those who were nonemployed for some time. Similarly the probability to find employment might differ between those OLF who were recently classified as unemployed as opposed to those who have been consistently OLF over the preceding few months.

We exploit the panel structure of the CPS to classify the nonemployed based on their LFS history and to study the probability of transitioning into employment. In the CPS, respondents are interviewed for 4 consecutive months, then they are not interviewed for 8 months, and then they are interviewed again for 4 consecutive months. The interview months are labeled from 1 to 8, and are referred to as month-in sample (MIS, hereafter). The monthly CPS file thus contains data from respondents in any of the eight interview months. We match respondent records across month-in-sample to obtain short four-month panels.[7] For those in MIS-3 (and MIS-7), we can therefore construct three-month LFS histories and calculate the job finding rate conditional on these LFS histories for those who are nonemployed (i.e., either U or OLF) in MIS-3 (MIS-7).[8] In order to arrive at population-representative samples, we weigh the data using the average of the CPS sampling weights in MIS-3 and MIS-4.

There are 18 possible LFS histories that have either U or OLF in MIS-3 which renders a description of the heterogeneity unwieldy. We therefore aggregate these LFS histories further. First, we combine all those LFS histories with U or OLF in MIS-3[9] that were employed in MIS-1 or MIS-2 into "U, recent E" or "OLF, recent E," respectively. The remaining LFS histories describe sequences of three months of nonemployment, i.e., some combination of U and OLF. Among those, we consider specifically those who were consistently either OLF or U in MIS-1 through MIS-3, i.e., OLF-OLF-OLF and U-U-U, respectively. Finally, we aggregate the remaining LFS histories into groups "U, no recent E" and "OLF, no recent E". The first of these two groups consists of those with U-OLF-U, OLF-U-U, and OLF-OLF-U. The second is formed analogously using those with OLF in MIS-3. Below we will justify this aggregation scheme by showing that job finding rates for the different groups within "U, no recent E" and "OLF, no recent E" are very close to each other.

Our LFS-History classification thus consists of the following six categories:

[6] The only so called dependent interviewing in such case refers to constructing the duration of unemployment after 1994.

[7] To match the individual records month-to-month, we follow Madrian and Lefgren (1999) and Shimer (2012) and match individuals by race, age and sex besides individual and household ID. This approach minimizes errors in matching across months that arises due to the fact that the CPS uses a sample of addresses.

[8] Hereafter, we will treat MIS 5 through MIS-8 analogously to MIS-1 through 4 without specifically referencing this in each instance.

[9] We proceed analogously for MIS-5 through 8.

1) "U, recent E" (i.e., U in month t, E in t-2 or/and t-1)
2) "U, no recent E" (excluding "U-U-U")
3) "U-U-U"
4) "OLF, recent E" (i.e., OLF in month t, E in t-2 or t-1)
5) "OLF, no recent E" (excluding "OLF-OLF-OLF")
6) "OLF-OLF-OLF."

2.2. The BLS Classification of the Nonemployed

The CPS contains a set of questions, described below, that allow constructing the official BLS definition of unemployment and allow distinguishing between groups in the OLS according to how closely they are attached to the labor force.

According to the standard definition, the unemployed are those aged 16+ who did not work at all during the reference week, who were not absent from a job, but who *actively* looked for work during the past four weeks and were available for work during the reference week. Persons who were on layoff from a job to which they expect to return and were available for work during the reference week are also classified as unemployed, even if they did not actively look for work.[10]

Those OLF are asked a sequence of questions designed to determine how closely they are attached to the labor market. Those not actively looking for work are asked whether they currently want a job. If a person indicates that she wants a job, she is asked about the main reason for not looking for work during the last 4 weeks. They are also asked about their search behavior in the last 4 weeks and the last 12 months. Based on the responses to these questions, the BLS constructs seven categories among the OLF. Those who want a job, are available for work, who have looked for a job sometime in the prior 12 months (or since the end of their last job if they held one within the past 12 months), but were not counted as unemployed because they had not searched for work in the 4 weeks preceding the survey are referred to as "marginally attached". Among these, we distinguish between those who gave an economic-related reason for not looking for work (referred to as "Want job, marginally attached, discouraged") and the individuals who gave a non-economic-related reason for not looking for work (referred to as "Want job, marginally attached, other"). The third category consists of the individuals who want a job but are neither in the first nor in the second category (referred to "Want job, other"). Finally, we distinguish among those who do not want a job between retired, disabled, those in school, and other. As is conventional, we also distinguish between the short-term unemployed – the unemployed whose duration of unemployed is less

[10]The unemployed who are expected to return to a job are on layoff. The definition of layoff unemployment was tightened during the 1994 CPS redesign. After 1994, those on layoff must expect to be recalled to the job within 6 months or the employer must have given the person a specific date upon which they would be recalled in order to be counted as "unemployed" without actively searching for work.

than 27 weeks – and the long-term unemployed, whose reported unemployment durations are at least 27 weeks.

Thus, the BLS-based classification for the nonemployed consists of the following nine categories:

- unemployed short-term (<27 weeks)
- unemployed long-term (>=27 weeks)
- OLF, Want job, marginally attached, discouraged
- OLF, Want job, marginally attached, other
- OLF, Want job, other
- OLF, Do not want job, retired
- OLF, Do not want job, disabled
- OLF, Do not want job, in school (16-25 y. o.)
- OLF, Do not want job, other (not retired, not disabled, not in school).

2.3. Wages and Occupations

Besides documenting heterogeneity in job finding rates, we also analyze whether the types of jobs found differ across groups in re-employment wages, occupations, and industries. Hourly wages are constructed in two ways. If an individual reports weekly earnings, the nominal hourly wage is calculated using the weekly earnings divided by usual weekly hours worked. If an individual reports to be paid by hours, we use her reported hourly wage rate. Only nonimputed wages are used. We deflate hourly wages using the CPI-U with 2013 as the base year.

Prior to the introduction of the 2002 Census occupational and industry classification systems in 2003, the CPS used the 1990 Census occupational and industry classifications. The composition of detailed occupations and industries was substantially different in the 1990 system, as was the structure for aggregating them into major groups. To construct consistent time-series for occupations or industries, we rely on conversion factors between the 1990 and 2002 Census classifications for industry and occupation created by the BLS. These factors are based on 3-year average survey micro data (2000 to 2002) that were dual-coded to both the old and new classification systems. That is, we code the industry and occupations after 2002 using the 2002 classification scheme. Prior to 2002, we use the 1990 classification system. We then rely on the BLS conversion factors to recode the 1990 system to be consistent with the 2002 system. After obtaining historically comparable occupations, we classify them into four groups - nonroutine cognitive, routine cognitive, nonroutine manual, and routine manual – following Jaimovich and Siu (2012).

3. Heterogeneity in Job Finding Rates

In this section, we show that job finding rates differ widely across the LFS histories of the nonemployed. We then show that the LFS-History classification tends to explain a lot more of the overall variation in job finding rates than the BLS classification scheme.

3.1. Heterogeneity across LFS Histories

Figure 2 displays the annual averages of monthly job finding rates for the six different categories of the LFS-History classification introduced above. Within the unemployed and those OLF in MIS-3, the job finding rates are highest for those with recent employment. Those unemployed who did not have a job during the previous two months have similar job finding rates regardless whether they were unemployed throughout the last 3 months or whether they transitioned between OLF and U.

Among those OLF, we find large differences across all three LFS-History categories. Those with recent employment have the highest job finding rate, second only to those of the unemployed who recently held employment. In addition, those with OLF in MIS-3 who were recently unemployed have vastly higher job finding rates compared to those who were consistently OLF. In particular, the job finding rate of "OLF, no recent E" ("OLF-U-OLF", "U-OLF-OLF", or "U-U-OLF") are around 0.10, while the job finding rates of "OLF-OLF-OLF" are only about 0.02. The large differences in job finding rates across these groups indicate that frequent status changes between OLF and U describe a search process and/or a type of job seeker, instead of representing measurement error.

Figure 3 shows the job finding rates for the eight histories included within the broader categories that we use to describe histories of three-month consecutive nonemployment, i.e., "U, no recent E", "U-U-U", "OLF, no recent E," and "OLF-OLF-OLF." As can be seen from the figure, the job finding rates across the three LFS histories grouped within "U, no recent E" as well as the three histories grouped within "OLF, no recent E" are similar, which explains why we summarize these LFS-histories using only the two broader categories "U, no recent E" and "OLF, no recent E.".

Figure 4 shows the shares of the population that fall into each of the categories of nonemployed defined by their history of their labor force states as evident in the CPS. Group "OLF-OLF-OLF" is the most sizeable group in the population, followed by "OLF, recent E."

The most notable secular pattern is that the share of those consistently OLF declined between 1975 and 2000 by about 5 percentage points. Since 2001, the share in this group has begun to increase rapidly, recovering all of the lost ground over the previous 25 years in a just over decade. Figure 5 shows the share of all transitions from nonemployment into employment by LFS histories. It is noteworthy that the two largest contributing groups to new employment relationships come from OLF. In particular, those OLF with recent E and those consistently OLF make up around 60% of all new employment relationships (excluding job-to-job movers). The third largest group consists of the unemployed who were recently employed. By contrast, those who circle between U and OLF in the last three months make up a small overall share of new employment relationships.

The above figures suggest that those who were recently employed are closely attached to the labor market, regardless of whether they are classified as currently unemployed or OLF. By contrast, those consistently OLF across three periods are significantly more disconnected from the labor market as indicated by their low job finding rates. However, even though their job finding rates are low, they make up a large share of the overall number of new employment relationships that are formed since they make up the lion share of those without current employment.

3.2. Comparing Heterogeneity in Job Finding Rates across the LFS-History and the BLS-Classifications

The BLS has long recognized that there is heterogeneity in labor force attachment among those OLF. The BLS classification system is an attempt to account for this heterogeneity based on the answers to the CPS. Figure 6 shows the job finding rates conditional on the nine categories of the nonemployed based on the BLS classification as described in Section 2. The short-term unemployed have the highest job finding rate. The long-term unemployed have similar job finding rates as OLF (Want job). Those OLF who do not want a job and are retired or disabled have the lowest job finding rates. Figure 7 shows the population shares of the nine BLS categories of the nonemployed.

To understand how the LFS-History classification compares to the BLS classification, we first examine the share of the long-term unemployed in the third month (i.e., those with self-reported unemployment duration > 26 weeks) among categories “U, recent E”, “U, no recent E”, and “UUU”. Figure 8 shows that the share of the long-term unemployed is highest among “UUU”; however, it is non-zero among the other two LFS-History categories that end in U. Interestingly, the share of self-reported long-term unemployed is nonzero among “U, recent E.”

Figure 9 shows the composition of "OLF, recent E", "OLF, no recent E", and "OLF- OLF- OLF" by self-reported desire to work and other attributes in the third month. Interestingly, among "OLF, recent E" (the group with the high job finding rate), the highest share belongs to those "OLF, Do not want job, not in school". Among "OLF, no recent E", the highest share belongs to "OLF, Want job". Among, "OLF-OLF-OLF", the highest share belongs to "OLF, Do not want job, retired".

Table 1, Panel A shows how those OLF in 2013 break down into the BLS-classifications and across the LFS histories in 2013. Overall, the vast majority of those OLF report that they do not want a job.

Table 1, Panel B shows the job finding probabilities for the different categories of OLF across the BLS-classifications and across the LFS-History classification. The job finding rates among those who do not want a job are low. Nevertheless, they are not zero. Examining the LFS-History classification, we find that 3.3% of those who reported that they do not want a job in MIS-3 are classified as employed in MIS-4. This contrasts with a job finding rate of 8% among those who report wanting a job. Among those "OLF-OLF-OLF," the job finding rate is 2.7%. For those "OLF, recent E", the job finding rate is much higher (33.2%) and "OLF, no recent E", the job finding rate is 10.2%. The group with the lowest job finding rate is the group that reports not wanting a job and that has been consistently OLF for three months. Only 1.3% of this group is classified as employed in MIS-4.

Table 2 presents regression results that show how much heterogeneity in the job finding rates is explained by the LFS histories. In the regression, we aggregate data into bins where each bin is an intersection of age, one of the six LFS-History categories, and one of the nine BLS categories of nonemployment. The dependent variable is the average job finding rate of the nonemployed in the bin.

Comparing the R-squares obtained when controlling for the six categories of the LFS-History classification (column 4) with the R-squares obtained when controlling for the BLS classification and only the LFS histories that end in "U" (column 5), we observe that the LFS-History classification and particularly the LFS histories that end in "OLF" explain a lot more of the variation in the job finding rates than does the one-month BLS-classification. This is likewise reflected in the much larger F-statistics.

The evidence from the job finding rates shows that LFS histories provide important information on how closely individuals are attached to the labor market. In fact, the LFS histories are substantially more powerful in predicting transitions back into employment than are the BLS classifications.

The results point to the particular importance of the LFS histories that end in "OLF". The results thus suggest that the BLS' one-month classification into OLF and even the subsequent classification based on

the desire to work masks large differences in the job finding rates of these individuals. Examining the LFS history that leads to the OLF status helps explain some of the heterogeneity.

4. Re-employment Wages and Types of Jobs

We now characterize the types of jobs individuals with different LFS histories transition into. We concentrate on heterogeneity in wages and industry and occupation.

Column 3 of Table 3 shows the average new-hire wages of the six LFS-History categories of the nonemployed. As can be seen, there are significant disparities in the new-hire wage. In particular, "U, recent E", "OLF, recent E" and "UUU" transition into significantly better paying jobs than do those "U, no recent E", "OLF, no recent E" or "OLF-OLF-OLF". For example, those "U, recent E" on average earn $14.42 per hour. Those "OLF, recent E" earn $13.69, and those "UUU" earn $13.48 at their new jobs. In contrast, the "U, no recent E", "OLF, no recent E" and "OLF-OLF-OLF" earn between $11.70 and $12.01 per hour. Column 4 of Table 3 shows the wage differences across the six LFS-History categories after controlling for age, year, gender, and educational effects. The basic patterns in the wage differences across LFS histories are robust to controlling for these characteristics.

The remaining columns in Table 3 show the distribution of new employment in each of the six LFS-History categories across broad occupational categories. The data do not show interpretable differences across the six categories of the nonemployed at this level of aggregation.

5. The NonEmployment Index

In addition to the unemployment rate, the BLS constructs extended measures of resource utilization in the labor market (known as U4, U5, and U6) that include different groups among those OLF as well as those officially unemployed. [11] The BLS measures give equal weight to the unemployed and the various segments of the OLF.

As we have shown, there is substantial heterogeneity in job finding rates across the nonemployed with different LFS histories. We thus construct a measure of resource (un)utilization in the labor market that aggregates different categories of nonemployment taking into account their job finding rates as in Hornstein, Kudlyak, Lange (2014).

[11] The BLS alternative measures are: U4: unemployed+OLF(discouraged workers), U5: unemployed+OLF(discouraged workers+marginally attached), U6: unemployed+OLF (discouraged) + OLF (marginally attached) + working part-time for economic reasons.

The nonemployment index is a weighted sum of six categories of nonemployed where the weight of each category is given by its average job finding rate over the 1975-2013 sample period relative to the average job finding rate of the category with the highest job fining rate (those "U, recent E").[12] Figure 10 shows the index based on the LFS-History classification, the index based on the BLS classification and unemployment, as shares of population. As can be seen, in 2013 all three measures are halfway back to their pre-2007-09 recession value from their respective 2010 peaks.

6. Conclusion

This project examines heterogeneity in job finding rates and in the characteristics of new jobs across different categories of the nonemployed defined by the labor force status histories that can be constructed based on the short four-month panels available in the CPS. We then compare the classification of the nonemployed based on the labor force status history to the BLS classification, which is based on one-month labor force status and responses to the questions about desire and availability for work.

We find that there is substantial heterogeneity in job finding rates across LFS-histories that are not captured by the standard BLS distinction between OLF and unemployment. We also find significant differences across LFS histories in re-employment wages. In particular, those nonemployed who were either consistently OLF for the last three months or cycled between OLF and U enter into new employment relationships that pay substantially less than those nonemployed who consistently searched for jobs (were counted as U for the last three months) or who were recently employed.

We propose a new measure of the resource utilization in the labor market that accounts for differences in the job finding rates across the population of the nonemployed. Our new measure, the non-employment index, behaves similarly over the business cycle to unemployment rate.

In summary, we conjecture that the LFS histories contain information about the type of job search that individuals are engaged in or the type of the job seeker. These questions are left to further analysis as we continue our research on this project.

[12] Related studies that construct a measure of labor market resource utilization that takes into account different job fining rates of the nonemployed or of the unemployed are Hall and Schulhofer-Wohl (2013), Joyce, Jones, and Thomas (2003), and Schweitzer (2003).

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Appendix A. Data and Labor Force Attachment Concepts

We use the monthly data from the CPS. The CPS is the official source of the labor market statistics and is administered by the Bureau of Labor Statistics (BLS). The BLS determines the definitions of concepts "employment", "unemployment" and "out of the labor force". The CPS interviews usually took place during the week of the month containing the 19th day. The week for which the interviewer asks information from the respondent (reference or survey week) is the week of the month containing the 12th day.

The CPS contain a set of questions that allow identifying the unemployed using the official BLS definition of unemployment (which is described below) as well as allow distinguishing a few additional categories of workers who are out of the labor force but vary in their degree of attachment to the labor force. The 1994 redesign of the CPS brought some changes to the old concepts and introduced the new ones. In addition, the changes in the wording of some questions have also impacted the statistics after the redesign (see Polivka and Rothgeb, 1993). Bregger and Haugen (1995) provide an excellent history of labor underutilization concepts developed by the BLS and give an overview of the old and new concepts in the CPS after the 1994 redesign. Because not all series are comparable before and after the redesign, in the analysis we focus on the CPS data after the redesign.

A.1. Definition of Unemployment in the U.S.

A.1.1. Definition

According to the CPS definition (see p. A1-7 of the Current Population Survey Interviewing Manual 2013), employed persons are those who are working at a paid job or business for at least one hour during the reference week, or are working at an unpaid family business for 15 or more hours during the reference week or who did not work last week, but held a job or owned a business from which they were temporarily absent during the reference week.

Unemployed persons are those individuals who did not work at all during the reference week, who were not absent from a job, but who *actively* looked for work during the past four weeks and were available for work during the reference week. Persons who were on layoff from a job to which they expect to return and were available for work during the reference week are also classified as unemployed, even if they did not actively look for work. After the 1994 CPS redesign, the persons on layoff must expect to be recalled to the job within 6 months or the employer must have given the person a recall day (with no time restriction on the date). Persons who report waiting to start a new job must have actively searched for a

job within the last 4 weeks to be counted as unemployed.[13] Otherwise, they are counted as out of the labor force.

The distinction between active and passive job search methods is important for counting a person as unemployed. An active job search is one that could have resulted in a job offer without further action on the part of the job seeker. An individual is classified as unemployed only if (s)he used at least one active job search method to look for work. If the person used only passive job search methods, or did nothing, then (s)he is classified as out of the labor force. The active job search methods are the following: (1) contacted public employment agency, (2) contacted private employment agency, (3) contacted employer directly, (4) sent out resume or filled out applications, (5) contacted friends or relatives, (6) contacted school/college or university employment center, (7) placed or answered ads, (8) checked union/professional registers, (9) other active methods. The passive job search methods are as follows: (1) looked at ads, (2) attended job training programs or courses, and (3) other passive.[14]

A.1.2. Comparison with Other Countries' Definitions

The International Labor Office provides some guidance for the concepts of "unemployment" and "labor force" to aid the comparison of the statistics between countries. However, the definitions differ from country to country. The differences pertain to the treatment of active versus passive job search methods, persons waiting to start a new job, unpaid family workers, and treatment of the Armed Forces. Sorrentino (2000) provides an excellent summary of the differences in the concept of unemployment between the U.S., Canada and the European Union.

The official labor force statistics in the U.S. are based on the civilian populations, and thus the Armed Forces are excluded from the concepts. Unpaid family workers are counted as employed only if they work more than 15 hours per week. If they work less than 15 hours, they should be involved in active job search to be counted as unemployed.

In the U.S., the nonemployed should be involved in active search to be classified as unemployed while in Canada and Europe any search method counts as search. Prior to 1994, in the U.S. workers who were not

[13] The CPS does not have an option to state "waiting for a job to start" as a reason for not looking for work. However, this option is available as an answer to the question of why the job seeker is not available for work last week. Our own investigation reveals that job seekers who respond that they were actively searching for work but are unavailable (PELKAVL=2) either due to waiting for a new job to start (PULKAVR=1) or own temporary illness (PULKAVR=2), appear to be counted as unemployed.

[14] Prior to 1994, there were only seven choices of search methods to choose from: contacting a public employment agency, contacting a private employment agency, contacting a potential employer directly, contacting friends or relatives, placing or answering ads, "nothing," and using other methods. The passive methods were not listed. See Polivka and Rothgeb (1993) for the detailed discussion.

searching because they had a job to start within the next 4 weeks were classified as unemployed, while after the 1994 redesign of the CPS they are classified as out of the labor force.

A.2. Other Categories of Labor Force Attachment in the CPS

The official definition of the unemployment rate is rather restrictive. The CPS thus contains questions that allow identifying varying degree of labor force attachment among those who are officially counted as out of the labor force. The questions are asked about desire for work, reasons for not looking for a job, recency of job search for work activity, and availability for work.

The "want a job" category consists of the individuals out of the labor force who did not look for job in the last 12 months but answer yes to the question whether they want a job. The "marginally attached" category consists of a subset of "want a job" category who are not employed and not currently looking for job but who were looking during the past 12 months, want to have a job and are available for work. Finally, "discouraged workers" is a subset of the "marginally attached" category who are not currently searching for work and list a job-related reason as a main reason for not looking, i.e., 1) They believe no job is available to them in their line of work or area; 2) They had previously been unable to find work; 3) They lack the necessary schooling, training, skills, or experience; or 4) Employers think they are too young or too old, or they face some other type of discrimination.

There were substantial changes in the CPS questionnaire in 1994 that affected these broad labor force attachment categories. Prior to 1994, the definition of discouraged workers included a broader categories of workers and the information on marginally attached workers was not available (Bregger and Haugen, 1995). In particular, Polivka and Rothgeb (1993) report that the changes to the definition of discouraged workers that included questions to determine whether a person has searched for a job within the last 12 months, and whether an individual was available to work during the references week, reduced the number of discouraged workers by more than half. Thus, the concepts of discouraged workers before and after 1994 are not comparable. Also, prior to 1994, the questions about the desire to work were asked only of the individuals in the outgoing rotation groups, and thus the data cannot be used to study month-to-month transitions of individuals based on the different answers to these questions.

As noted in Polivka and Rothgeb (1993), after the 1994 CPS redesign, the survey was also changed to reduce the burden per persons retired, disabled and unable to work. In particular, the simplified procedure is applied to the individuals are 50 years of age or older and volunteer to answer that they are retired. If individuals are reported as "disabled" in any of the labor force questions, they are being asked whether

they can do any gainful work in the next 6 months. If the answer is no, these individuals are counted as out of the labor force and the interview is terminated in Polivka and Rothgeb (1993).

Figure 1. Share of New Employment from OLF

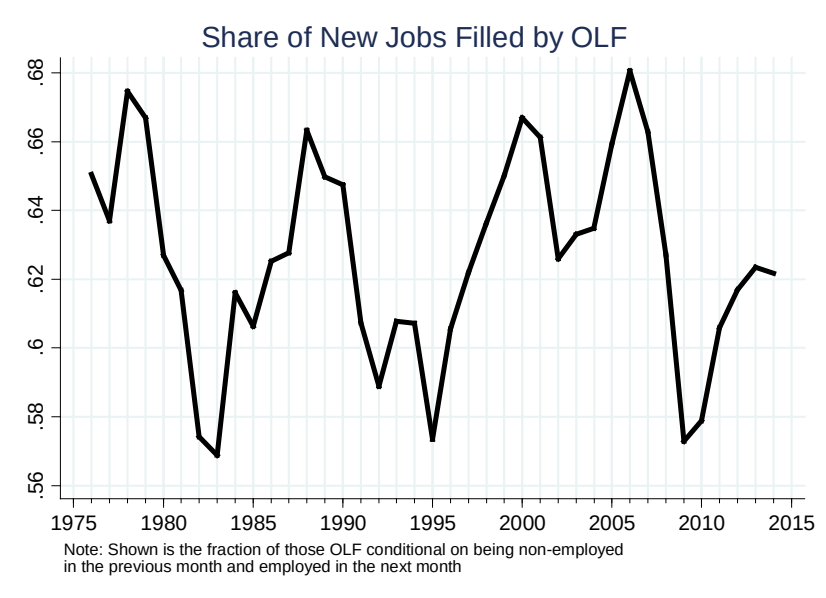
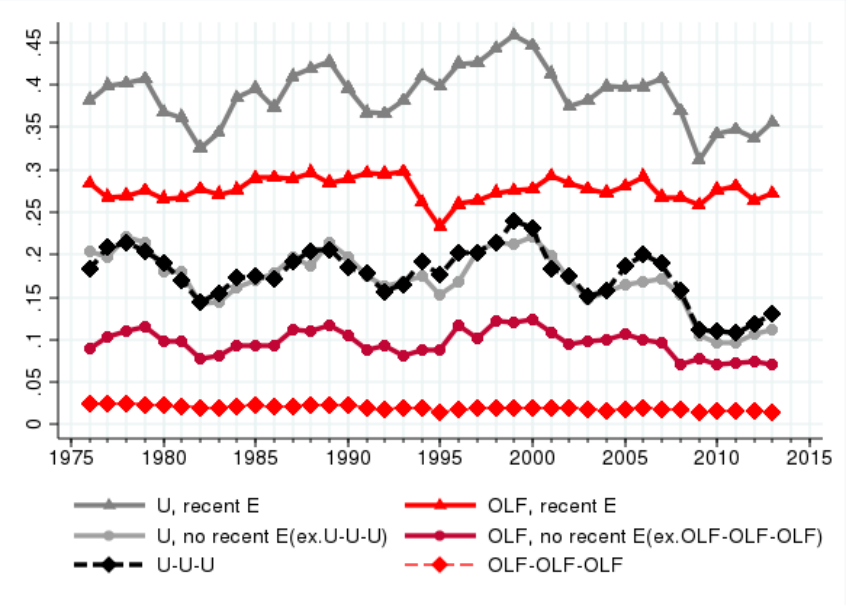


Figure 2. Transition Probabilities from Nonemployment to Employment, LFS-History Classification



Note: The figure shows annual averages of monthly series, NSA.

Figure 3. Transition Probabilities into Employment after Three Months of Nonemployment

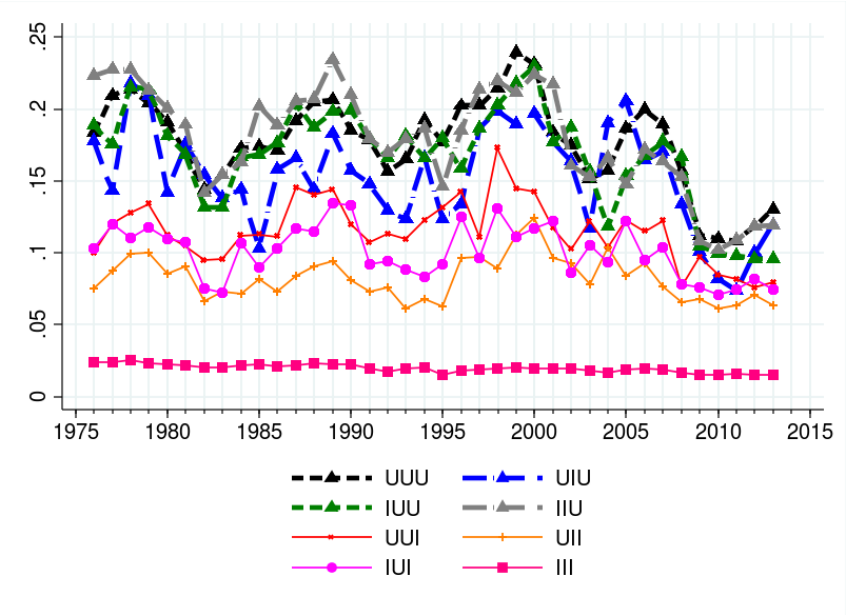


Figure 4. Population Shares, LFS-History Classification

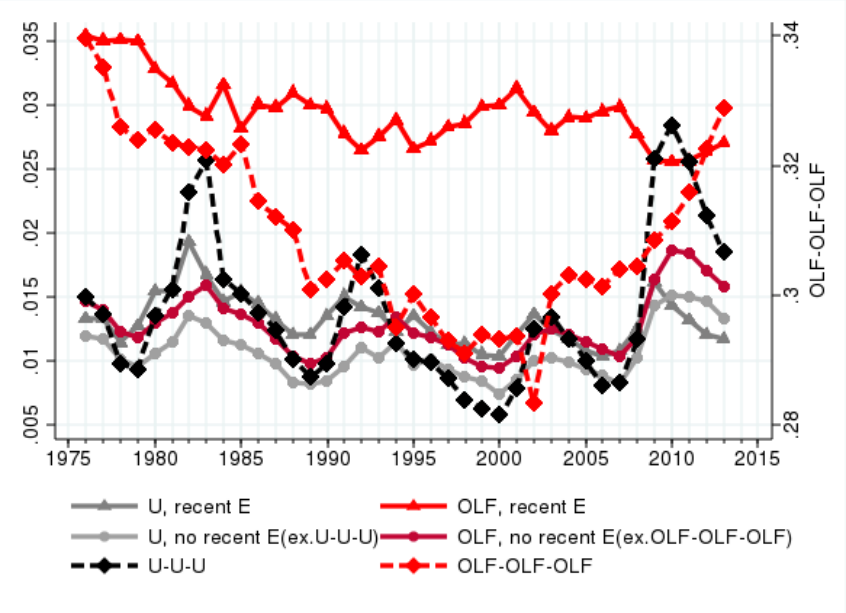


Figure 5. Shares in New Employment, LFS-History Classification

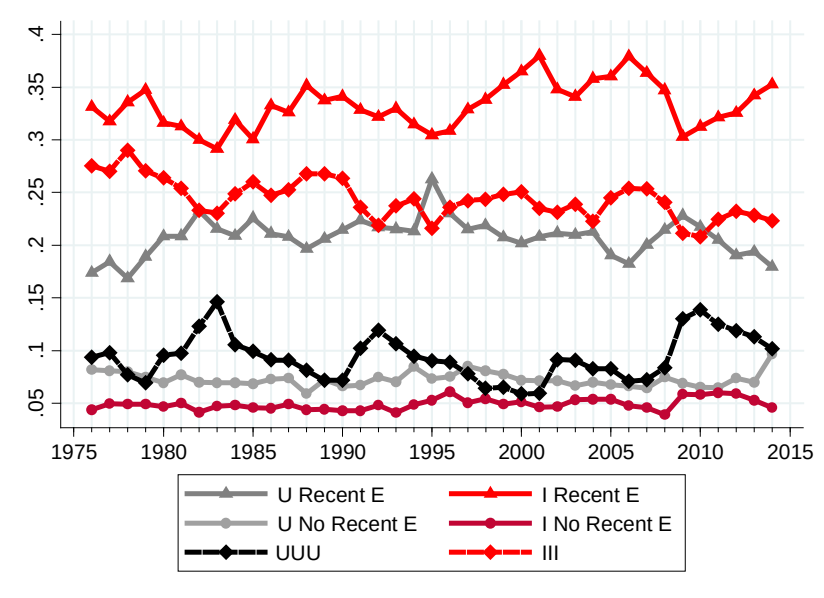


Figure 6. Transition Probabilities from Nonemployment to Employment, BLS Classification

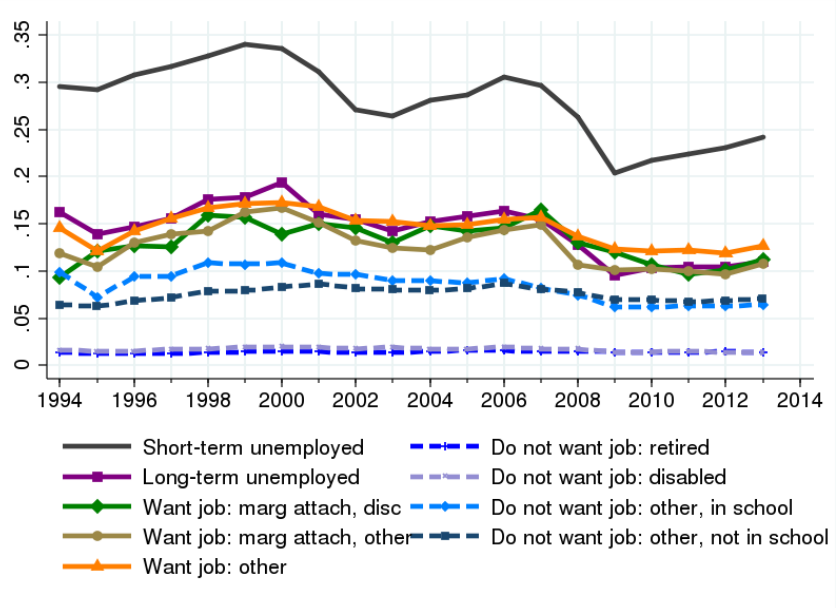
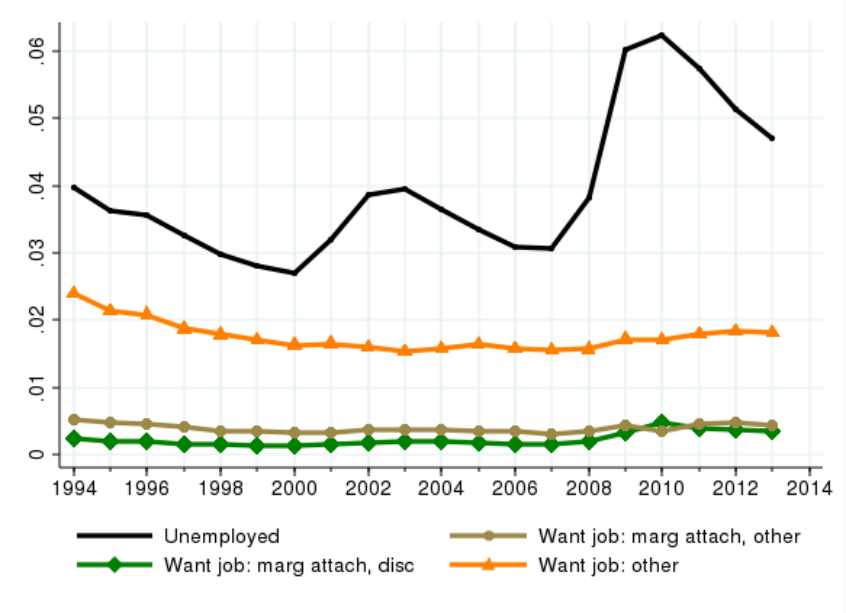


Figure 7. BLS Classification, population shares

A. Unemployment and OLF(Want Job)



B. OLF(Do Not Want Job)

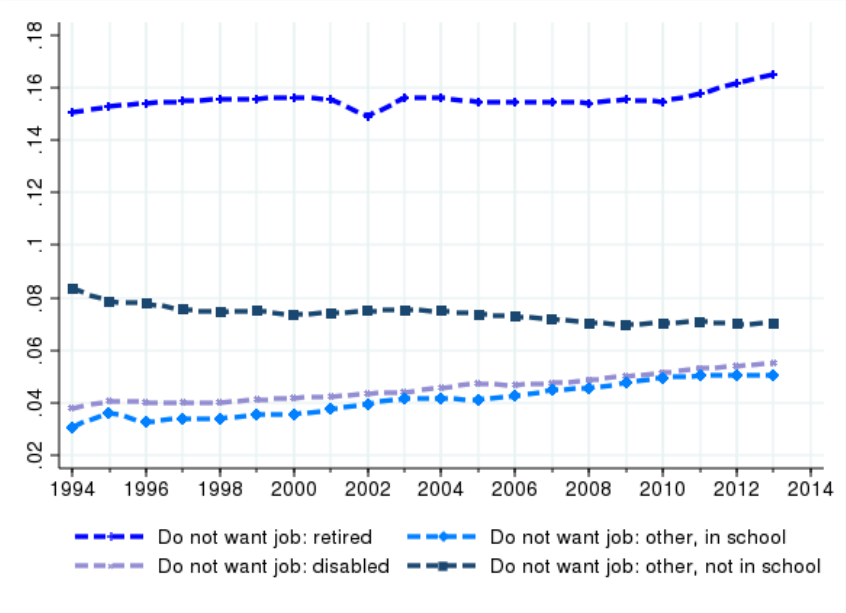


Figure 8. Share of "U, recent E", "U, no recent E", and "UUU", with self-reported unemployment duration > 26 weeks in the third month

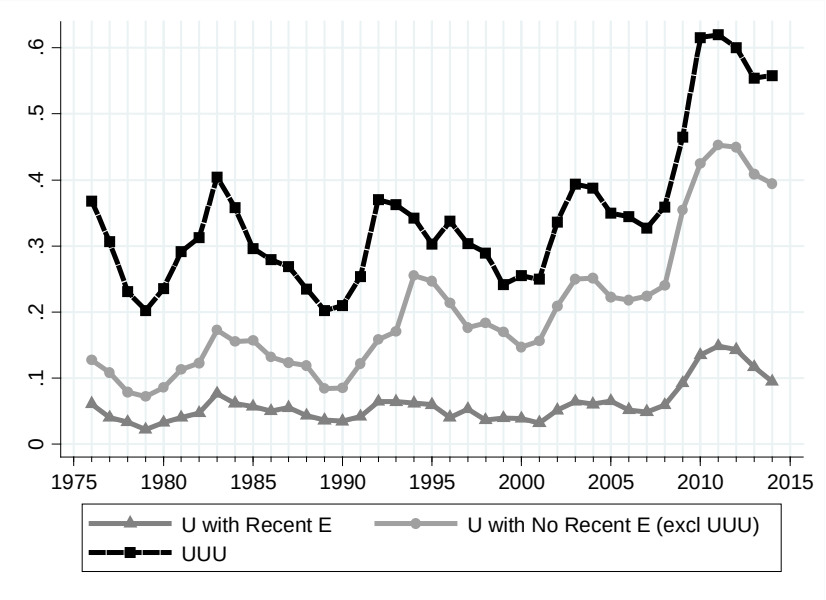
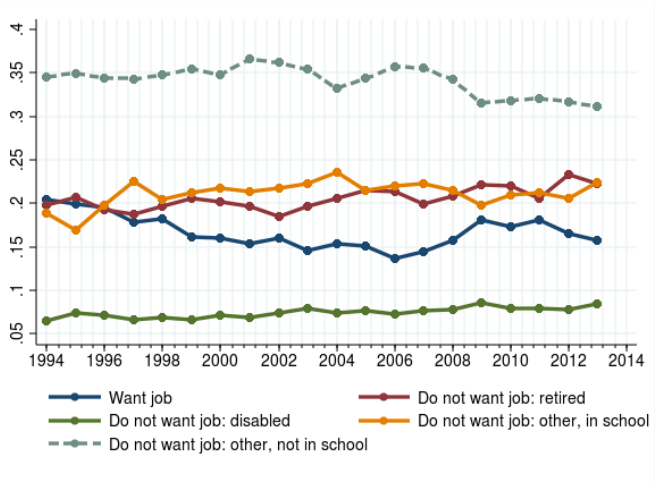
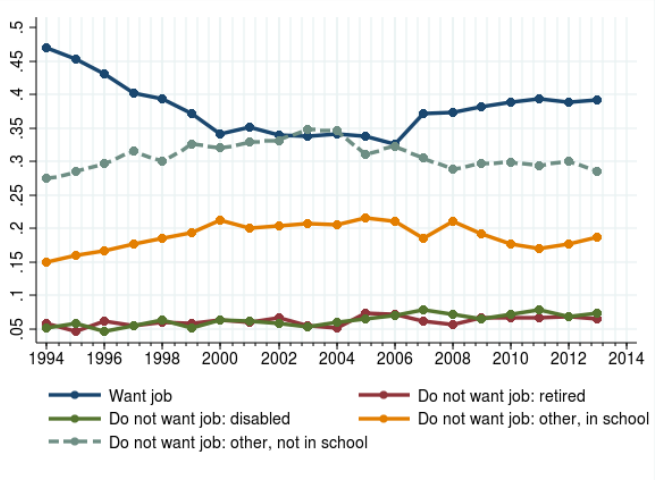


Figure 9. Composition of "OLF, recent E", "OLF, no recent E", and "OLF-OLF-OLF"

A. OLF, recent E



B. OLF, no recent E (excluding OLF-OLF-OLF)



C. OLF-OLF-OLF

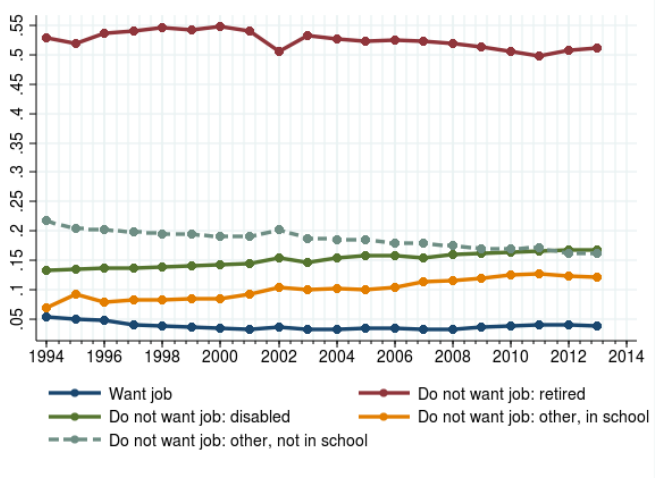
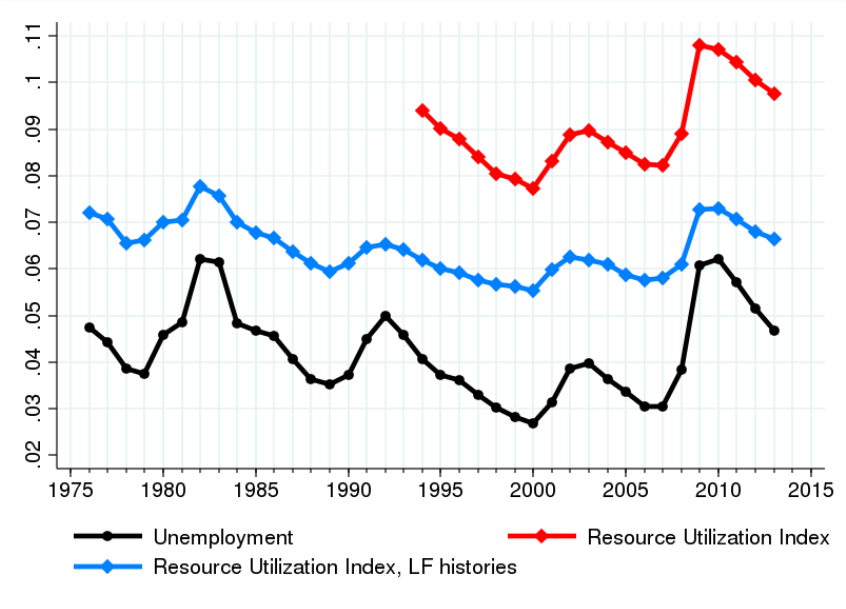


Figure 10. Nonemployment Index



Note: Blue line shows the index constructed from the LFS histories. Red line shows the index constructed from the BLS classification (see Hornstein, Kudlyak, and Lange, 2014). All index are expressed as population shares.

Table 1. OLF in the LFS-History and the BLS Classifications, 2013

	OLF-OLF-OLF	OLF, recent employment	OLF, no recent employment	All OLF
	1	2	3	4
	Panel A: Distribution of those OLF across the LFS-History and the BLS classifications			
Want a Job:				
Marginally Attached, Discouraged	0.004	0.022	0.090	0.009
Marginally Attached, Other	0.005	0.021	0.095	0.010
Other	0.028	0.114	0.205	0.042
Total	0.037	0.157	0.391	0.061
Do not Want a Job:				
Retired	0.512	0.221	0.064	0.472
Disabled	0.168	0.084	0.073	0.158
Other, In School	0.122	0.228	0.186	0.132
Other, Not In School	0.161	0.311	0.285	0.177
Total	0.963	0.843	0.609	0.939
	Panel B: Job Finding Probability of OLF by LFS-History and BLS Classifications			
Want a Job :				
Marginally Attached, Discouraged	0.061	0.308	0.094	0.080
Marginally Attached, Other	0.048	0.274	0.097	0.066
Other	0.059	0.367	0.118	0.084
Total	0.057	0.347	0.107	0.080
Do not Want a Job:				
Retired	0.006	0.193	0.097	0.023
Disabled	0.006	0.194	0.062	0.022
Other, In School	0.036	0.242	0.096	0.054
Other, Not In School	0.026	0.329	0.098	0.051
Total	0.013	0.257	0.093	0.033

Note: The table contains the distribution of those OLF by BLS classification and by sequence of Labor Force States. These distributions are calculated using the sample consisting of MIS-3.

TABLE 2. JOB FINDING RATES BY OBSERVABLE HETEROGENEITY IN U AND OLF POPULATION

	1	2	3	4	5	6
OLF	0.0024	0.002	0.13***	0.24***	0.11***	0.30***
	(0.07)	(0.07)	(0.022)	(0.04)	(0.004)	(0.0030)
Unemployed	0 .16**	0.19***	0.25***	0.16***	0.25***	0.23***
	(0.07)	(0.07)	(0.022)	(0.04)	(0.004)	(0.0030)
Short term U			Omitted Category			
Long term U		-0.13***	-0.07***	-0.074***	-0.072***	-0.078***
		(0.003)	(0.003)	(0.0019)	(0.0028)	(0.0018)
U-U-U			Omitted Category			
U, Recent E			0.19***	0.19***	0.19***	0.19***
			(0.0028)	(0.0018)	(0.0028)	(0.0019)
U, No Recent E			-0.015***	-0.014***	-0.017***	-0.015***
			(0.0029)	(0.0019)	(0.0028)	(0.0018)
OLF, Recent E			Omitted Category			
OLF, No Recent E				-0.18***		-0.19***
				(0.0016)		(0.0016)
OLF-OLF-OLF				-0.24***		-0.24***
				(0.001)		(0.001)
Do not Want a Job: Disabled			Omitted Category			
Do not Want a Job: Other					0.028***	0.015***
					(0.0014)	(0.0009)
Do not Want a Job : Retired					0.026***	0.015***
					(0.0014)	(0.0009)
Want a Job : Marg. Attached, Discouraged					0.086***	0.041***
					(0.0064)	(0.0064)
Want a Job : Marg. Attached, Other					0.073***	0.037***
					(0.0049)	(0.0033)
Want a Job : Other					0.11***	0.067***
					(0.0026)	(0.0017)
Cells/Observations	44,026	44,026	44,026	44,026	44,026	44,026
R-squared	0.55	0.57	0.62	0.85	0.64	0.85

Note: The specifications include year and age fixed effects.

Table 3: Characteristics of Reemployment Jobs by LFS-History and BLS Categories, 1995-2013

					Occupational Classification			
LFS History Category	Population Share	Job Find. Prob.	Average Wage	Wage Residuals	Non-Routine Cognitive	Routine Cognitive	Non-Routine Manual	Routine Manual
	1	2	3	4	5	6	7	8
U, Recent E	0.19	0.40	14.42	0.35	0.22	0.18	0.21	0.39
U, no Recent E	0.07	0.14	12.01	-1.11	0.21	0.27	0.27	0.26
U-U-U	0.11	0.15	13.48	-0.30	0.15	0.30	0.23	0.33
OLF, Recent E	0.34	0.30	13.69	0.37	0.31	0.23	0.26	0.19
OLF, no Recent E	0.05	0.08	11.70	-0.69	0.21	0.29	0.29	0.22
OLF-OLF-OLF	0.23	0.04	11.99	-0.73	0.26	0.26	0.30	0.18

Note: Average wage (in 2013 dollars) refers to the average real wage on reemployment in MIS-4. Column 1 contains the fraction of total new jobs among those nonemployed in MIS-3 that comes from a particular category. Column 4 contains the average residuals from regressing the level of wages on year and age fixed effects. Occupational classification is based on Jaimovich and Siu (2012).