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Job Flows, Demographics and the Great Recession

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Abstract

The recession the United States economy entered in December of 2007 is considered to be the most severe downturn the country has experienced since the Great Depression. The unemployment rate reached as high as 10.1 percent in October 2009 - the highest we have seen since the 1982 recession. In this paper we examine the severity of this recession compared to those in the past by examining worker flows into and out of unemployment taking into account changes in the demographic structure of the population. We identify the most vulnerable groups of this recession by disaggregating the workforce by age, gender and race. We find that adjusting for the aging of the U.S. labor

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force increases the severity of this recession. Our results indicate that the increase in the unemployment rate is driven to a larger extent by the lack of hiring (low outflows), but flows into unemployment are still important for understanding unemployment rate dynamics (they are not as acyclical as some literature suggests) and differences in unemployment rates across demographic groups. We find that this is indeed a "mancession," as men face higher job separation probabilities, lower job finding probabilities and, as a result, higher unemployment rates than women. Lastly, there is some evidence that blacks suffered more than whites (again, this difference is particularly pronounced for men).

Keywords: Unemployment, Worker flows, Job Finding Rate, Separation Rate, Demographics, Gender

JEL Codes: J1, J6

1 Introduction

In August 2007, the U.S. and global economy were hit by a financial crisis. Many argued that it is the worst financial crisis in the post-war period, and some went as far as suggesting it might be the worst in modern history.¹ The colossal losses faced by financial institutions (and stunning failures of some of them) led to a credit crunch. At the same time, the extremely poor performance of housing and stock market led to an enormous wealth loss by households (over 25 percent of U.S. households' net worth was destroyed in the crisis). With weakening demand, the labor market tumbled, as businesses laid off workers. The U.S. economy entered the recession in December of 2007. Early on, job losses were low in comparison to previous recessions and the downturn appeared to be mild (in fact, some questioned if a recession was imminent). As financial panic intensified in the fall of 2008, massive job losses followed, and it was clear that not only the country entered a recession, but that this was going to be a deep one.

As we write this paper, the National Bureau of Economic Analysis (NBER) has yet to announce the end of the recession. Yet, as early as September 2009, many analysts and policymakers suggested that the recession might be over. Even if this is so, it took until January of 2010 for the U.S. economy to start registering job gains. Overall, the U.S. economy lost close to 8.4 million jobs since the beginning of the recession. The unemployment rate reached as high as 10.1 percent. While the pace of the job losses subsided and the unemployment rate came down from the peak, the

¹Bernanke 2010 – <http://www.federalreserve.gov/newsevents/speech/bernanke20100103a.htm>

multitude of public and private forecasts suggest that it would take years for the U.S. labor market to recover. And, thus, while the recovery has begun, "it is likely to be painfully slow."²

The extreme weakness of the labor market became the focus of attention of many U.S. policymakers. Policy response was comprehensive and involved measures aimed at the stabilization of the financial system, improvements in credit and liquidity and the American Recovery and Reinvestment Act (ARRA) - an aggressive fiscal expansion. One of the goals of ARRA was to create and save jobs.

How does this recession compare to the other ones? What is the main driving force of rising unemployment? Is it fueled by higher worker inflows into unemployment or decreasing worker outflows? Are some demographic groups affected more than others? Is ARRA helping the most vulnerable? We take a stab at answering these important questions by examining labor market experiences of several demographic groups. We compare the experiences of men and women and control for age and race -an important variable in the United States. We find that both outflows and inflows to unemployment need to be considered when explaining differences in unemployment experiences during this recession. Men's decline in the job finding probability and women's decline in the job separation probability during this recession seem particularly important. We also find that it is important to be mindful of the changes in labor force composition when comparing aggregate measures of labor market performance over time. For instance, when aging of labor force in the U.S. economy is taken into account, this

²Yellen . 2009-<http://www.frbsf.org/news/speeches/2009/0728.html>

recession looks even more severe.

The paper is organized as follows. Section 2 discusses reasons to expect heterogeneity in employment experiences during economic downturns and briefly summarizes the relevant literature. The data is discussed in Section 3. We present our empirical methodology in section 4. Section 5 documents the current state of the U.S. labor market for different demographic groups and compares it to previous recessions. Section 6 discusses policy response and section 7 concludes.

2 Heterogeneity in Employment Experiences and Background Literature

There are reasons to expect labor market experiences to differ across demographic groups during expansions and even more so during recessions. Job segregation, differences in labor market attachment and job tenure, and employment discrimination all could serve as mechanisms by which women and men have different work experiences during times of economic downturn. With regard to race and age, one motivation is theoretical work by Blanchard (1995), which argues that economic downturns have "ladder effects" adversely affecting lower-income individuals. In this section, we outline the potential reasons for expecting differential employment responses during changing economic conditions in the labor market. In the first instance our focus is on gender differences as research especially with regard to gender on this issue is sparse.

2.1 Employment segregation

Empirical evidence in OECD countries indicates that women tend to work in a different and narrower range of occupations than men, leaving the possibility of unevenly distributed employment effects during times of economic change.³ Traditionally, men are more likely to be employed in manufacturing and agricultural professions while women tend to concentrate in administrative, public, and service sector occupations in a more restricted range of professions. In the 1990s, OECD countries saw the beginning of a greater demand for women in the labor market due to: technological change that allowed substitution of men and women workers, the rise of the service sector and the decline of the production sector, increased education levels of women, and effective anti-discrimination policy measures. As discussed in the next section, while women's labor market attachment increased, occupation and industry segregation, although declining, has remained an issue (Dolado et al. (2002)). Given the existence of occupational and industry segregation, a differential employment effect by gender due to the onset of a recession can be expected, if these sectors have for example, differing degrees of interest rates sensitivity. Cyclical properties of certain industries and occupations could also result in a gendered employment effect. For example, in European Union (EU) countries, women's relative lower unem-

³Both demand- and supply-side explanations for employment segregation have been advanced. On the demand side, employer discrimination against women, including the perception that women are on average less qualified, could result in a greater willingness to hire men and a greater willingness to lay off women first during economic downturns. On the supply side, one explanation is that women self-select into occupations that require smaller human capital investment, due to lower penalties for career breaks. This could be attributed to "societal discrimination" whereby women are expected to bear the burden of raising children, thus requiring more flexible jobs.

ployment rates in the past have been attributed to female labor shifts from manufacturing to the service sector, the latter being less affected by the business cycle. Hence, women, by concentrating in industries less sensitive to business cycle swings, shelter themselves from both negative and positive business cycle effects (Buddelmeyer et al. (2004b)). More recently, the influences of changes in occupational distribution, rather than distributions by industry, have been highlighted as having a greater effect on employment. Using United Kingdom data, Rives and Sosin (2002) show that although at times of recession, unemployment rises for both genders, the occupational distribution favors women's employment. More specifically, within occupations, women's unemployment rates are consistently higher than men's, but the distribution of occupations favors women because low unemployment occupations have relatively higher proportions of women. This evidence suggests the possibility of gender-specific employment effects, although the direction of that effect is ambiguous.

2.2 Labor market attachment

Men's and women's employment effects due to changing economic conditions may also take place due to gender differences in the division of part-time and full-time work and labor market attachment (resulting from men's and women's different roles in the care economy) and its correlation with occupational segregation. In both Europe and the US, women have a considerably lower presence in full-time work compared to men (see for example, Blank (1998); Buddelmeyer et al. (2004a); Bardasi and Gornick (2008)) and concentrate in temporary and part-time jobs, which are more sensitive to

economic downturns and upswings. Occupational segregation is also positively correlated with the share of part-time jobs, as these jobs tend to be in occupations traditionally held by women.

2.3 Job tenure

A third reason we could expect differential employment responses is the difference between genders in job tenure (Munasinghe and Reif (2008)). Researchers have found that women have shorter tenure (one reason is that they leave work to start families) and consequently may be laid off faster than men (see Booth et al. (1999) for the case of the UK). As a result, in times of economic downturns women may suffer more in terms of employment. However, workers with substantial tenure may also be disproportionately hurt in terms of employment during economic downturns. Ruhm (1987) finds that although the inverse relationship between job duration and turnover rates holds in the US, workers with substantial tenure in recently held jobs are more vulnerable during cyclical fluctuations. This effect is strengthened in sectors that are hit particularly hard by recessions. Overall, it is clear that there are differences in job tenure between men and women, and that tenure affects employment responses to economic conditions.

2.4 Gender discrimination

Employer gender discrimination can also result in employment segregation and cause a gendered employment effect during recession. Employers may perceive the productivity of men and women differently and prefer to hire one over the other, either in hiring/firing the more productive or hiring/firing

the seemingly less productive and offering a lower wage. This type of behavior may not be evident when the economy is operating close to full employment but can certainly be in effect in times of economic downturns. Although the argument of employer discrimination is difficult to maintain with the existence of widespread occupational segregation, there is empirical evidence for the US showing that in male-dominated occupations and industries, the unemployment rate for women has in the past increased more at the cycle troughs (see the literature review in Rives and Sosin (2002) and Azmat et al. (2006)). More recently, Singh and Zammit (2002) found that women in developing countries were fired at substantially higher rates than men after the Asian financial crisis. Another study also found that employers in developing countries may prefer to hire men as a means of reducing costs in recessionary times given that women are more likely to go on leave due to maternity or illness despite the fact that they are perceived as reliable employees (Seguino (2003)).

3 Data

We use current, publicly available data from the Current Population Survey (CPS). The CPS is a monthly survey of households conducted by the U.S. Bureau of Census for the Bureau of Labor Statistics. It provides data on the labor force, employment, unemployment, persons not in the labor force, hours of work, earnings, and other demographic and labor force characteristics. For this project unless otherwise stated, we use monthly aggregated unemployment data disaggregated by age, gender and race. The

three main unemployment series are: the number of unemployed, the unemployment rate and the number of short-term unemployed (those unemployed for less than 5 weeks).⁴ The unemployment rate and the number of unemployed is available for the whole sample (1948:1 to 2009:12) and the data for short-term unemployed is often available from mid-1970s (1976:1 to 2009:12). Thus, the beginning of our period of analysis is driven by the availability of the data yet, our results and discussion are focused on the current recession.

4 Empirical Methodology

We first examine unemployment rates, which give us an idea of the share of people in the labor force that are not working in a given period of time or the probability that a randomly chosen person will be unemployed. Next, we take a dynamic approach and estimate the underlying movements of workers into and out of unemployment. These are typically referred to as the inflow rate (s_t), which is the pace at which workers move *into* unemployment and the outflow rate (f_t), the pace at which workers move *out of* unemployment.

During recessions, generally, we see more people losing jobs and becoming unemployed, hence we expect the inflow rate to increase. At the same time, it is harder for people to find jobs, hence we expect the outflow rates to decrease. Yet, there is quite a disagreement in the literature as to which is the main driver of the unemployment rate. Earlier literature found flows

⁴The 1994 re-design of the CPS survey introduces a discontinuity in the measurement of unemployment duration and other labor force variables. To make the series consistent over time, we apply the adjustment factors described in Elsby et al. (2009). Other adjustment methods include Polivka and Miller (1998) or Shimer (2007), for example.

into unemployment to be the main driver of unemployment hence "The Ins Win" title of the seminal paper by Darby et al. (1986). Later work claimed the opposite with Robert Hall (e.g. Hall (2005a), Hall (2005b)) and Robert Shimer (e.g. Shimer (2005), Shimer (2007)) being, perhaps, the strongest voices arguing that "outs" of unemployment explain much of unemployment dynamics. Finally, a recent strand of literature finds that "everyone's a winner" -i.e. both ins and outs are important in a complete understanding of cyclical unemployment (Elsby et al. (2009)). In this paper, we revisit this issue during the most recent downturn with a particular focus on differences across demographic groups. We find that to explain differences across demographic groups both ins and outs into unemployment need to be considered as their contribution varies over time and across population groups.

We use Shimer's methodology for computing flows into and out of unemployment. We assume that during period t the job finding (outflow) rate and job separation (inflow) rate are governed by a Poisson process with arrival rate f_t and s_t , respectively. That is unemployed workers find a job according to $f_t \equiv -\log(1 - F_t) \geq 0$ and employed workers lose a job according to $s_t \equiv -\log(1 - S_t) \geq 0$. F_t and S_t are finding and separation *probabilities*.⁵

We follow the model outlined in Shimer (2007) in which unemployment and short-term unemployment increase and fall according to

$$\dot{u}_{t+\tau} = e_{t+\tau}s_t - u_{t+\tau}f_t \tag{1}$$

⁵*Probabilities* summarize the concentration of spells at each instant along the time axis, while *rates* summarize the same concentration at each point of time, but conditional on survival in that state up to that instant.

$$\dot{u}_t^s(\tau) = e_{t+\tau}s_t - u_t^s(\tau)f_t \quad (2)$$

where $e_{t+\tau}$ is the number of employed workers at time $t + \tau$, $u_{t+\tau}$ is the number of unemployed workers, and $u_t^s(\tau)$ is short-term unemployment, i.e. workers who are unemployed at time $t + \tau$, but were employed at some time before $t' \in [t, t + \tau]$. Once the equation is solved and a number of simplifying assumption imposed, the number of unemployed workers at time $t + 1$ is equal to the number of workers at time t who do not find a job (fraction $1 - F_t = \exp^{-f_t}$) plus the number of short-term unemployed workers u_{t+1}^s , those who are unemployed at $t + 1$, but held a job at some point during time t .

$$u_{t+1} = (1 - F_t)u_t + u_{t+1}^s \quad (3)$$

Thus the monthly job finding probability is equal to

$$F_t = 1 - \left[\frac{u_{t+1} - u_{t+1}^s}{u_t} \right] \quad (4)$$

and the outflow hazard then

$$f_t \equiv -\log(1 - F_t) = -\log \left[\frac{u_{t+1} - u_{t+1}^s}{u_t} \right] \quad (5)$$

Finding the inflow hazard is more complicated as some workers that flow into the unemployment pool exit unemployment before the next period, hence they are not counted and as a result the measured stock of short-term unemployed is in fact underestimated. One can solve equation (1) to obtain

an implicit expression for the separation probability

$$u_{t+1} = \frac{(1 - \exp^{-f_t - s_t})s_t}{f_t + s_t} l_t + \exp^{-f_t - s_t} u_t \quad (6)$$

where $l_t \equiv u_t + e_t$ is the size of the labor force during period t .

This continuous time formulation allows to avoid the time aggregation bias that occurs in a discrete time model in which the information on workers that lose and find a new job within the same period is omitted. For more details, see Shimer (2007).⁶

It is important to note that this approach assumes that all inflows into unemployment come from employment whereas, flows into unemployment can also originate from previous non-participation in the labor force. However, one of the requisite series for such analysis, the number of unemployed for less than 5 weeks by reason of unemployment, is not readily available for the demographic groups this project focuses on.

4.1 Demographic Adjustment

The sample of analysis spans over six decades, which represents over two generations. During this time there have been many cultural and demographic changes in the United States, which may have affected the unemployment rates and subsequently the job finding and job separation probabilities. We take this into account by comparing adjusted-hypothetical measures with the actual ones further discussed in the empirical section of the paper. Our

⁶An alternative approach to correct the CPS data for the time aggregation bias would be to impute discrete weekly hazard rates. Yet, Elsby et al. (2009) show that both types of correction yield broadly similar results

hypothetical measures discussed in section 5.1 keep labor force shares of certain sub-groups constant, thereby "purging out" the effects of changes in the labor force composition.

4.2 Impact of Flows into and out of Unemployment on the Unemployment Rate

In addition to computing flows into and out of unemployment, we also look at the contribution of these flows to increases in unemployment rate during recessions. As Elsby et al. (2009) point out, all that is necessary is to compare the log variation in the two rates. In order to see this, first note that several studies have shown that actual unemployment rate (\tilde{u}_t) dynamics is closely approximated by the steady state unemployment rate (u^*):

$$\tilde{u}_t \equiv \frac{u_t}{l_t} \approx \frac{u_t^*}{l_t} = \frac{s_t}{s_t + f_t} \quad (7)$$

Log differentiate the above to obtain

$$d \log \tilde{u}_t \approx (1 - \tilde{u}_t)[d \log f_t - d \log s_t] \quad (8)$$

One can also multiply both sides by \tilde{u}_t to obtain an expression for the change in unemployment rate:

$$d\tilde{u}_t = \tilde{u}_t(1 - \tilde{u}_t)[d \log f_t - d \log s_t] \quad (9)$$

Either way, this yields a separable decomposition of unemployment rate changes into contributions from inflow and outflow rates. We use this decom-

position to study increases in the unemployment rate during every recession in our sample. As a first step, we identify start and end dates for the unemployment increase associated with each recession. We identify the start date as the minimum quarterly unemployment rate preceding each NBER recession start date.⁷ The end date is the date of the unemployment rate peak during the recession.⁸

5 The Current State of the U.S. Labor Market

As mentioned in the introduction, during the recent downturn about 8.4 million jobs have been lost in the U.S.. The national unemployment rate reached a high of 10.1 percent (October, 2009), bringing back memories of unemployment rates as high as 10.8 percent reached during the recession of the early 1980 (See Figure 1). To gain additional insight into which forces lead to high unemployment rates during recessions we examine job finding and separation probabilities. The average job finding probability (Ft) during the whole sample period (January 1948 - March 2010) is rather high at 43 percentage points and volatile, while the average separation probability (St) is rather low at 3.3 percentage points and exhibits less variation (See Figure 2).

The extent to which flows into and out of unemployment contributed to the increase in unemployment during this recession and how that compares

⁷Note that here we focus on quarterly (rather than monthly data) to smooth some of the noise.

⁸Please note that our choice of dates is different than in Elsby et al. (2009), because we choose the minimum rather than *the most recent* pre-recession minimum unemployment rate.

to previous recessions can be seen in Figure 3. We find that until the 1990s, both separation and finding probability played a role in unemployment rate increases. Interestingly, in those cases when both flows played a significant role, large recessionary increases in unemployment were accompanied by strong declines. In contrast, the recessions of the 1990s were characterized by large declines in job finding probability and job separation played a relatively minor role in the aggregate unemployment rate dynamics. Thus, unemployment rate increases during those two recessions were driven more by the lack of hiring than firing of workers. The return of unemployment to lower levels after those two recessions was much more gradual (hence, these recoveries are often described as jobless). Our results indicate that the current downturn is similar to the two preceding it in a sense that the decline in job finding rate played a much larger role than the increase in separation. This supports the view that it will take the unemployment rate a while to recover following the current downturn.

To give the reader a bit more detail about the severity of the most recent downturn, the job finding probability fell from the pre-recession peak of just above 40 percentage points to a low 17 percentage points. This level is the lowest observed since 1948. The decline in job finding probability from pre-recession peak to trough is 57 percent. This is the largest peak-to-trough decline observed since data collection began (the next largest decline observed is equal to 45 percent (in the 1950s)). The separation probability increased from a pre-recession low of slightly below 2 percent to a peak of just above 3 percent over the course of the most recent recession. At 3 percent, the separation probability is not extraordinarily high, as similar

levels were observed during the previous recession and higher levels were observed in prior recessions.

Shimer (2007) points out the secular decline in separation probability since the early 1980s. Recent data does not contradict this conclusion. However, the increase in the job separation probability over the course of the most recent recession allows for a possibility of a reversal of this trend.

5.1 Age

One possible explanation for the changes in the aggregate unemployment rate and probabilities of losing and finding a job is the change in the composition of the labor force. One dimension of the changing labor force discussed here is the aging of the babyboomers and resulting increase in the share of prime age adults.⁹ Older age groups, on average, have a lower unemployment rates, and also lower job finding and separation probability (see Table 1). An increase in their share in total labor force might drive the aggregate job finding probability down. To verify this hypothesis we next examine how the unemployment rate and probabilities would have evolved if the population shares had remained constant and whether the aging of the population can partly explain the observed changes in the aggregate unemployment rate.

Let the aggregate unemployment rate be expressed in the following way:

$$U_t = \sum_{i \in I} \omega_t(i) u_t(i) \quad (10)$$

⁹Another is an increase in the share of adults with higher education, which we do not consider explicitly in this paper.

Table 1: Average Job Finding (F) and Separation (S) Probabilities (1976-2010) (Standard Errors in Parenthesis)

	Men		Women	
	F	S	F	S
16-19	0.49* (0.004)	0.14* (0.001)	0.53* (0.004)	0.14* (0.002)
20-24	0.40* (0.004)	0.06* (0.000)	0.47* (0.004)	0.06* (0.001)
25-34	0.35* (0.003)	0.03* (0.000)	0.41* (0.004)	0.04* (0.001)
35-44	0.31* (0.003)	0.02* (0.000)	0.37* (0.004)	0.02* (0.000)
45-54	0.28* (0.014)	0.01* (0.001)	0.34* (0.017)	0.02* (0.001)
55+	0.29 (0.003)	0.01 (0.000)	N/A	N/A

Source: Authors' calculations.

Note: * indicates results between men and women are statistically significantly different at 5%.

where $\omega_t(i)$ is the fraction of workers at age i at time t , so $\sum_{i \in I} \omega_t(i) = 1$ for all t . $u_t(i)$ is the unemployment rate at age i time t . Here the aggregate unemployment may rise if the unemployment rate of different workers ($u_t(i)$) rises or the population shifts toward groups with higher unemployment rates, so either $w_t(i)$ rises for those with high $u_t(i)$ or falls for those with low $u_t(i)$.

Next, in order to understand what would be the unemployment rate if there were no changes in the age structure of the population we create a hypothetical unemployment rate by assuming for the entire sample period constant shares of employment at each age¹⁰ i and summing them across each age group j . In other words, we assume $\omega_t(i) = \omega(i) = \text{const}$ ¹¹ for all t and we group the population into the following age groups: $J = \{16 - 19, 20 - 24, 25 - 34, 35 - 44, 55+\}$. Our hypothetical unemployment rate is then of the following form:

$$U_t^h = \sum_{j \in J} \omega(j) u_t(j) \quad (11)$$

where $\sum_{j \in J} \omega(j) = 1$. The gap between the two series (U_t and U_t^h) will indicate the extent to which changes in the aggregate unemployment rate are due to changes in demographics.

Similarly, we construct hypothetical job finding and separation probabilities. That is, we fix each sub-group's weight and allow group-specific job finding or separation rates to fluctuate across time.

¹⁰We assume people in the sample are 16-65 years old hence the share at each age is 1/48.

¹¹Although the choice of base year is irrelevant, we prefer this "year independent" formulation as it provides us with a clear picture of the changing demographics throughout the sample period, which is more intuitive and not only in relation to the base year.

In Figure 1 we plot the actual and hypothetical unemployment rate. In the 1970s, we begin to see the effect of demographic changes on the aggregate unemployment rate as the baby boomers are entering the labor market and are driving the aggregate unemployment rate up compared with the hypothetical situation where the population age shares would be constant. This is taking place as young workers' unemployment rate is much higher than the rate for adult workers (See Figure 13 for age group shares in the labor force and age-specific unemployment rates). In the late 1990s the actual unemployment rate is lower than the hypothetical one because of the aging of the baby boomers and a larger share of the population is with a lower unemployment rate. During this last recession the gap is even larger. Again, thanks to the aged baby boomers the unemployment rate is about one percentage point lower than it would have been if the demographic structure had not been changing in favor of those traditionally with lower unemployment rates (adult and older workers).¹²

Figure 1 illustrates the importance of taking into account changes in the composition of the labor force when making comparisons of aggregate statistics across time. Aggregate unemployment rate series suggest that this recession is not as severe as those of the 1980s, as the peak of unemployment rate reached during this recession (10.1%) is below that of the 1980s (10.7%). However, a look at the hypothetical unemployment rate reveals that, in fact, this recession is the most severe one in the sample period, as the peak of hypothetical unemployment rate is above any other.

¹²Part of the explanation for low rates of unemployment for older workers are exits from the labor force.

We also find that such demographic adjustments are important for probabilities of losing and finding a job, especially for the job separation probability. The hypothetical/adjusted probabilities in Figure 2 suggest a lower job finding probability throughout the sample period. The separation probability would have been lower in the late 1970s and higher since then. This is again due to the aging of the baby boomers. As shown in Table 1, those in younger age groups tend to have higher separation and finding probability (note that those in the 16-19 and 20-24 age groups have considerably higher job separation probabilities than those in all other age groups). The decline in the share of those 24 and younger in the labor force since early 1970s causes the actual job separation probability to be lower than the adjusted one for the period of decline in the share of the young ones. As for the job finding probability, the calculation of adjusted series assumes a higher share for those 45 and older. Since the job finding probability for these age groups is lower, the adjusted job finding probability falls below the actual one. The main conclusion we reach from looking at hypothetical probabilities is that the decline in the job separation probability since the early 1980s is not nearly as pronounced when we control for the change in the age structure of the labor force (i.e. this change is driven, in part, by demographics).

Our findings indicate that this recession in many ways is different from those in the past (in terms of degree of severity and the driving forces behind the increase in the unemployment rate) and as a result will have different implications for the well-being of households and individuals. In order to get a better understanding of those most affected we proceed by examining differences in employment experiences in the most recent recession among

men and women and by race. We note that while the understanding of the experiences of certain demographic groups may not be necessary for those trying to understand aggregate unemployment rate dynamics, others, for instance, those interested in policies aimed at sheltering the most vulnerable might benefit from such discussion.

5.2 Who has been hit the hardest?

Examining the composition of employment and job losses suggests that some demographic groups have been hit harder than others (see Table 2). For example, for the youngest group (under 25), the share of job losses (18 percent) exceeds the group's share in employment (13 percent) with young men suffering relatively slightly more than young women. In addition, although the oldest group (55 and over) suffered relatively less than their employment share would indicate assuming an even distribution of job losses, older women suffered relatively more by this measure. With respect to race, blacks are affected more than whites-both men and women. In this section, we will look at unemployment rate and flows into and out of unemployment by different demographic groups.

5.2.1 Gender

In the United States the unemployment rate for men had been lower than for women until the early 1980s. Since then, the situation reversed particularly during recessions (see Figure 4 for gender-specific unemployment rates). In August 2009, the male unemployment rate was 2.7 percentage points higher than that for females - the largest unemployment rate gap observed in the

Table 2: Demographic composition of employment and job losses (percent).

	Men		Women		Total	
	Emp.comp.	Job loss.	Emp.comp.	Job loss.	Emp.comp.	Job loss.
lt 25	13	20	14	19	13	18
25-54	69	64	68	61	69	65
55+	19	16	18	20	18	16
	100	100	100	100	100	100
White	83	80	81	77	81	79
Black	10	15	12	16	11	15
Other	7	5	7	7	8	6
	100	100	100	100	100	100
Total	54	65	46	35	100	100

Source: Authors' calculations and Bureau of Labor Statistics.
 Note: Employment composition in 12/07. Job losses as of 11/09.

history of the series. When comparing unemployment rates between men and women for different age groups (results available upon request) we found similar results. This is particularly visible for prime age workers, where the male and female unemployment rate tended to converge since the 1980s (unemployment rate gap is close to zero), but during the recent recession the gap increased dramatically.

This unusually large gap between male and female unemployment is driven by historically high unemployment rates for males. At 11.4 percent in October 2009, the unemployment rate for males stands at its highest level since 1948. The last time male unemployment rate reached the teens was during the recessions of the 1980s (the peak back then was 11.2 percent in December of 1982). For females, unemployment rate stands at 8.8 percent. While this is the highest unemployment rate we have observed for females in more than two decades, it is not an unprecedented high, as unemployment

level for females reached 10.4 percent in December 1982.¹³

Figure 5 shows the job finding and separation probabilities since 1976. At the beginning of the sample period, the job finding probability for males is lower than for females. The two probabilities start converging in the early 1990s and move closely together during the most recent downturn. The decline in job finding probability was 64.8 percent for men, and 58.5 percent for women. Both groups experienced the largest decline in the job finding probability during the sample period. The job finding probability during the current recession is at historically low levels for both women and men.

The job separation probability for men is also below that for women, but the decline in the job separation probability seen in the aggregate is driven by women, as men do not have a pronounced decline in the job separation probability. The current downturn is a noticeable exception, as the job separation probability for men increased and became higher than that for women. These results suggest that the gender gap differential observed (higher unemployment rate for men) in the current downturn can be explained by differences in job separation probabilities (with job separation probability for men exceeding that for women) and not job finding probabilities. As we have shown this phenomena has not been observed during previous recessions and is driving the current results.

The hypothetical probabilities shown in Figure 6 indicate that age matters when it comes to the job separation probability (grey dashed line). For example, for men the aggregate job separation probability in the current

¹³Looking at the age-adjusted unemployment rate gaps only strengthen this conclusion. Age adjusted unemployment rates are available from the authors upon request.

downturn seems to be below that of the 1980s, but once we adjust for age, it seems that this recession is as bad as that of the 1980s in term of the probability of losing jobs. The changing age composition does not have a very large affect on the job finding probability during the current recession (grey solid line) although it does matter overall.

Lastly, we look at contributions of job finding and separation flows to unemployment rate by gender (Figure 7). We find that job separation tends to exert larger pressure on unemployment of men than of women for the four recessions in our sample, but this is particularly pronounced in the most recent downturn, which confirms our conclusions from Figure 5.

5.2.2 Race and Gender

Next, we now take a look at the labor market indicators by race. The unemployment rate of whites stands below that of blacks (see Figure 8). The available data show that the race gap has been growing since 1976 until the early 1980s and then reversed course until the last recession when both groups saw a big spike in their unemployment rates. The trend has been for a decreasing race gap although in 4 out of 5 recessions the gap increased (the recession of the early 1990s is an exception). As a result the increase observed during the most recent downturn is not unusual although it is rather large in magnitude. The peak of 6.4 percent reached in September of 2009 is about half of what was observed during the recession of the 1980s (for instance, the gap reached 12.1 percent in January of 1983). Comparing the unemployment rate by race and gender (Figure 9) reveals that the increase in the race unemployment gap during the current recession is driven by the

increase in the unemployment rate gap for males, as the unemployment rate gap for females actually declined.

Turning to job finding and separation probabilities (Figure 10 and 11, respectively), we find that for whites job finding probabilities are for the most part higher than for blacks. During the current economic downturn, peak-to-trough decline in job finding probability was higher for blacks. Job separation probabilities have remained lower for whites, although for blacks, they have been steadily declining since 1976 for both women and men. Since the mid-1990s there is about a 1 percentage point difference in probabilities between the two race groups.

The race unemployment gap for women has decreased resulting from the convergence of the two probabilities for women. It seems that for men, the observed increase in the race unemployment gap is driven by differences in job separation probabilities, as job separation probability for blacks jumped noticeably above that for whites during the recent recession (see Figure 11). Thus, once again, we see that the job separation rate is playing an important role in explaining the differences between unemployment rates across demographic groups.

In terms of contributions to increases in unemployment rate, for both black and white workers (men and women) the reduction in the job finding probability is the main driver of the recessionary increases in unemployment rate (see Figure 12). For either race, the job separation probability played a larger role in the increase of the male rather than female unemployment rate.¹⁴

¹⁴The gender-specific changes in inflow and outflow rates for the two races are not

6 Policy Response

After documenting the current state of the U.S. labor market, we turn to policy response. In particular, we look into the American Recovery and Reinvestment Act (ARRA) of 2009, whose purpose (among others) is to save and create jobs. The Council of Economic Advisers (an agency within the Executive Office of the U.S. President charged with offering the President objective economic advice on the formulation of both domestic and international economic policy) estimates that ARRA would increase employment by 3.5 million by the end of 2010 and 6.8 million by the end of 2012 (Council of Economic Advisers (2009)).

The employment and unemployment experiences during economic downturns, however, vary by demographic groups. The Obama administration recognizes this and one of ARRA's aims is to protect the most vulnerable from the deep recession. The administration estimates that roughly 42 percent of jobs created will go to women, which as of December 2007 held about 48% of jobs and initially (until the end of November, 2008) accounted for about 27% of the job losses during the current recession (Romer and Bernstein (2009)).¹⁵ In order to assess whether this recovery package favors one demographic groups over another (for example, women over men) we would need to understand the reasons lower shares of, for example, women are employed in certain industries in the first place (due to discrimination or individual preferences). As a result assessing the equity of the stimulus

presented in this paper, but are available from the authors upon request.

¹⁵Our most recent calculations based on Dec 2007-Nov 2009 data indicate women lost about 35% of the jobs (see Table 5).

Table 3: Change in Payroll Employment 2007-2009

	Q1	Q2	Q3	Q4
2007	133	82	2	167
2008	-113	-153	-208	-553
2009	-691	-428	-199	-69

Source: Department of Labor (Bureau of Labor Statistics)

package based on raw data alone is not fully satisfactory. Other evidence on the demographic split of jobs created by the ARRA forecasts that less jobs will go to whites compared to their initial employment share before the recession, while nonwhites will not gain significantly. The highest job losses not addressed by ARRA will be for those with low education levels (high school or less)(Zacharias et al. (2009)).

Compared to the above studies, which forecast the likely path of recovery, the most recent estimates of the impact of the ARRA published by the Council of Economic Advisers (Council of Economic Advisers (2009), Council of Economic Advisers (2010)) examine the effect of the stimulus plan relative to a baseline scenario. Using past data of GDP and employment and actual data from 2009 these estimates indicate that employment would be about 2 million jobs lower without the ARRA. In Table 3, BLS data indicate the extent to which there has been a systematic decrease in the number of jobs lost since the onset of the recession.

Using the employment effects calculated by the CEA we estimate the possible job effects by gender by industries given the share of groups employed in each of the industries (see Table 4). We see that for some industries the net gain of total jobs considering the baseline scenario is larger than their

Table 4: Employment Effects of the Recovery Act by Sector, 2009:Q4

Factor	Empl. Share	Share of total jobs created			Total jobs (000s) CEA	Fraction Female	Jobs Women (000s) CEA
		Gov.	Levy Private	CEA			
Mining and Logging	1%	2%	2%	0%	8	13	1
Construction	5%	5%	10%	13%	262	13	34
Manufacturing	9%	8%	9%	17%	354	29	103
Trade, Transportation and Utilities	19%	15%	16%	22%	459	43	197
Information	2%	2%	2%	5%	101	42	42
Financial Activities (FIRE)	6%	5%	5%	3%	61	59	36
Professional and Business Services	13%	12%	13%	25%	510	44.7	228
Education and Health Services	15%	10%	13%	2%	46	77	35
Leisure and Hospitality	10%	8%	7%	8%	165	53	87
Other Services	4%	4%	4%	2%	43	52	22
Government	17%	29%	19%	3%	60	57	34
Total Nonfarm Employment	100%	100%	100%	100%	2068		955

Sources: Authors' calculations; Bureau of Labor Statistics; Council of Economic Advisers (2009); Zacharias et al. (2009)

Notes: Items may not add to total due to rounding. In bold if estimate of share of jobs created is larger than the share in employment. Employment composition in 12/07. Levy estimates is ARRA employment estimated as in Zacharias et al. (2009) considering two scenarios (government and private). See text.

share in total employment (in bold: construction, manufacturing, trade and to the largest extent professional and business services) as compared to the other sectors (education and health services, leisure and government). Taking into account the equity effects of the ARRA one should note that in the former industries the majority of employees are men as compared to the latter group. In Table 4 besides the estimates of the CEA, for comparison purposes we also include two types of estimates of jobs created performed by the Levy Institute based on different assumptions.¹⁶ These matched well with CEA estimated considering the total number of jobs created in 2009-2011 (about 6.2 million), but there is some variation when comparing the results by industry (particularly for manufacturing, professional and business services and government).

Finally, we compare the impact of the fiscal stimulus on employment by demographic groups with the employment composition and job losses until late 2009 (see Table 5). We find that men and the young have suffered in terms of job loss relatively more than their share in employment would suggest. Job creation estimates suggest that the nonwhite will benefit relatively more than the white from ARRA job creation and the young relatively less than prime-age adults.

¹⁶In both of these the midpoint of ‘high’ and ‘low’ multipliers for transfers, taxes and subsidies provided by the Congressional Budget Office is used. The difference lies in the further assumption regarding the industrial distribution of final demand generated by government purchases. The ‘government’ scenario assumes it is distributed among government industries and the ‘private’ scenario assumes most of the final demand increase is captured by private industries.

Table 5: Demographic composition of employment, job losses and ARRA employment

	Emp.comp.	Job loss.	ARRA emp.	
			Gov.	Priv.
Gender				
Men	54	65	60	63
Women	46	35	40	37
Race				
White	81	79	61	61
Nonwhite	19	21	40	39
Age				
lt 25	13	18	10	12
25+	87	80	90	88

Source: Authors' calculations. Bureau of Labor Statistics; Zacharias et al. (2009)

Note: Employment composition in 12/07. Job losses as of 11/09. ARRA employment estimated as in Zacharias et al. (2009) considering two scenarios (government and private). See text.

6.1 ARRA and the income distribution

Our results indicate that men, nonwhite and particularly the young have been affected relatively more (in terms of percentages) by unemployment during the current recession than their employment share would suggest. To some extent this seems to be addressed by ARRA thus affecting the distribution of earnings, although it still leaves the most vulnerable- vulnerable. Zacharias et al. (2009) estimate that jobs created by ARRA will provide higher average earnings than the earnings of earners in non-ARRA jobs by 3%. Particularly affected will be those in the bottom quintile of the earnings distribution compared to the rest of the distribution. There will be some gain for those with high school diploma, nonwhites and to women compared to men although these will not be sufficient to close the respective earnings gaps. These authors also find that the gain in average income resulting from the ARRA stimulus package will benefit those in the lower quintiles relatively more than those in the higher quintiles, but the pro-poor pattern of income growth will only have a negligible effect on the shares of aggregate income entering each quintile hence, suggesting that the overall effect of ARRA on income inequality will be negligible.

7 Conclusions

This paper measures worker inflows and outflows into unemployment in the United States between 1948 and 2009 and between 1976 and 2009 for several demographic groups. The focus of the paper are the experiences of the most vulnerable groups during the last recession and a comparison with previous

recessions.

We find that during the most recent recession the job finding probability exhibited its biggest drop from peak to trough since official measurement began (57%). In addition the job separation probability also exhibited one of the largest increases in the post-war period. The decline in the job finding probability seems to be explaining the majority of the fluctuations in the unemployment rate, which to a certain extent can be explained by the changing composition of the labor force with older workers exhibiting smaller job finding probabilities than younger workers (and at the same time smaller separation probabilities).

This recession has also been accompanied by a large gender gap in unemployment with men driving the unemployment rate upwards (particularly at older ages). Further insight shows that men currently have one of the highest unemployment rates in history due to very low job finding probability rates. The increase in separation probabilities has not been so dramatic. Gender differences though seem to be driven by the higher separation probabilities for men compared to women and not by the historically low finding probabilities for men and women.

We find that the race gap has also increased being driven by the gap for males as the differences in unemployment rates for black and white females has actually decreased. In terms of job finding probabilities, historically they have been higher for whites, and during this recession both white women and men have exhibited less of a decline in these probabilities than their black counterparts. Overall, the increase in the race unemployment gap for males seems to be driven by differences in job separation probabilities, as job sepa-

ration probability for blacks jumped noticeably above that for whites during the recent recession. Yet again, the job separation rate seems to be playing an important role in explaining the differences between unemployment rates across demographic groups.

In terms of the ARRA stimulus package and its effect on job creation the research has only begun. For the moment, we find that industries that have been hit the hardest (trade and professional and manufacturing) and employ a majority of men will benefit the most. Those suffering the most will be the low educated and the young.

References

- Azmat, G., Guell, M., and Manning, A. (2006). Gender Gaps in Unemployment Rates in OECD Countries. *Journal of Labor Economics*, 24(1):1–37.
- Bardasi, E. and Gornick, J. (2008). Working for Less? Women’s Part-Time Wage Penalties across Countries. *Feminist Economics*, 14(1):37–72.
- Blank, R. (1998). *Research in Labor Economics*, volume 17, chapter Labor Market Dynamics and Part-Time Work, pages 57–93. Greenwich, CT: JAI Pres.
- Booth, A. L., Francesconi, M., and Garcia-Serrano, C. (1999). Job Tenure and Job Mobility in Britain. *Industrial and Labor Relations Review*, 53(1):43–70.
- Buddelmeyer, H., Mourre, G., and Ward, M. (2004a). Recent Developments

in Part-Time Work in EU-15 Countries: Trends and Policy. IZA Discussion Paper 1415, Institute for the Study of Labor.

Buddelmeyer, H., Mourre, G., and Ward, M. (2004b). The Determinants of Part-Time Work in EU Countries: Empirical Investigations with Macro-Panel Data. IZA Discussion Paper 1361, Institute for the Study of Labor.

Council of Economic Advisers (2009). The Economic Impact of the American Recovery and Reinvestment Act of 2009. First Quarterly Report.

Council of Economic Advisers (2010). The Economic Impact of the American Recovery and Reinvestment Act of 2009. Second Quarterly Report.

Darby, M. R., Haltiwanger, J. C., and Plant, M. W. (1986). The ins and outs of unemployment: The ins win. NBER Working Papers 1997, National Bureau of Economic Research, Inc.

Dolado, J., Felgueroso, F., and Jimeno, J. E. (2002). Recent Trends in Occupational Segregation by Gender: A Look across the Atlantic. IZA Discussion Paper 524, Institute for the Study of Labor.

Elsby, M. W. L., Michaels, R., and Solon, G. (2009). The ins and outs of cyclical unemployment. *American Economic Journal: Macroeconomics*, 1(1):84–110.

Hall, R. E. (2005a). Employment efficiency and sticky wages: Evidence from flows in the labor market. *The Review of Economics and Statistics*, 87(3):397–407.

- Hall, R. E. (2005b). Job loss, job finding, and unemployment in the u.s. economy over the past fifty years. NBER Working Papers 11678, National Bureau of Economic Research, Inc.
- Munasinghe, L. and Reif, T. (2008). The Gender Gap in Wage Returns on Job Tenure and Experience. *Labour Economics*, 15(6):1296–316.
- Polivka, A. E. and Miller, S. M. (1998). *Labor Statistics Measurement Issues*, volume 60 of *Studies in Income and Wealth*, chapter 7, The CPS after the Redesign: Refocusing the Economic Lens., pages 249–89. Chicago: University of Chicago Press.
- Rives, J. and Sosin, K. (2002). Occupations and the Cyclical Behavior of Gender Unemployment Rates. *The Journal of Socio-Economics*, 31:287–99.
- Romer, C. and Bernstein, J. (2009). The Job Impact of the American Recovery and Reinvestment Plan.
- Ruhm, C. J. (1987). Job Tenure and Cyclical Changes in the Labor Market. *Review of Economics and Statistics*, 69(2):372–78.
- Seguino, S. (2003). Why Are Women in the Caribbean So Much More Likely than Men to Be Unemployed? *Social and Economic Studies*, 52(4):83–120.
- Shimer, R. (2005). The cyclicalities of hires, separations, and job-to-job transitions. Technical Report Jul.
- Shimer, R. (2007). Reassessing the ins and outs of unemployment. NBER Working Paper 13421, NBER.

Singh, A. and Zammit, A. (2002). Gender Effects of the Financial Crisis in South Korea. Paper presented at New Directions in Research on Gender-Aware Macroeconomics and International Economies: An International Symposium. Levy Economics Institute of Bard College.

Zacharias, A., Masterson, T., and Kim, K. (2009). Distributional impact of the American Recovery and Reinvestment Act: A microsimulation approach. Working Paper 568, The Levy Economics Institute of Bard College.

Figure 1: Aggregate Unemployment Rates

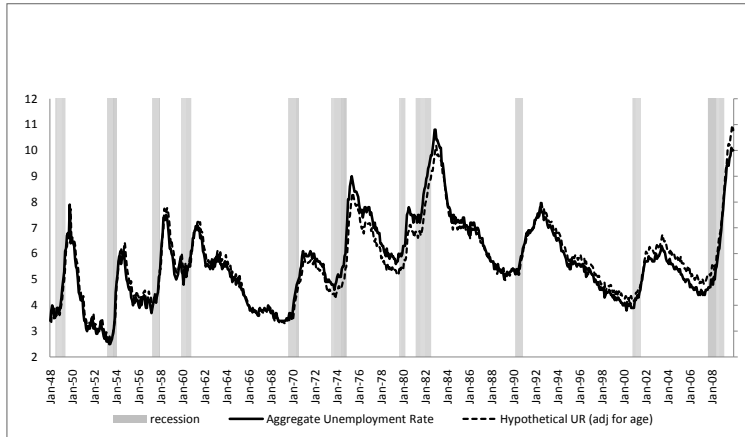


Figure 2: Aggregate Job Finding and Separation Probabilities

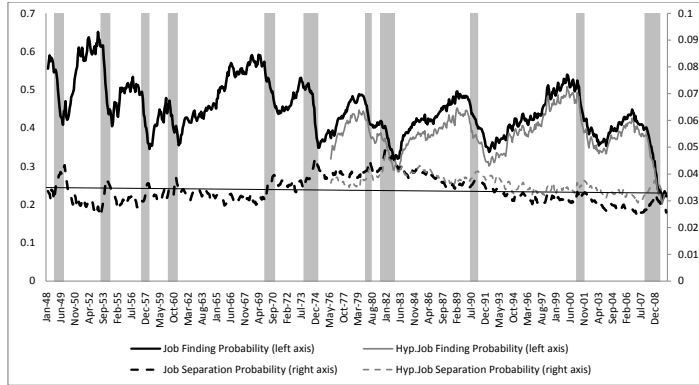


Figure 3: Aggregate Job Finding and Separation Probabilities

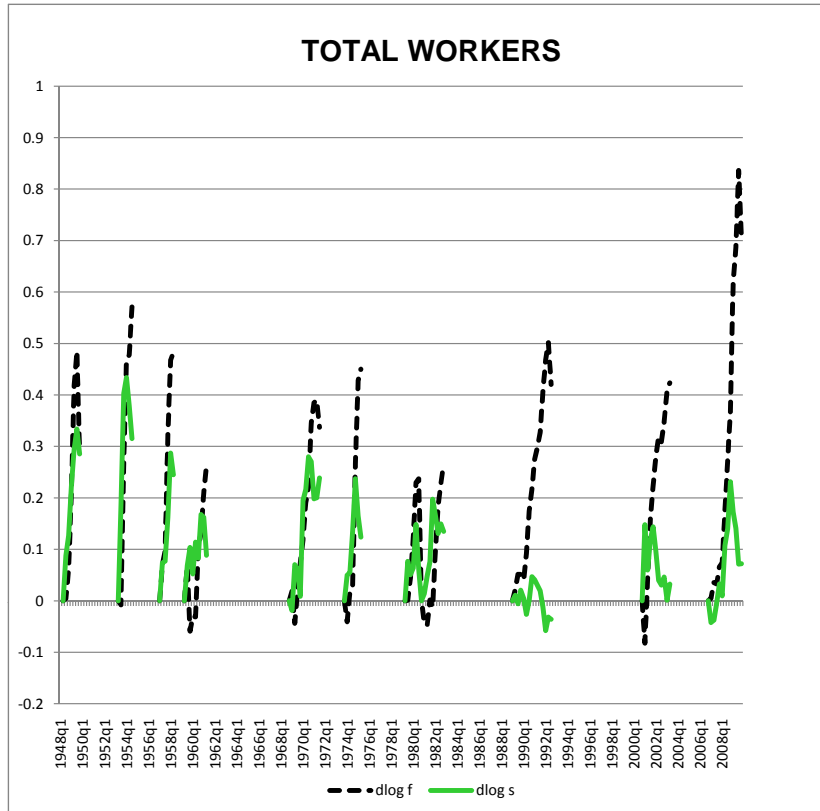


Figure 4: Male and Female Unemployment Rate

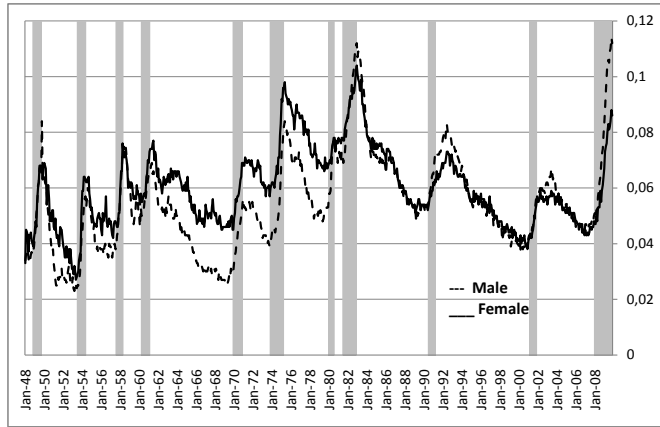


Figure 5: Job Finding and Separation Probabilities for Women and Men.

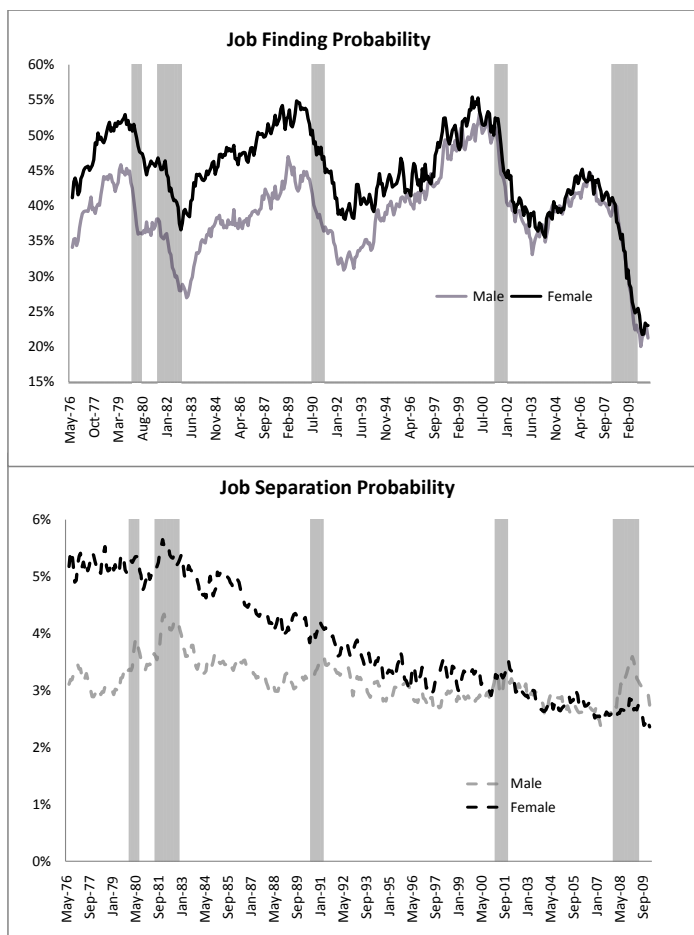


Figure 6: Actual and Hypothetical Job Finding and Separation Probabilities by Gender.

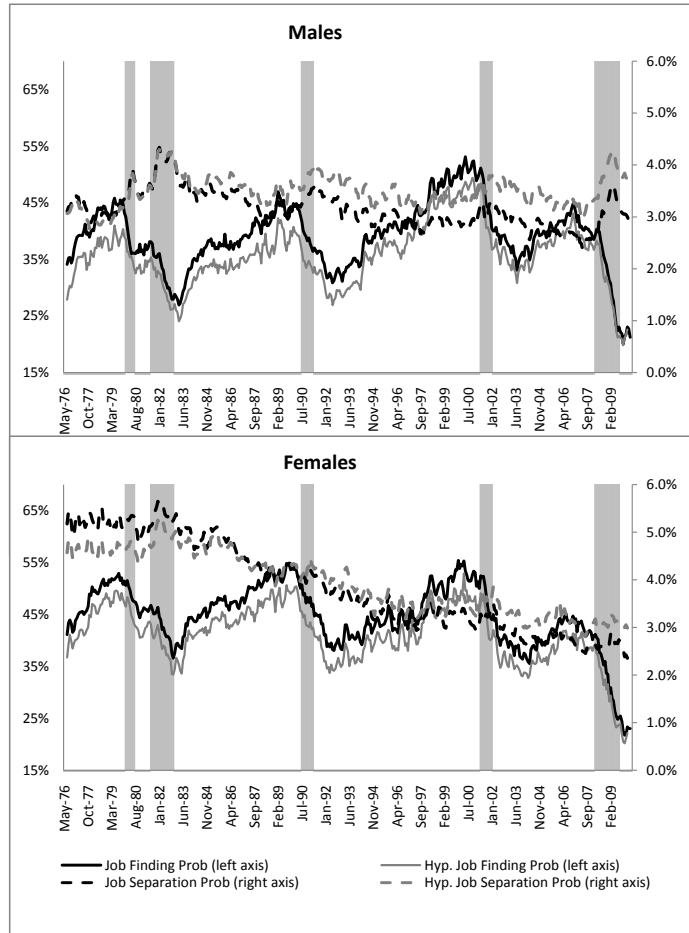


Figure 7: Changes in Log Inflow and Outflow Rates by Recession: Males vs. Females

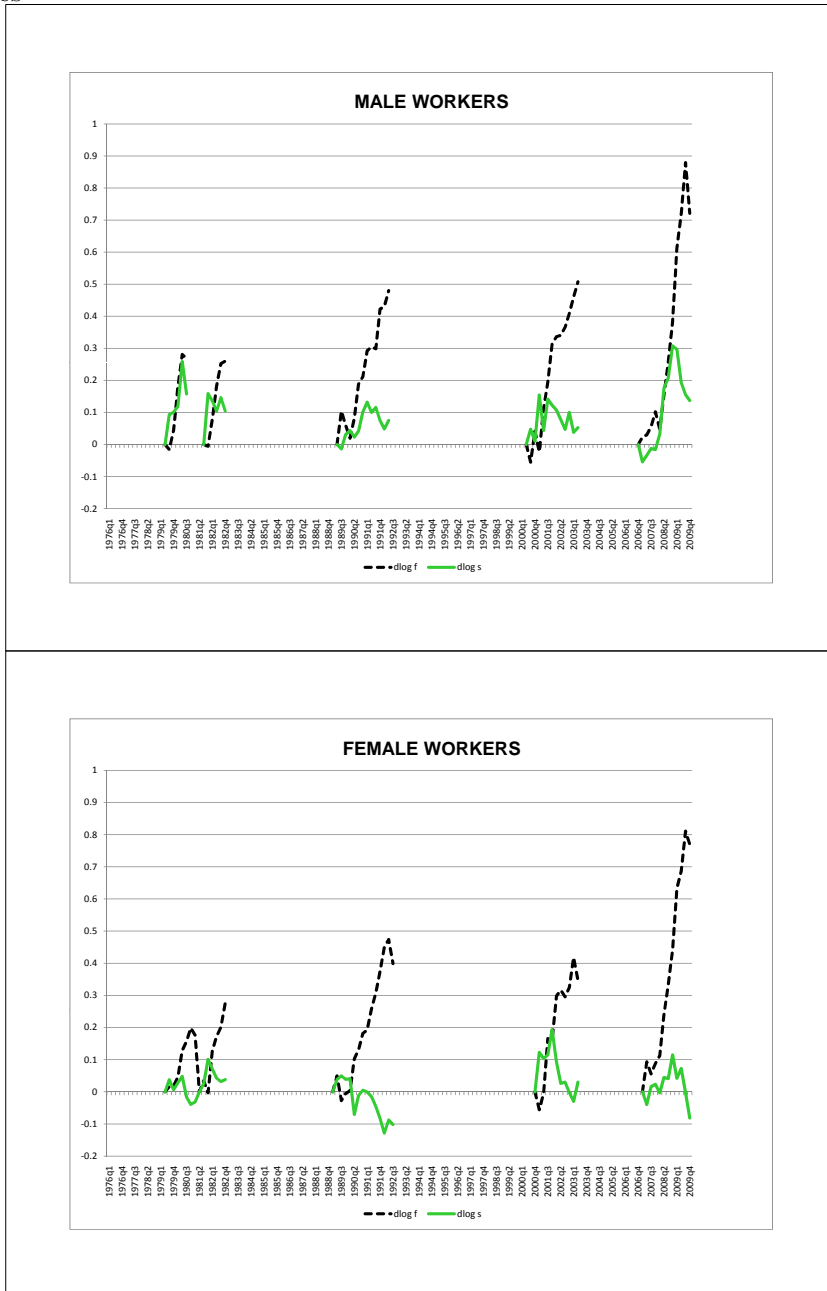
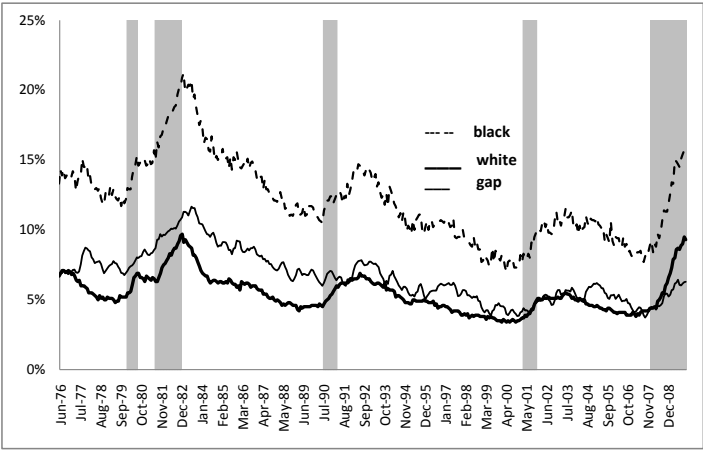
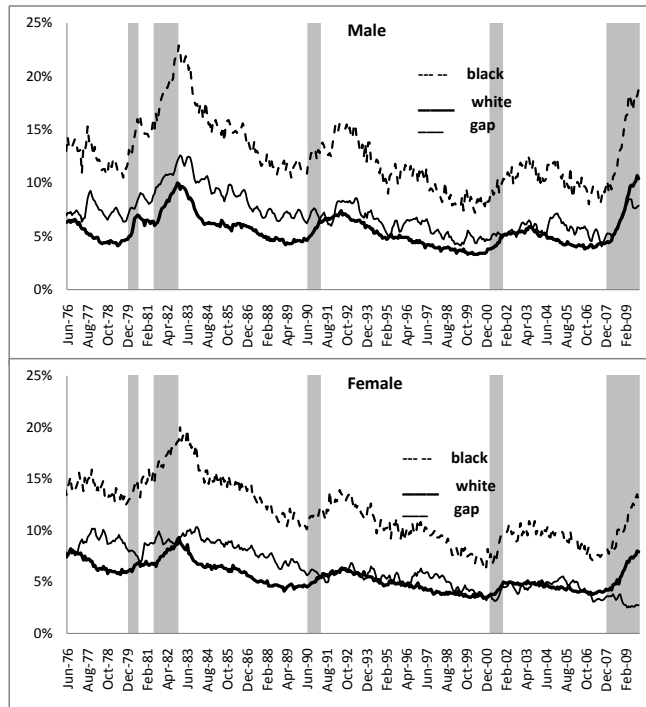


Figure 8: Unemployment Rate and Unemployment Rate Gap by Race (3-month moving average).



Note: Gap shown is the difference between black and white unemployment rates

Figure 9: Unemployment Rate and Unemployment Rate Gap by Race and Gender



Note: Gap shown is the difference between black and white unemployment rates

Figure 10: Job Finding Probabilities by Race and Gender.

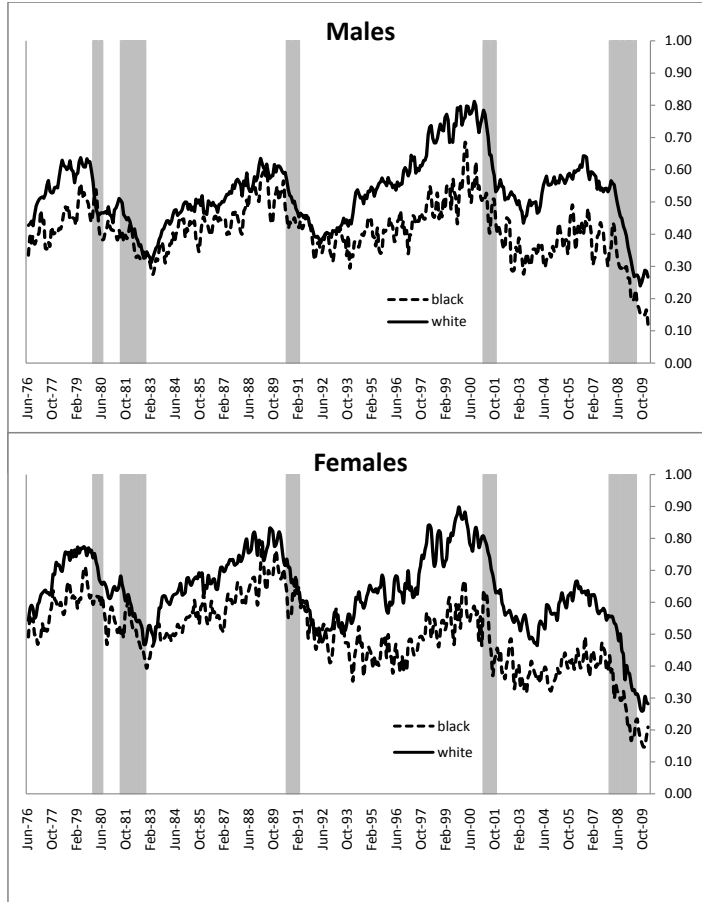


Figure 11: Job Separation Probabilities by Race and Gender.

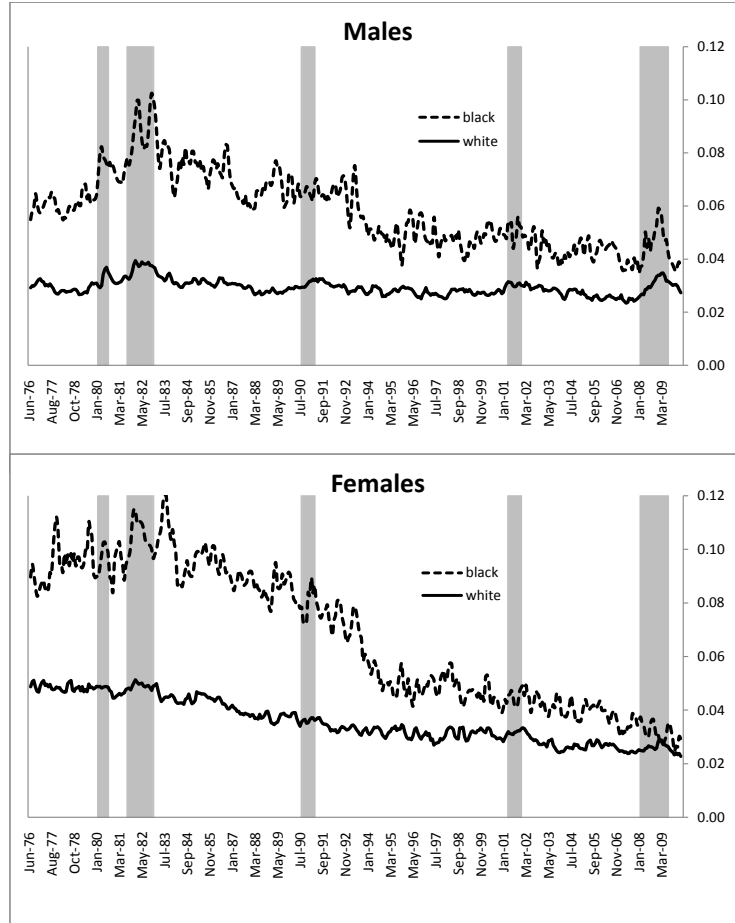


Figure 12: Changes in Log Inflow and Outflow Rates by Recession: White vs. Black Workers.

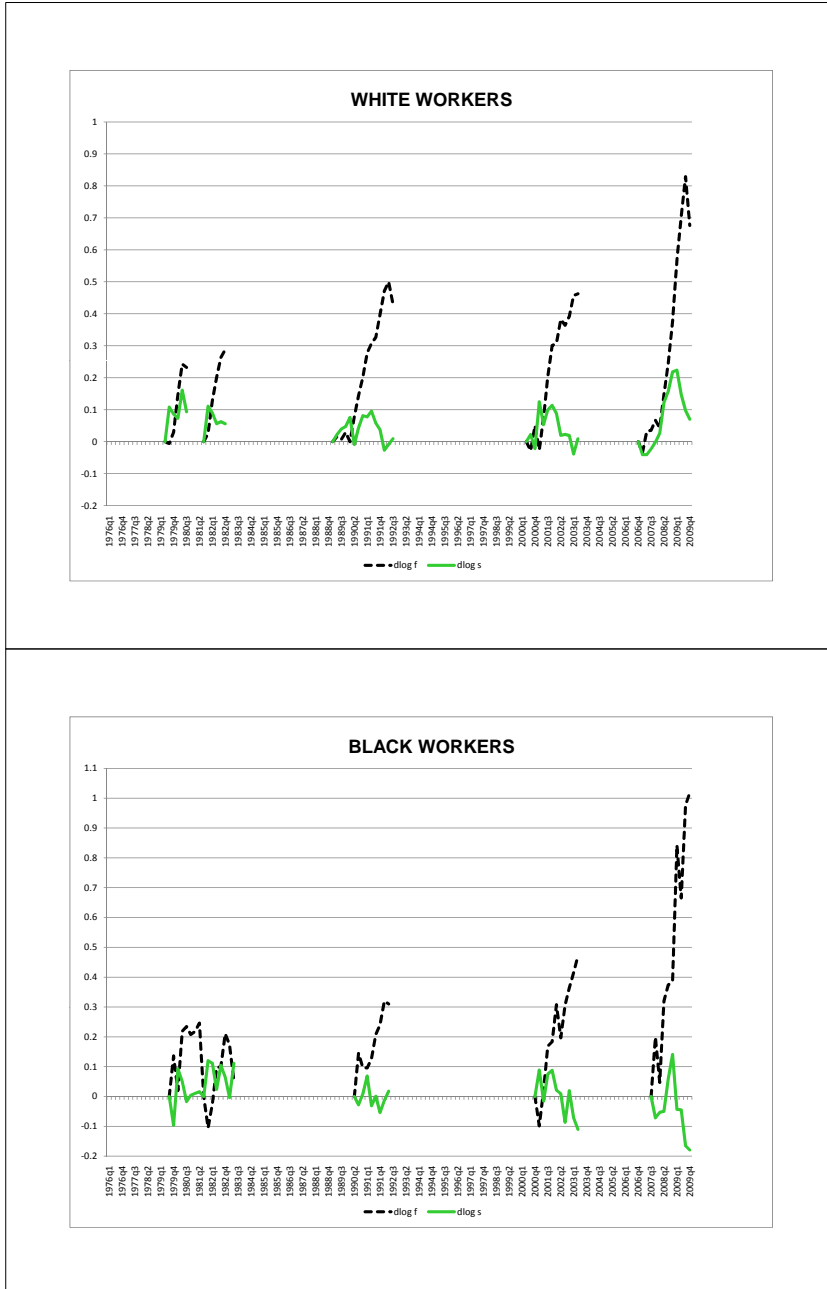


Figure 13: Shares in the Labor Force and Unemployment Rates by Age Groups.

