Potential Effects of the Great Recession on the U.S. Labor Market

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Introduction

Past recessions in the United States have not left many scars. Wage movements over past business cycles are hard to detect, labor force participation rates quickly return to trend levels, and unemployment rates show no long term effects after typically quick recoveries. Other countries haven't been as lucky. At least since Blanchard and Summers (1986) it has been noted that many other OECD countries experience long drops in labor market participation and persistent high unemployment.

It has been suggested (for example, Ball (1999)) that U.S. exceptionalism in this regard is due to our experiencing quick recoveries in output after our recessions. Indeed, none of our postwar recessions have been particularly protracted until now. Will that difference, or any other aspect of the great recession, cause medium or long-term changes in the operation of the U.S. labor market?

We focus on a few areas where previous research and recent discussions have suggested that there may be medium to long-term effects. One area where the Great Recession may have a substantial impact is on the wage and earnings of workers displaced during the recession. Workers who have been displaced from long-term jobs may lose the value of job-specific skills, and need to search anew for an employment situation to which they are well matched. As a result, such workers may suffer persistent decreases in labor market earnings. Displacement may also have persistent effects on probabilities of future job separations and on the aggregate job finding rate. Workers who regain employment after displacement from long-term jobs may be at higher risk of termination in their new jobs than they were in their former long-term jobs. Workers displaced from long-term jobs may also have relatively low rates of job finding after

displacement due to the greater specificity of their human capital. The potential for increased labor marker churning and relatively slow matching of displaced workers with job opportunities might contribute to an outward shift of the Beveridge Curve and an increase in the NAIRU. We evaluate the evidence for this, and examine the degree to which the apparent outward shift of the Beveridge Curve may reflect structural issues that will persist over a reasonably long horizon.

Related Previous Research

A large increase in the fraction of the unemployed who are experiencing very long spells of unemployment has prompted concern that the pool of unemployed job searchers may, on average, be more difficult to match to job openings than has been true at the end of previous recessions. Nearly all studies of the rate of new job finding show rates falling as the duration of unemployment increases.[1] Two processes could cause this finding. It could be that extended unemployment makes it difficult for people to find jobs or it could be that those who have trouble finding jobs are disproportionately represented among the long term unemployed. A number of studies have attempted to determine the relative importance of these two explanations for the downward trend in new job finding rates for the long-term unemployed. Most studies, using a number of different methods to control for individual differences, still find a substantial downward trend in new job finding rates (Lynch 1985, Arulampalam 2000, Imbens and Lynch 2006). However, all studies rely on restrictive assumptions about the distribution of individual differences, leaving the findings suspect. Perhaps more important, the rate of job finding at all durations of unemployment increases considerably when labor demand is stronger (Imbens and

[1] An exception is that studies often show an increase in the rate of exit from unemployment around the time that unemployment benefits expire.

Lynch 2006) and it could be that such increases cancel out the effects of longer average durations of unemployment.

A related literature examines the effect of unemployment spells on future income and the probability of future employment. Again there is the problem of separating out individual differences from causal effects. Most typically this is done by comparing people's experience before and after a spell of unemployment. These studies often find that spells of unemployment are followed by a medium to long-term reduction in the wages (Addison 1989, Arulampalam 2001, Corcoran 1982, Farber 2005, Gregg & Tominey 2005, Gregory & Jukes 2001, Jacobson et al. 1983, Kletzer 1991, Kletzer & Fairlie 2003, Podgursky & Swaim 1987). In a recent paper using U.S. Social Security records, von Wachter, Song and Manchester (2009) find that workers who were displaced from stable jobs during the 1982 recession suffered earnings losses of approximately 20% even after 15 to 20 years. Davis and von Wachter (2011) show that earnings losses attributable to displacement are roughly twice as large for workers who lose jobs in a recession compared to those who lose their jobs during an economic expansion. Farber (2011) documents that the Great Recession has been accompanied by substantial earnings reductions of job losers, although he notes that it is not yet clear how prolonged the effects will be.

Research suggests that the earnings of young workers are particularly vulnerable to the effects of recessions. Oreopoulos, von Wachter and Heisz (2006) find that graduating from college during a recession results in earnings declines lasting ten years. However, von Wachter and Bender (2006) show that young German workers who leave apprenticeship programs during a recession generally suffer less persistent earnings losses.

The future employment and earnings of older workers appears to be sensitive to economic conditions and job displacement. Von Wachter (2007) finds that both job displacement and economic conditions affect the earnings and employment of older men. Sass and Webb (2010) show that job loss in one's early 50 is associated with subsequent further job loss and spells of unemployment. Johnson and Mommaerts (2011) document that although job tenure reduces the probability of job loss, age alone offers no protection. Older workers have slower rates of reemployment than do younger workers, and suffer much larger reductions in earnings upon reemployment. Bosworth and Burtless (2010) note that while decreased labor demand works toward reduced employment of older workers during a downturn, falling assets prices may lead to increased labor supply through a wealth effect. They find that high unemployment is associated with increased claiming rates for Social Security benefits. Although they also find that low asset returns work in the opposite direction, the magnitude of this wealth effect is vey small.

A few studies suggest that long spells of unemployment result in a lower probability of being employed in the future for broader groups of workers (Arulampalam 2000, Lynch 1985, Ruhm 1991), but except for Ruhm these were done with British data. Other studies of U.S. data conclude that there is no long-term scaring effect of unemployment (Corcoran and Hill 1985, Ellwood 1982, Genda et al. 2010, Heckman & Borjas 1980).

Evidence from the Great Recession

With the unemployment rate still hovering near 9%, it is too soon to fully assess the long-term effects of the Great Recession on labor markets. Recent data, however, can allow us to gauge the extent to which the Great Recession differed from the period that preceded it. This can

be helpful in extrapolating the results of research studies based on earlier data to predict how the Great Recession will affect labor markets as the recovery continues.

The data that we use in this exercise comes from the first seven waves of the 2004 and 2008 panels of the Survey of Income and Program Participation (SIPP). The SIPP is a large scale sample survey, where households are interviewed every 4 months, and a new panel of sample members is fielded every few years. In each wave (sample interviews) of the SIPP, household respondents answer questions that refer to the preceding 4 calendar months, with the particular calendar months covered in a wave dependent on the rotation group that the household is assigned to. The first wave of the 2004 panel covers October 2003 through April 2004, and the seventh wave covers October 2005 through April 2006. The first wave of the 2008 panel covers May through November 2008, and the seventh wave covers the same months of 2010. The first seven waves of the 2004 panel provides data for a 28 month stretch that ends well before the onset of the recession, with wave 7 data referring to months exactly 2 years after those covered in wave 1. The first seven waves of the 2008 panel provide similar data for a period of time that starts in the midst of the recession.

A key advantage of the SIPP is that in wave1, sample members are asked when they had started their current jobs, allowing researchers to distinguish between long-term and short-term jobs. The SIPP also records the dates at which sample members start or end jobs when employment transitions occur over the course of the panel.

Job Transitions

Table 1 compares the experiences of workers who were employed in wave 1 of each of the two panels.[2] Corroborating patterns found in other data, a much higher proportion of workers observed at the start of the 2008 panel left their job involuntarily (through layoff or termination) than did workers observed at the start of the 2004 panel. The 2008 panel members were less likely to leave their wave 1 jobs voluntarily (quits) than were the 2004 panel members; they were also less likely to stay at their initial jobs over the first seven waves of the panel than were the 2004 panel members.

The composition of the job losers is important for assessing the long-term effects of job displacement. If a worker leaves a long-term job, there may be a substantial loss of job-specific human capital. In contrast, a worker who has been on the job a relatively short time has had little opportunity to build up capital specific to that job. Workers who have substantial tenure on their jobs are also likely to be in a situation where both the employee and the employer view the worker to be well matched to the job. If this were not the case, either party would have terminated the employment relationship before substantial time on the job had accumulated. Long-term workers who are displaced from jobs lose that "match capital," and must again search for an employment situation that is a good match.

We investigate the composition of job losers in a multinomial logit analysis of job transitions, the results of which are reported in Table 2. All workers who were employed in wave 1 are included in the analysis. Workers are classified in terms of how and whether they left their wave 1 jobs by the end of the wave 7 reference period: workers may have stayed in their initial job, left that job involuntarily, or left that job voluntarily. We treat staying at the initial job as the base case, and report the multinomial logit results for the probability of involuntary or

[2] Workers holding more than one job in wave 1 were excluded from these calculations.

voluntary transitions relative to staying at the initial job. The analysis is purely descriptive, and is not intended to capture the parameters of an underlying structural model of employment transitions. The reported multinomial logit coefficients have been transformed into relative risk ratios: each coefficient indicates how a unit increase in the conditioning variable affects the probability of the given outcome (voluntary or involuntary transition) relative to the base case (staying in the job). A value greater than one indicates increased risk of the outcome relative to the base case, and a value less than one indicates decreased risk; the reported significance levels are for rejection of the null hypothesis that the relative risk ratio is equal to one.

The coefficients on the conditioning variables are generally of the expected signs and magnitudes. Coefficients on dummy variables for job tenure indicate that the probability of either voluntary or involuntary transition from the job decreases sharply with time for the first few years of employment. In contrast, the probability of an involuntary transition varies relatively little with age. Young (less than 25 years old) and old (at least 59 years old) workers are at significantly higher risk than those in the intermediate groups, but the magnitudes of the effects are much smaller than those for job tenure. The age effects are larger for voluntary transitions than they are for involuntary transitions, most likely due to young workers leaving jobs for schooling, or changing jobs, and older workers leaving jobs for retirement. The probability of an involuntary job transition decreases sharply with educational attainment; this is also true for voluntary transitions, but to a lesser extent.

The effect of the Great Recession is measured by an indicator variable for membership in the 2008 panel (the omitted group is the 2004 panel). The 2008 panel indicator enters the specification as both a main effect and interacted with the job tenure indicators. The main 2008 panel effect is large for involuntary transitions, although small and statistically insignificant for

voluntary transitions. The interactions with job tenure are statistically indistinguishable from one, with the exception of very short tenure workers (less than one year) in the case of involuntary separations. Experiments with interacting the 2008 panel indicator with other conditioning variables generally yielded coefficients insignificantly different from one.

An interpretation of the results is that the Great Recession greatly increased the probability of involuntary job transitions across the board, but did not change the relative transition probabilities of different types of workers. Young, less educated, and short-tenure workers were at greater risk of displacement both before and during the recession. Very low tenure workers were at less of a relative disadvantage during the recession than before the recession, but this may reflect employers who adopt a last hired-first fired policy needing to reach further into the tenure distribution when layoffs increase.

Although the relative risks of displacement were not greatly affected by the Great Recession, this does not imply that the overall increased risk of displacement will not have long-term consequences. Although long-tenure workers were not disproportionately displaced during the recession, they were still at increased risk relative to the pre-recession period. To the extent that displacement of long-tenure workers results in long-term consequences for these workers, the Great Recession will have a long-term impact through the increase in the number of long-tenure job matches that were destroyed.

Earnings Changes

Table 3 displays the mean change in nominal log monthly labor earnings between wave 1 and wave 7 for members of the 2004 and 2008 panels who held jobs in both of these waves,

shown separately for those who stayed in their wave 1 job, those who voluntarily left their wave 1 job, and those who involuntarily lost their wave 1 job. In interpreting this table, it is important to remember that the monthly earnings changes can only be calculated for those job changers who have found new jobs by wave 7. Mean earnings growth was lower in the 2008 panel than in the pre-recession panel for all three groups. Those who made involuntary transitions fared the worst both before and during the recession. Nominal monthly earnings increased about 1 percent for the involuntary job changers over the first 7 waves of the 2004 panel, but fell about 9 percent in the 2008 panel. Voluntary job changers had the largest monthly earnings increase in the pre-recession panel, but were second to the job stayers in the 2008 panel. It is evident that job separations during the recession are having an impact on the monthly earnings of those workers who are observed in new jobs in wave 7, although it is not clear how long lasting the effect will be.

Table 4 shows results from regressions of the change in log monthly earnings between wave 1 and wave 7 on the change in log weekly hours between waves 1 and 7, worker characteristics and an indicator for the 2008 panel. The regressions were estimated separately for job stayers, those making involuntary transitions, and those making voluntary transitions. The estimated values of the constant and 2008 panel coefficient are essentially providing the same information as that shown in Table 3, but conditional on changes in weekly hours and worker characteristics. The regression estimates are not adjusted to account for nonrandom selection of separated workers into reemployment.

Very few of the worker characteristic coefficients are statistically significantly discernable from 0. This is somewhat surprising, since one would expect workers with long tenure in their wave 1 jobs to have experienced a greater loss of earnings than did workers

displaced from shorter-term jobs. Experiments with interacting worker characteristics with the 2008 panel indicator generally also yielded insignificant coefficients.

The estimated coefficient on the dummy variable for the 2008 panel is negative for all three groups, but largest in magnitude for workers making involuntary job changes. This is consistent with the dearth of job openings relative to the number of unemployed during the 2008 panel period, and helps to explain why quit rates fell so much during the recession.

Reemployment of Separated Workers

In addition to having an influence on the labor earnings of separated workers who regain employment, the Great Recession may also have affected labor earnings through influencing the reemployment probabilities of workers leaving jobs. Table 5 shows the estimated coefficients from multinomial logit analysis of the labor force transitions of workers who leave their wave 1 jobs. The transitions are defined in terms of the wave 7 labor force status (employed, unemployed, or not in the labor force). The specification was estimated separately for those who left their wave 1 jobs voluntarily and involuntarily. Reemployment is classified as the base case, and the coefficients have been transformed into relative risk ratios (with statistical significance again measured against the null hypothesis that the relative risk ratios equal 1).

Not surprisingly, the results indicate that the probability of unemployment (relative to reemployment) is much greater in the 2008 panel period than in the 2004 panel; this is true both for those losing their job involuntarily as well as for those leaving voluntarily. There is not a statistically significant difference between the two panels in the estimated probability of being out of the labor force (relative to reemployment).

Relatively few of the estimated worker characteristic coefficients are statistically significant. In particular, the job tenure coefficients do not have a statistically significant effect on the probability of remaining unemployed as of wave 7. This is surprising, since one might expect the greater specificity of the human capital of long-term employees to make finding a new job match more difficult. However, it may also be the case that having had a long-term job signals to potential employers that a job applicant is a reliable employee, possibly resulting in an increased chance of a job offer.

Conditional on previous job tenure, older workers are significantly more likely than young workers to remain unemployed. Although the human capital specificity associated with losing a long-term job does not appear to be an impediment to job matching, age does appear to be an impediment. Older workers are not only significantly more likely than younger workers to be unemployed rather than employed, but are also significantly more likely than middle aged workers to drop out of the labor force after both voluntary and involuntary job separations. The voluntary separations that lead to being out of the labor force likely reflects planned retirement, but involuntary separations that lead to being out of the labor force are probably best interpreted as the unplanned retirements of discouraged workers.

Matching Efficiency and the Beveridge Curve

Although the micro-based evidence on the effects of recessions on separation and job finding rates is not conclusive, aggregate data suggests that the Beveridge Curve may have shifted out. Figure 1 shows monthly data for the rate of unemployment and a measure of the vacancy rate constructed from the Conference Board's help-wanted index for the period 1980-1983 and annual average data for those same measures from 1965-1980. The unemployment rate

and the vacancy rate from the Job Openings and Labor Turnover Survey (JOLTS) for the period 2001-2010/7 is also presented where the JOLTS vacancy rate has been adjusted to be compatible with the vacancy rate from the help-wanted index.[3] Beveridge curves for the 1980-1987 and the 1954-69/2001-09 periods are also drawn. In models of frictional (Blanchard and Diamond 1989, 1991) or mismatch unemployment (Shimer 2005) the Beveridge curve is derived as the locus where the number of jobs being filled is equal to the number of new unemployed and the number of new jobs becoming available. On this curve both the unemployment and vacancy rates remain constant so long as the rate of new job creation and the inflow rate of new unemployed stay constant. The position of the Beveridge curve is often interpreted as a measure of the efficiency of worker-job matching. The further the curve is from the origin the more unemployed there are with the same number of available jobs. The Beveridge curve relation fits remarkably well for long periods of time. In each of the periods for which the curves are drawn, monthly data on vacancies and unemployment remained remarkably close to these curves.

Starting a little more than two years ago the vacancy rate began to rise while the unemployment rate remained mostly unchanged.[4] The last time there was a sustained increase in the vacancy rate, at similar levels of unemployment was during the 1970s. That rise coincided with a period during which it is widely believed that the NAIRU increased. Similarly, during the late 1980s and 1990s the level of vacancies that coexisted with a particular level of unemployment fell and this coincided with a period during which most estimates suggest that the NAIRU fell (Gordon 1987, Staiger et al. 1997).

[3] See Dickens (2009) for an explanation of the method.

[4] In April there was a large increase in the vacancy rate that should probably be ignored as it was mainly due to government hiring for the Census. But, even ignoring that month, there is still a noticeable increase in the vacancy rate over the last year.

Dickens (2009) developed and estimated a model of the Beveridge curve and the Phillips curve that links movement in the Beveridge curve and the position of the long-run Phillips curve or NAIRU. The results from estimating the model suggest that *all* shifts in the NAIRU in the U.S. result from changes in the efficiency of worker-job matching as reflected in movements of the Beveridge curve. Using this model we can determine the implications of the recent increases in the vacancy rate for the NAIRU.

Figure 2 presents quarterly estimates of the NAIRU from the model going back to 1960. It suggests that since 2009 there has been a notable increase in the NAIRU from 5% to just under 6%. Similarly, when we estimate a model allowing for downward nominal wage rigidity to affect the inflation-unemployment trade-off as in Akerlof et al. (1996), we find that the lowest sustainable rate of unemployment rises from 3.9% to just over 5%. There is some variation when we estimate different specifications of these models but all suggest that it would be possible to lower unemployment by at least 3 percentage points without risking substantial inflation.

While the model interprets the increase in vacancies as indicating an outward shift in the Beveridge curve, there are several reasons to question whether the Beveridge curve really has shifted out. First, the high levels of unemployment we are now experiencing have only been experienced once before in the period under study and at that time the monthly values strayed away from the curve that prevailed before and after the recession. In that case the departure suggested an inward shift in the Beveridge curve. But, as time passes this seems less and less likely. The departure of the observed vacancy and unemployment rates from the neighborhood of the Beveridge curve in the 1982 recession lasted only about a year while it has been over 2 years since vacancies began increasing in the current recession with no reduction in unemployment.

With adjustments to make the JOLTS vacancy rate equivalent to the one derived from the help-wanted index, the vacancy rate has recently been below that experienced at any other time in the sample period. If there is some minimum level of vacancies that are always present (seasonal jobs that must be filled, firms looking for highly qualified labor at significantly below market wages) then the Beveridge curve will not have the same shape in the vicinity of that minimum. In figure 1 it could bend in to the right as the level of vacancies approached that minimum. That would reduce the extent to which the current level of vacancies departs from the 2001-2009 Beveridge curve.

Note also that the Beveridge curve is the locus where the unemployment rate and the vacancy rate will settle given a constant rate of new job creation and entry of new unemployed to the labor market. During a recession these rates aren't constant. When the rate of new job creation falls, initially the vacancy rate declines faster than the unemployment rate increases. During an expansion, the opposite happens as new job creation causes the vacancy rate to rise before the unemployment rate begins to fall. These tendencies are exacerbated as frustrated workers leave the labor market when jobs are hard to find (causing the increase in the unemployment rate to lag the decline in vacancies) and enter the labor market as they become easier to find (causing the decline in the unemployment rate to again lag the change in vacancies). This leads to a clockwise movement around the Beveridge curve as it is depicted in figure 1. This is barely apparent in the 1980 and 2001 recessions, but is pronounced in the 1982 recession – the only other time in the sample that unemployment reached current levels.[5]

[5] Tasci and Lindner (2010) have also pointed out the tendency for the unemployment-rate-vacancy-rate points to circle the Beveridge curve. They present three previous examples, 1975, 1982 and 2001. As shown in figure 1 the cycle in 2001 was quite muted. The cycle in 1975 took place while the Beveridge curve was moving out. Their use of quarterly rather than monthly data makes the 2009-2010 move look muted relative to the comparison periods.

It is possible that the failure of unemployment to fall in response to the increase in vacancies during the last two years is due to the slow response of the unemployment rate to an increase in the available jobs. But, a direct comparison to what happened in 1982-83 makes this doubtful. It only took two months after the vacancy rate began to increase before the unemployment rate began to decline fairly quickly. It has been over two years since the vacancy rate began to increase in the current recession and the unemployment rate has hardly declined at all. This seems like too long a lag to be explained by labor market dynamics. We therefore turn to potential explanations for deterioration in the efficiency of labor market matching.

The research reviewed above on the effects of the duration of unemployment spells on job finding rates offers some support for the hysteresis in unemployment hypothesis. More direct evidence on Ball's hypothesis comes from a study by Laudes (2005). He estimates Phillips curves for a sample of OECD countries separating out the effect of the rate of unemployment for those out of work for more than a year and those out of work for less than a year. He finds that only those out of work for less than a year put downward pressure on prices while those unemployed for more than a year apparently have no effect on wages.

We have been able to replicate that result nearly exactly in an updated data set that we have collected. However, the result is not robust to small changes in the specification. In particular, when the unemployment rate is broken down to as fine a set of categories for duration as possible, only the category for unemployment of duration 6-12 months puts statistically significant downward pressure on wages. Further, any set of categories that contains the category 6-12 months will be found to put significant downward pressure on wages while no set of categories that does not contain it is ever statistically significant or has a large negative coefficient. This holds true even if countries whose unemployment benefits normally expire after

6 months are removed from the sample. These results make no sense for the U.S. economy, and little sense for the rest of the world. A possible explanation for them is that the 6-12 months category is the one that is most highly correlated with the overall unemployment rate (>.9).

Overall, there is not much evidence to support the hypothesis that extended periods with high rates of long-term unemployment will lead to an increase in the NAIRU in the U.S., but this is not to say that there is strong evidence against the hypothesis either. Given that, we turn to the evidence for other possible explanations for the worsening of labor market efficiency.

Other Potential Explanations for an Outward Shift in the Beveridge Curve

There have been three other explanations for a reduction in labor market efficiency that have been circulating following the rise in the vacancy rate. In response to the increasing numbers of long-term unemployed, the Federal Government has extended the duration of unemployment benefits several times. There is considerable evidence that increases in the duration of unemployment benefits increase unemployment durations and unemployment rates. In addition, mismatch between the skills of the unemployed and those demanded by employers has been offered as an explanation. Finally, it has been suggested that a mismatch between the location of available jobs and unemployed workers might help explain the worsening efficiency of labor market matching. That problem might be exacerbated by difficulties in the housing and mortgage markets.

Extended Unemployment Benefits

Several studies have looked at the role unemployment benefits may be playing in increasing the unemployment rate by extending the time the unemployed are willing to search for

jobs. Several of these studies use previous estimates of the effects of benefit duration on unemployment duration to compute the effects of current policy on unemployment (Aaronson et al. 2010, Elsby et al.). Such studies produce a range of estimates from .4 to 1.8 percentage points. A problem with these studies is that the estimates of the impact of extended benefits where made when the unemployment rate was much lower and jobs were easier to find. It is possible that such estimates overstate the impact in the current recession. Valletta and Kung (2010) take a different approach to estimating the impact of extended benefits. They compare the unemployment durations of those who are eligible for unemployment benefits and those who aren't as the duration of benefits is extended. They conclude that extended benefits are increasing the unemployment rate by about .8 percentage points. Valletta and Kung's estimate of the impact of extended benefits is very close to our estimate of the increase in the natural rate and is slightly below the mid range of previous estimates. However, Rothstein (2011) analyses how extended benefits affect the probability of leaving unemployment, and estimates that the benefit extensions raised the unemployment rate by only 0.2 to 0.6 percentage points. Thus, it seems likely that a substantial part of our estimate of the increase in the NAIRU is due to extended unemployment benefits, but there is uncertainty regarding the precise magnitude. An important implication of the effect of extended benefits on the increase in the NAIRU is that the portion of the increase due to extended benefits could be expected to go away as the benefits are withdrawn as the economy improves.

Skills Mismatch

It seems likely that the U.S. will undergo some structural transformation. The housing boom probably brought more workers into the construction field than can be sustained in the long-run. The financial sector may contract relative to its pre-recession size as well. To the

extent that it takes a long time for workers to move from one type of employment to another, structural shifts could cause extended increases in the equilibrium level of unemployment (Lilien 1982). The 2001 recession seems to have involved a fair amount of structural reallocation (Groshen and Potter 2003) and this may explain why it took a longer time than usual to bring the unemployment rate down during the recovery. To what degree is structural mismatch present in our economy today and has the degree of mismatch increased with the worsening efficiency of the labor market?

Figure 3 presents the ratio of vacancies to unemployment in several different industries. While it is possible to discern the increase in vacancies over recent months in some industries, the ratio remains substantially depressed in all industries. What we do not see is any industries with high vacancy-unemployment ratios. It is thus hard to make a case for structural mismatch being a major problem today.

An index of the extent of mismatch between unemployed workers and available jobs can be constructed by subtracting the fraction of unemployed in each industry from the fraction of vacancies in each industry and taking its absolute value. This can be thought of as the fraction of workers who would have to move in order for the fraction of workers unemployed in each industry to equal the fraction of all vacancies in that industry.[6] Figure 4 shows this measure, our estimate of the NAIRU, and the actual unemployment rate from 2001 to date. While the measure of mismatch rose considerably during the early phase of the recent recession, it has dropped off considerably since then and has returned now to levels that prevailed during the mid 2000s when unemployment was much lower and our estimate of the NAIRU was constant at 5%. The rise

[6] If the matching function exhibits constant returns to scale and the efficiency of matching is the same in all cells, an allocation of the unemployed that equates the fraction of vacancies and unemployed in each cell will maximize the match rate and minimize the unemployment rate.

during the early part of the most recent recession need not reflect a temporary rise in structural unemployment. Abraham and Katz (1986) showed that business cycles affect different industries during different phases. This can produce the appearance of structural mismatch which dissipates as the effects of the recession become widespread.

Although the JOLTS does not contain information on the occupation vacancies are for, the Conference Board's Help Wanted Online data do. Researchers at the New York Federal Reserve (Sahin et al. 2011) have used that data to construct the same sort of mismatch index used here. They find that there has been an increase in the mismatch between workers and jobs, but the pattern is similar to that apparent in figure 4 with a rise beginning in late 2006 and a decline starting in 2009. The timing of these changes suggest that they have nothing to do with the outward shift in the Beveridge curve. Note that it would be entirely possible for mismatch to increase and for it to have no impact on structural unemployment if reallocation of workers between occupations was easy at the margin.

Geographic Mismatch

A similar analysis can be conducted for the extent of geographic mismatch, but the JOLTS data on vacancies are only available at a very high level of aggregation – the four large Census regions: Northeast, South, Midwest, and West. Figure 5 presents a graph of the mismatch index by region from 2001 to date along with the NAIRU estimate and the actual unemployment rate. Not only is there no apparent relationship between the degree of mismatch and our estimate of the NAIRU, but the fraction of workers who would have to relocate to equalize the fraction of unemployed and job vacancies in each region has declined. Using the Conference Board's Help

Wanted On-line data Sahin et al. (2001) perform a similar exercise at a finer level of disaggregation and reach the same conclusion.

There is some reason to suspect that a combination of geographic mismatch and problems in the housing market could be responsible for the reduced level of matching efficiency in the labor market. In a series of papers Andrew Oswald (1996,1997) has suggested that the level of the NAIRU in a country is closely linked to the fraction of housing that is owner occupied.[7] Oswald argues that high rates of owner occupancy make it difficult for the unemployed to move when jobs become available elsewhere. In the past, the U.S. has been a huge outlier in this analysis, having both a high rate of owner occupancy and a low NAIRU. Oswald has explained this by pointing to the greater ease of transacting sales of housing in the U.S. and the efficiency of the U.S. mortgage market. However, with a large fraction of the U.S. housing stock underwater, and the recent tightening of credit standards for mortgages, it is possible that our high rates of owner occupancy are now making the reallocation of labor substantially more difficult.

There have been many studies of the effects of "housing lock" on labor market mobility.[8] Most studies performed before the recent recession found evidence that distress in housing markets reduced labor mobility. However, more recent studies generally find little evidence that long distance moves have been retarded.[9] [10] An exception to this is the work by Batini et al

[7] See Havet and Penot 2010 for a skeptical view of the relationship that Oswald points to.
[8] Chan (2001), Ferreira et al. (2010), Henley (1998), Schulhofer-Wohl (2011), Quigley (1987 and 2002). Though see Shulhofer-Wohl (2011) for a different view.
[9] Short distance moves are defined as within county and a reduction there would be unlikely to affect job matching.
[10] For example see Donovan and Schnure (2011), Barnichon and Figura (2011), and Molly and Smith (2010). Modestino and Dennett (2011) provide a survey of the recent literature, and present evidence supportive of negative housing equity reducing migration of homeowners.

(2011) that argues for a substantial role for skills mismatch in combination with a depressed housing market in increasing unemployment, but the paper has a number of serious flaws. The conclusions are drawn from a regression of unemployment on skill mismatch, housing market distress, and an interaction of the two. The first problem is that the index of skill mismatch compares the level of education of the unemployed not to the demands of available jobs but to that of the average employed person. Since unemployment rates tend to rise most for the least skilled during recessions this would induce a positive correlation between mismatch and unemployment. Second, the correlation between housing market distress and unemployment could be spurious since both could be due to adverse economic conditions in the state. The authors recognize this and attempt to ameliorate the problem using the share of subprime mortgages among all mortgages in the state as an instrument, but this is as likely to be correlated with economic distress as is the state of the housing market as families with poor employment prospects may be forced into taking sub-prime loans.

While there is little evidence that housing lock is currently causing structural unemployment, that could be because there are not enough available jobs to make moving worthwhile. However, if the housing market remains distressed as the economy picks up, it is possible that housing market problems could cause problems in the future.

Conclusion

The Great Recession appears to be exerting an influence on the U.S. labor market that will likely persist even after economic output has recovered.

One channel through which job displacement associated with the Great Recession will likely have a long-term impact is in probabilities of future job separations. Although the relative risk of job loss did not increase for long-term employees during the recession, their rate of job loss went up along with those of other groups. And once reemployed, they will be at higher risk of future job loss because they will have lost the protection afforded by job tenure. One caveat to this conclusion is that it depends on job tenure being a characteristic of the worker-firm job match, and not just a factor correlated with worker characteristics that are desirable and observable to employers, but unobservable to researchers.

Although involuntary job loss is associated with decreased earnings in the short term, it is puzzling that this effect does not appear to be especially strong for those losing long-term jobs and then starting a new job. It may be the case those who will eventually experience the greatest earnings loss upon reemployment are not yet observed in new jobs in the SIPP data. Or it may be that the persistent earnings losses of long-term displaced workers found in earlier research were specific to characteristics of the lost jobs in those studies (for example, rents associated with unionization) that are less prevalent now.

The relatively low probabilities of reemployment and relatively high probabilities of leaving the labor force for older displaced workers is cause for concern. Although overall labor force participation for this group has been surprisingly high, this appears to reflect workers who have not lost jobs electing to retire at somewhat older ages than has been the norm in the recent past. Older displaced workers are at relatively high risk of prolonged spells of unemployment and premature retirement. Although job loss was not disproportionately high during the recession for older workers relative to younger workers, the rate of job loss rose for older

workers along with other groups, resulting in an increase in the pool of displaced older workers who are at risk.

The recent increase in the vacancy rate, while the unemployment rate has remained mostly unchanged, probably does suggest a decline in the efficiency of the matching process in the labor market and an increase in the NAIRU. Estimates from our model of the NAIRU as a function of labor market efficiency suggests that it has increased by about one percentage point. However, this may be a phenomenon that will pass once aggregate demand has increased enough to bring vacancy rates back within their normal range and extended unemployment insurance programs have expired.

Of the explanations for the apparent increase considered here, it seems likely that extended unemployment benefits explain some, if not all, of this shift. An improvement in the rate of unemployment will allow the Federal Government to drop extended benefit programs and that should further reduce the rate of unemployment – possibly bringing back the levels of unemployment that prevailed before the recession.

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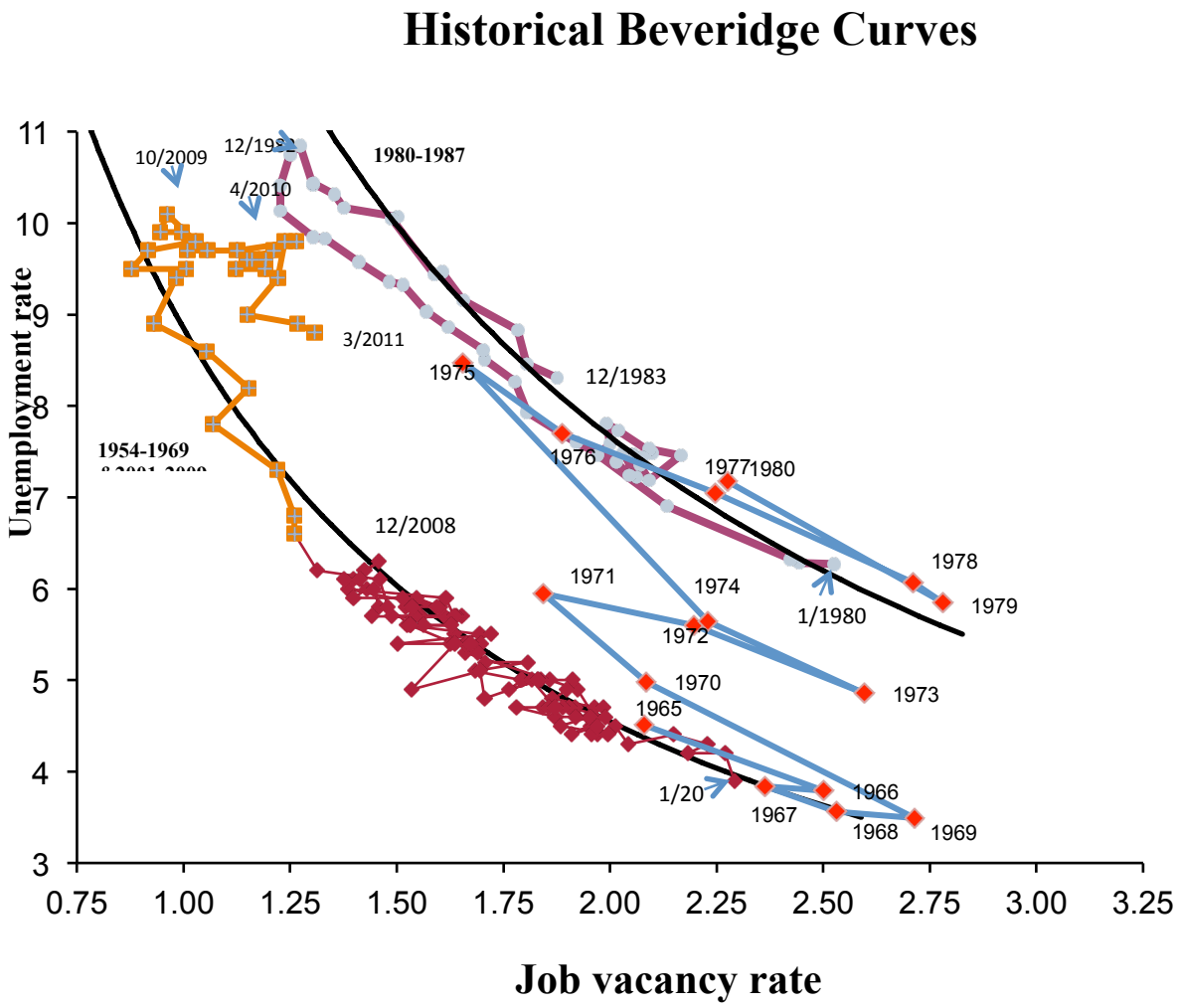
Figure 1


Historical Beveridge Curves
Unemployment rate
Job vacancy rate
11
10
9
8
7
6
5
4
3
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
10/2009
4/2010
3/2011
1980-1987
1954-1969
12/2008
1975
12/1983
1976
1977
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1979
1/1980
1971
1974
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1973
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1965
1/20
1966
1967
1968
1969

Figure 2

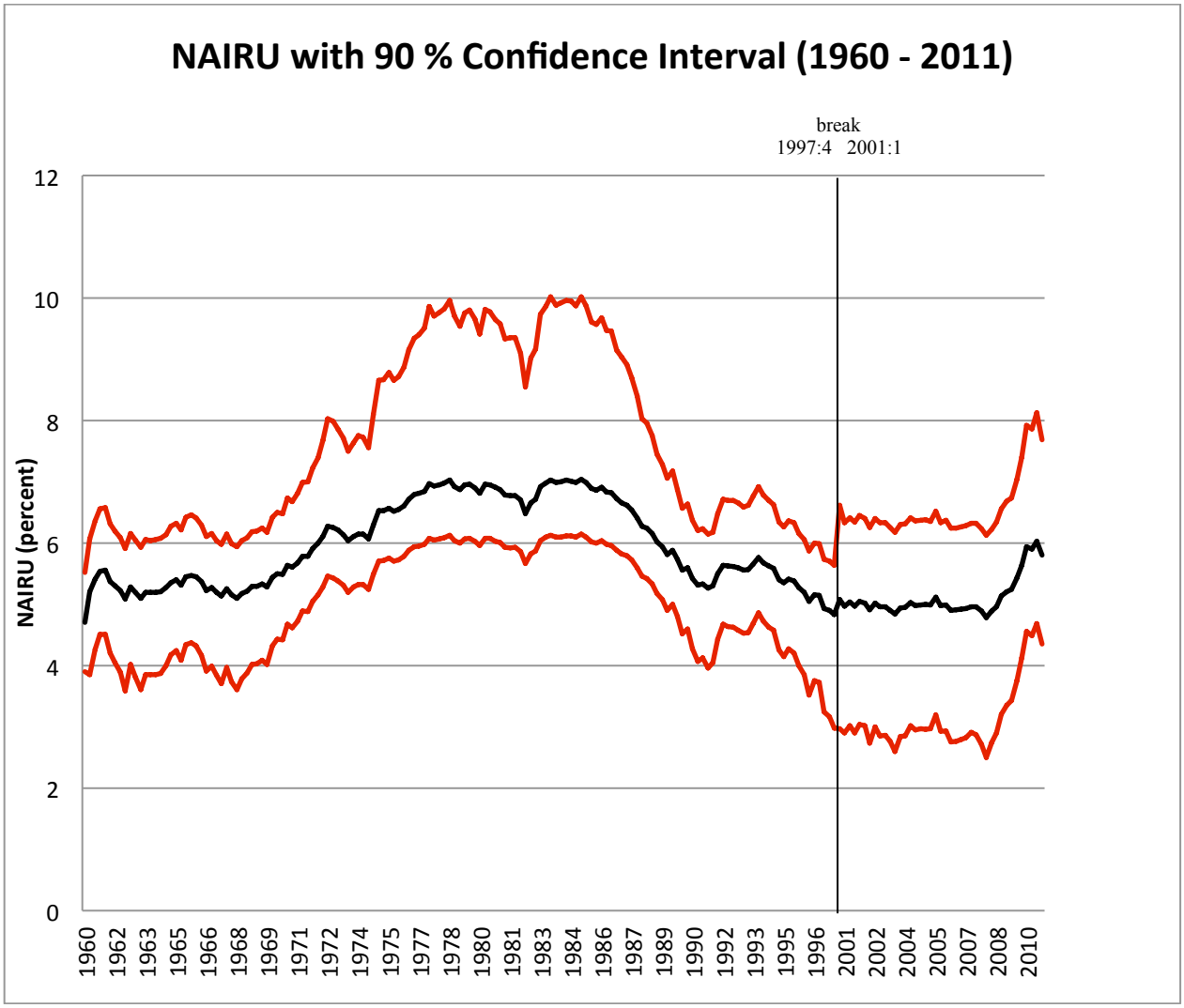
NAIRU with 90 % Confidence Interval (1960 - 2011)
break
1997:4 2001:1
NAIRU (percent)
12
10
8
6
4
2
0
1960
1962
1963
1965
1966
1968
1969
1971
1972
1974
1975
1977
1978
1980
1981
1983
1984
1986
1987
1989
1990
1992
1993
1995
1996
2001
2002
2004
2005
2007
2008
2010

Figure 3

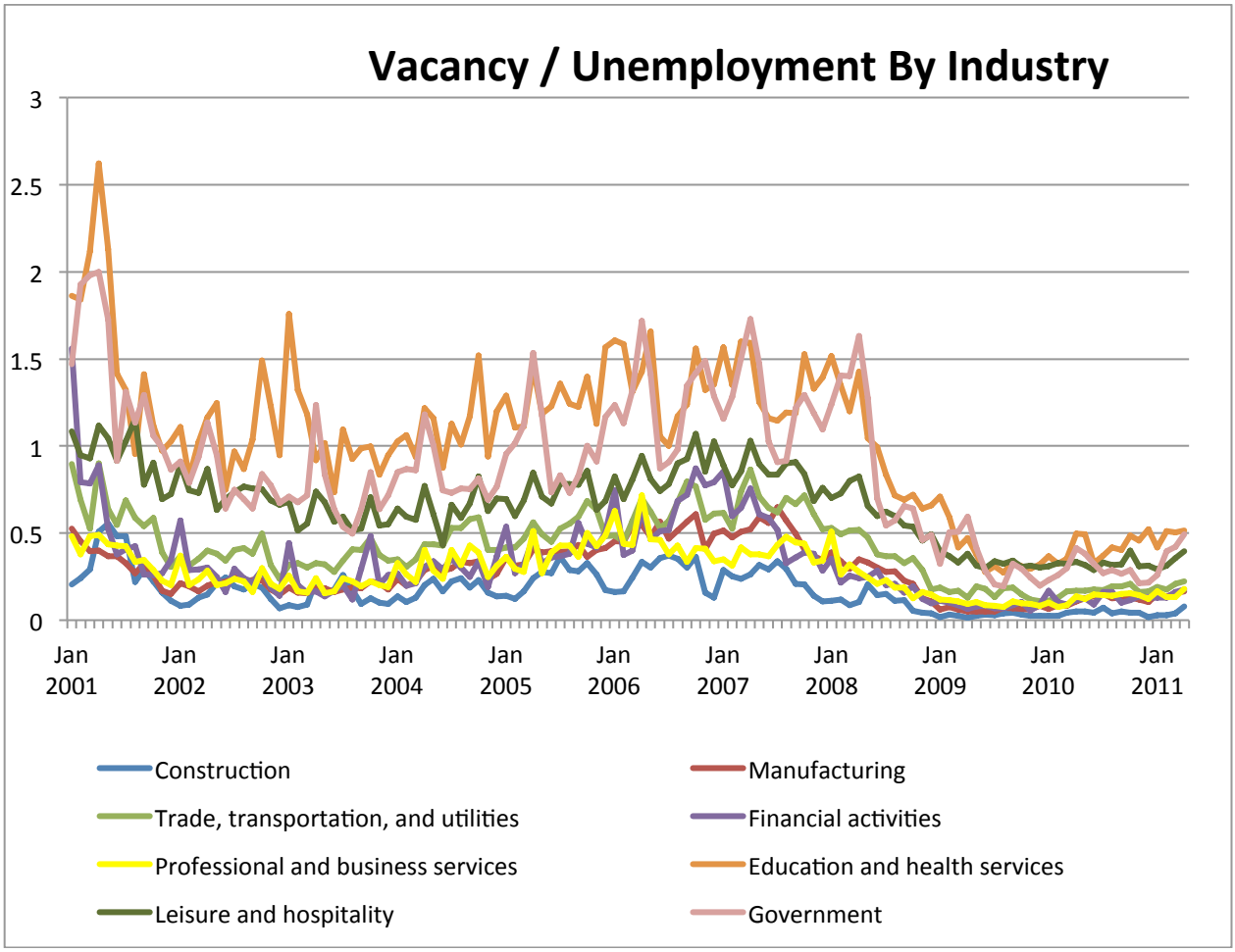
Vacancy / Unemployment By Industry
3
2.5
2
1.5
1
0.5
0
Jan 2001
Jan 2002
Jan 2003
Jan 2004
Jan 2005
Jan 2006
Jan 2007
Jan 2008
Jan 2009
Jan 2010
Jan 2011
Construction
Manufacturing
Trade, transportation, and utilities
Financial activities
Professional and business services
Education and health services
Leisure and hospitality
Government

Figure 4

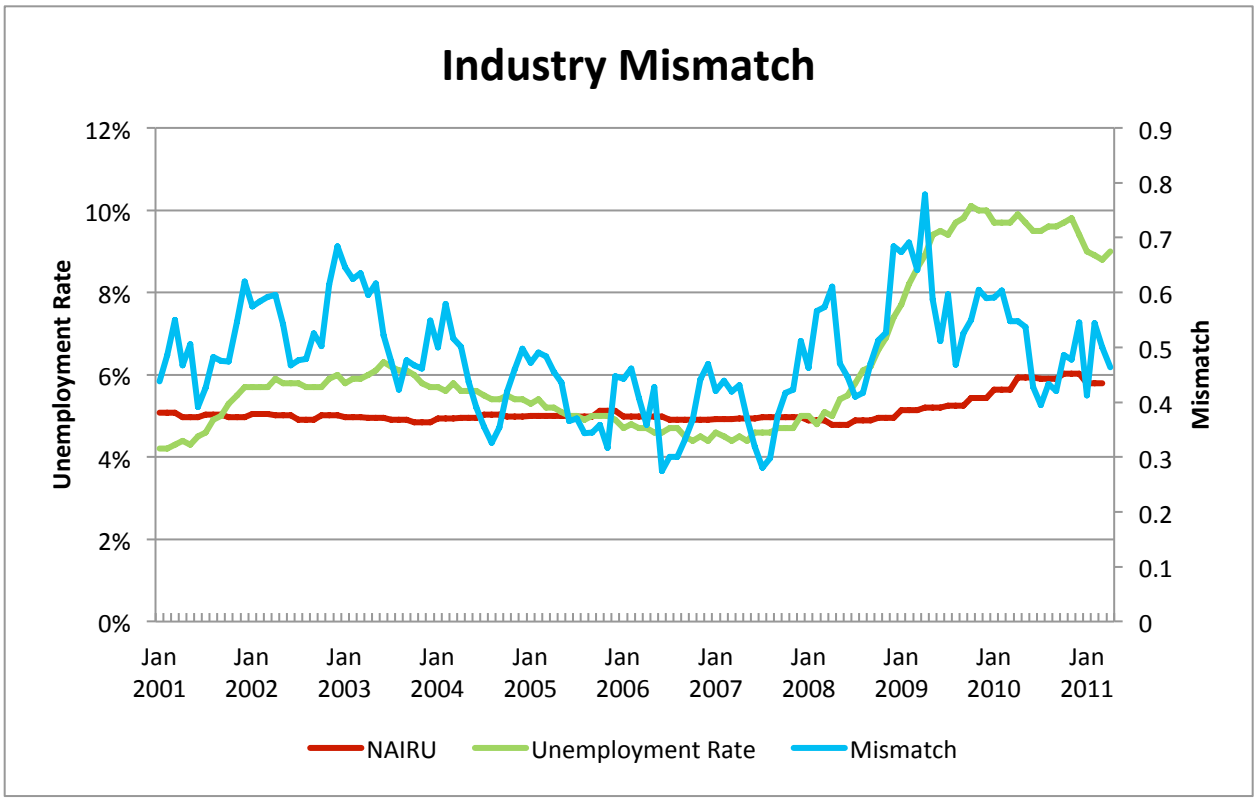
Industry Mismatch
Unemployment Rate
Mismatch
12%
10%
8%
6%
4%
2%
0%
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Jan 2001
Jan 2002
Jan 2003
Jan 2004
Jan 2005
Jan 2006
Jan 2007
Jan 2008
Jan 2009
Jan 2010
Jan 2011
NAIRU
Unemployment Rate
Mismatch

Figure 5

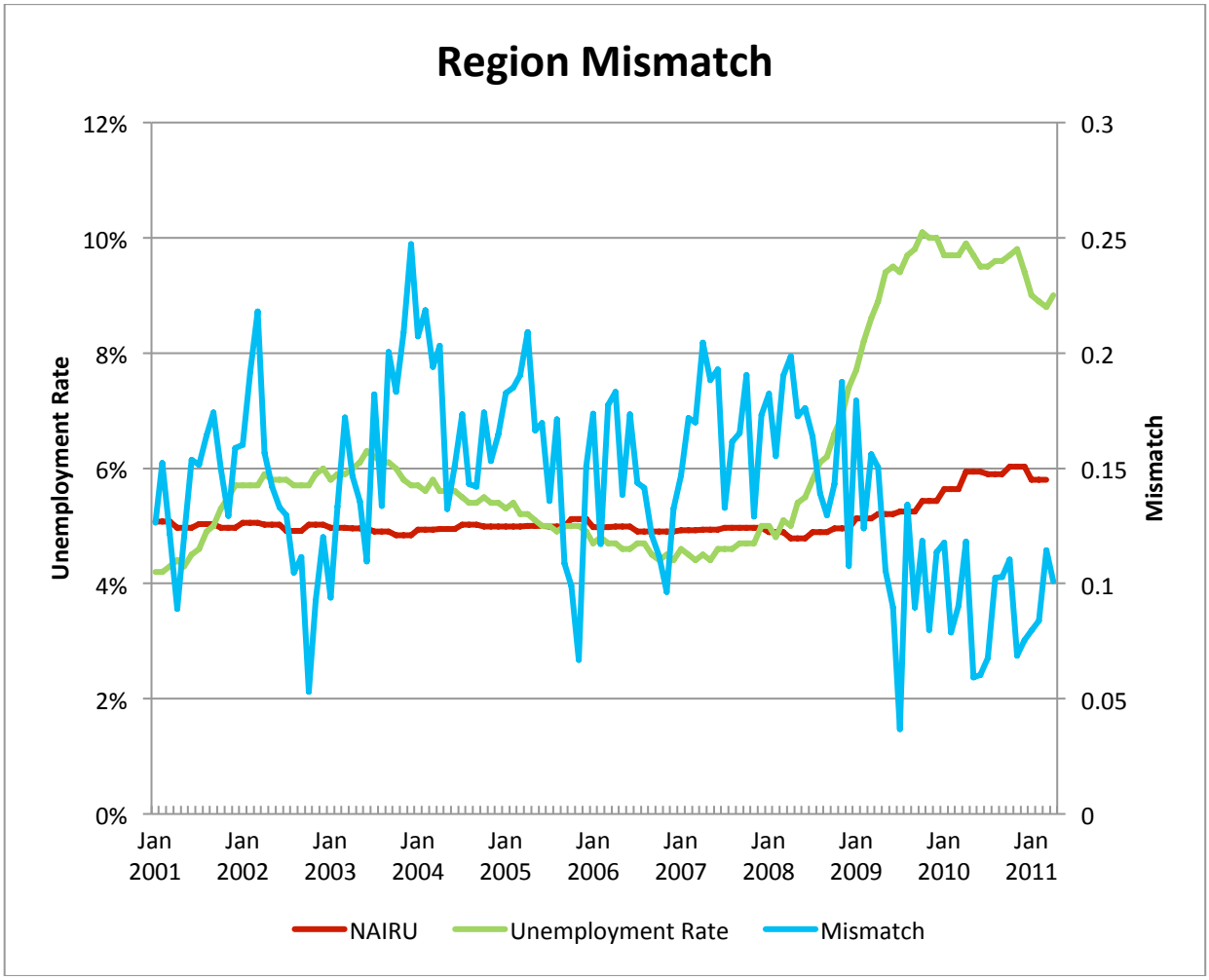
Region Mismatch
Unemployment Rate
Mismatch
12%
10%
8%
6%
4%
2%
0%
0.3
0.25
0.2
0.15
0.1
0.05
0
Jan 2001
Jan 2002
Jan 2003
Jan 2004
Jan 2005
Jan 2006
Jan 2007
Jan 2008
Jan 2009
Jan 2010
Jan 2011
NAIRU
Unemployment Rate
Mismatch

Table 1: Job transitions in the first 28 months of SIPP panels

	2004 Panel	2008 Panel
Stayed at initial job	**69%**	**63%**
Involuntary transition	11%	19%
Voluntary transition	20%	18%
Number of Observations	26,050	26,391

Source: authors' calculations using wave 1 SIPP person weights

Table 2: Multinomial Logit Analysis of Job Transitions (coefficients transformed to relative risk ratios)

Base Category: Stayed in Job	Involuntary Transition		Voluntary Transition	
Regressor	**Coefficient**	**2008 Panel Interaction Term**	**Coefficient**	**2008 Panel Interaction Term**
2008 Panel Indicator	2.493***		1.025	
	(0.223)		(0.086)	
Wave 1 Job Tenure (Years): indicator variables (3<5 omitted group)				
< 1	3.905***	0.682***	3.230***	0.877
	(0.318)	(0.071)	(0.214)	(0.085)
1 < 3	1.655***	0.908	1.548***	0.901
	(0.148)	(0.103)	(0.111)	(0.095)
5 < 9	0.634***	1.114	0.811***	0.966
	(0.068)	(0.146)	(0.065)	(0.113)
9 < 14	0.650***	0.873	0.693***	0.851
	(0.076)	(0.125)	(0.063)	(0.114)
14< 19	0.503***	0.792	0.626***	0.993
	(0.069)	(0.140)	(0.064)	(0.151)
>= 19	0.382***	0.999	1.067	0.949
	(0.050)	(0.157)	(0.085)	(0.107)
Wave 1 Age: indicator variables (25<30 omitted group)				
< 19	1.254**		4.214***	
	(0.114)		(0.332)	
19 < 24	1.289***		1.994***	
	(0.084)		(0.117)	
30 < 34	1.036		0.763***	
	(0.069)		(0.048)	
34 < 40	0.935		0.597***	
	(0.056)		(0.035)	
40 < 44	1.065		0.559***	
	(0.069)		(0.037)	
44 < 50	1.019		0.473***	
	(0.061)		(0.029)	
50 < 54	1.073		0.504**	
	(0.074)		(0.035)	
54 < 59	1.095		0.836***	
	(0.077)		(0.053)	
>= 59	1.594***		2.032***	
	(0.104)		(0.111)	

Wave 1 Educational Attainment: indicator variables (high school omitted group)		
Less than High School	1.370***	1.241***
	(0.070)	(0.063)
Some post-secondary	0.853***	1.036
	(0.034)	(0.039)
2-year degree	0.628***	0.824***
	(0.039)	(0.046)
Bachelor's degree	0.514***	0.735***
	(0.026)	(0.033)
Master's degree	0.433***	0.731***
	(0.033)	(0.046)
Professional or doctorate	0.204***	0.602***
	(0.033)	(0.062)
U.S. Citizen (indicator)	0.822***	0.970
	(0.048)	(0.060)
Male (indicator)	1.207***	0.736***
	(0.037)	(0.021)
Black (indicator)	1.343***	1.182***
	(0.060)	(0.051)
Hispanic (indicator)	1.132**	0.882**
	(0.056)	(0.045)
Married (indicator)	0.699***	0.965
	(0.023)	(0.030)

* denotes significance at 10% level, ** denotes significance at 5% level, ***denotes significance at 1% level

Table 3: Mean Change in Nominal Monthly Earnings between Wave 1 and Wave 7 (log points)

Job Transition	Panel	Mean Change
Did not leave	2004	.086
	2008	.025
Involuntary transition	2004	.011
	2008	-.090
Voluntary transition	2004	.095
	2008	-.004

Source: authors' calculations using wave 1 SIPP person weighs

Table 4: Change in Monthly Earnings between Wave 1 and Wave 7(log points) Regressions

	Did Not Leave	Involuntary Separation	Voluntary Separation
Constant	0.085***	-0.114	0.216
	(0.016)	(0.103)	(0.114)
2008 Panel (indicator)	-0.047***	-0.040	-0.142***
	(0.005)	(0.037)	(0.038)
Change in weekly hours (log points)	0.444***	0.768***	0.961***
	(0.010)	(0.039)	(0.033)
Wave 1 Job Tenure (Years): indicator variables (3 < 5 omitted group)			
< 1	0.037***	0.167***	-0.004
	(0.010)	(0.060)	(0.064)
1 < 3	0.010	0.056	-0.086
	(0.010)	(0.063)	(0.070)
5 < 9	-0.009	-0.004	-0.123
	(0.009)	(0.076)	(0.081)
9 < 14	-0.005	-0.073	-0.231**
	(0.010)	(0.081)	(0.103)
14 < 19	-0.013	-0.054	-0.302**
	(0.011)	(0.102)	(0.128)
>= 19	-0.013	-0.090	-0.314***
	(0.010)	(0.098)	(0.107)
Wave 1 Age: indicator variables (25 < 30 omitted group)			
< 19	0.115***	0.130	0.130
	(0.028)	(0.101)	(0.080)
19 < 24	0.049***	0.058	0.066
	(0.015)	(0.070)	(0.065)
30 < 34	-0.006	-0.026	0.044
	(0.012)	(0.075)	(0.078)
34 < 40	-0.001	-0.028	0.033
	(0.011)	(0.069)	(0.076)
40 < 44	-0.007	-0.099	-0.164**
	(0.011)	(0.074)	(0.081)
44 < 50	-0.022**	-0.022	0.039
	(0.010)	(0.069)	(0.079)
50 < 54	-0.016	-0.051	0.012
	(0.012)	(0.076)	(0.101)
54 < 59	-0.034**	-0.061	-0.237**
	(0.012)	(0.082)	(0.098)

>= 59	-0.032**	0.010	-0.021
	(0.012)	(0.090)	(0.093)
Wave 1 Educational Attainment: indicator variables (high school omitted group)			
Less than High School	0.021*	-0.026	0.131**
	(0.011)	(0.059)	(0.066)
Some post-secondary	0.007	-0.068	0.147***
	(0.007)	(0.046)	(0.053)
2-year degree	0.016*	-0.021	0.086
	(0.010)	(0.075)	(0.081)
Bachelor's degree	0.009	0.030	0.095
	(0.008)	(0.058)	(0.062)
Master's degree	0.008	-0.085	-0.014
	(0.010)	(0.092)	(0.084)
Professional or doctorate	0.016	-0.312	0.104
	(0.016)	(0.209)	(0.159)
U.S. Citizen (indicator)	0.002	0.071	-0.101
	(0.012)	(0.068)	(0.077)
Male (indicator)	-0.010*	0.039	-0.039
	(0.005)	(0.036)	(0.038)
Black (indicator)	0.010	-0.035	-0.005
	(0.009)	(0.051)	(0.058)
Hispanic (indicator)	-0.011	0.063	-0.013
	(0.010)	(0.057)	(0.061)

* denotes significance at 10% level, ** denotes significance at 5% level, ***denotes significance at 1% level

Table 5: Multinomial Logit Analysis of Labor Force Status in Wave 7 for Job Changers (coefficients transformed to relative risk ratios)

Base Category: Employed in Wave 7	Involuntary Separation		Voluntary Separation	
	Unemployed	**Not in Labor Force**	**Unemployed**	**Not in Labor Force**
2008 Panel (indicator)	3.515***	0.928	2.522***	1.063
	(0.370)	(0.077)	(0.351)	(0.067)
Wave 1 Job Tenure (Years): indicator variables (3 < 5 omitted group)				
< 1	1.107	1.207***	1.178	1.317**
	(0.159)	(0.170)	(0.280)	(0.149)
1 < 3	0.946	0.888	1.102	1.246*
	(0.144)	(0.136)	(0.290)	(0.153)
5 < 9	1.131	0.925	1.157	1.155
	(0.191)	(0.162)	(0.335)	(0.160)
9 <14	1.045	0.763	1.186	1.513***
	(0.195)	(0.152)	(0.399)	(0.244)
14<19	1.285	0.735	1.573	1.857***
	(0.307)	(0.191)	(0.588)	(0.345)
>=19	1.114	1.372	1.579	2.790***
	(0.236)	(0.277)	(0.485)	(0.409)
Wave 1 Age: indicator variables (25 < 30 omitted group)				
< 19	0.920	2.605	0.639	1.484***
	(0.241)	(0.535)	(0.199)	(0.210)
19 <24	0.996	1.223	0.658	0.858
	(0.187)	(0.209)	(0.186)	(0.108)
30 <34	1.251	0.783	0.769	0.765*
	(0.231)	(0.149)	(0.259)	(0.111)
34 <40	1.138	0.800	1.707**	0.956
	(0.196)	(0.137)	(0.462)	(0.127)
40 <44	1.353*	0.692*	1.352	0.572***
	(0.241)	(0.131)	(0.396)	(0.090)
44 <50	1.616**	1.001	1.512	0.885
	(0.267)	(0.166)	(0.412)	(0.121)
50 <54	1.409*	0.964	1.839	1.322*
	(0.263)	(0.183)	(0.578)	(0.208)
54 <59	2.013***	1.496**	2.269*	2.221***
	(0.386)	(0.283)	(0.672)	(0.319)
>=59	1.764***	5.045***	1.298***	6.192***
	(0.343)	(0.824)	(0.404)	(0.793)

Wave 1 Educational Attainment: indicator variables (high school omitted group)				
Less than High School	1.194	1.220	1.041	1.138
	(0.161)	(0.154)	(0.224)	(0.123)
Some post-secondary	0.957	1.039	0.651**	0.889
	(0.105)	(0.110)	(0.115)	(0.077)
2-year degree	1.051	0.820	0.587*	0.860
	(0.175)	(0.145)	(0.168)	(0.114)
Bachelor's degree	0.790*	0.682***	0.494***	0.636***
	(0.110)	(0.096)	(0.110)	(0.067)
Master's degree	0.570	0.752	0.401***	0.483***
	(0.131)	(0.159)	(0.132)	(0.069)
Professional or doctorate	0.205	0.611	0.116**	0.438***
	(0.154)	(0.283)	(0.119)	(0.106)
U.S. Citizen (indicator)	1.176	1.161	0.973	1.087
	(0.185)	(0.182)	(0.284)	(0.156)
Male (indicator)	0.923	0.445***	1.118	0.563***
	(0.078)	(0.036)	(0.150)	(0.036)
Black (indicator)	1.137	1.248*	2.159***	1.130
	(0.139)	(0.144)	(0.357)	(0.109)
Hispanic (indicator)	0.896	1.094	0.857	0.805*
	(0.123)	(0.141)	(0.209)	(0.091)
Married (indicator)	0.789***	1.227**	0.773*	1.209***
	(0.071)	(0.112)	(0.115)	(0.087)
Months between job loss and end of panel	0.946***	1.006	0.984*	0.997
	(0.006)	(0.006)	(0.009)	(0.005)

* denotes significance at 10% level, ** denotes significance at 5% level, ***denotes significance at 1% level