Economic Studies
at BROOKINGS

Brookings Panel on Economic Activity
March 20–21, 2014

Are the Long-Term Unemployed on the Margins of the Labor Market?

Alan B. Krueger, Princeton University and NBER
Judd Cramer, Princeton University
David Cho, Princeton University

Final conference draft

Are the Long-Term Unemployed on the Margins of the Labor Market?

Alan B. Krueger, Princeton University & NBER

Judd Cramer, Princeton University

David Cho, Princeton University

March 10, 2014

*We thank Katharine Abraham, Hank Farber, Larry Katz, Scott Kostyshak, Chris Nekarda, David Romer, Rob Shimer, Thomas Winberry and Justin Wolfers for helpful comments, and Tito Boeri for providing data for Italy. The authors are solely responsible for the views expressed in the paper and any errors.

Introduction

A number of observers have noted that in recent years conventional Phillips Curve and Beveridge Curve models predicted greater price deflation, greater real wage declines and fewer vacancies as a result of the high rate of unemployment experienced during the Great Recession and its aftermath than actually occurred. Several economists have provided possible explanations for the missed predictions of the Phillips Curve, based on anchoring of expectations (Bernanke, 2007 and 2010) or changes in the distribution of price increases and interactions in the Phillips Curve (Ball and Mazumder, 2011). Others have shown that the price Phillips Curve relationship is stable if the short-term unemployment rate (defined as the number of job seekers unemployed for 26 weeks or less relative to the labor force) is used instead of the total unemployment rate (Gordon, 2013 and Watson, 2014), while others have shown that the Beveridge Curve relationship is stable if short-term unemployment rate is used instead of the overall unemployment rate (see Ghayad and Dickens, 2012).

This paper explores the plausibility of a unified explanation for the recent shifts in the price and real wage Phillips Curves and Beveridge Curve in the U.S.: namely, that the long-term unemployed, whose share of overall unemployment rose to an unprecedented level after the Great Recession, are on the margins of the labor force and therefore exert very little pressure on the job market and economy. The hypothesis we seek to test is that the longer workers are unemployed the less they become tied to the job market, either because, on the supply side, they grow discouraged and search for a job less intensively (e.g., Krueger and Mueller, 2011) or because, on the demand side, employers discriminate against the long-term unemployed, based on the (rational or irrational) expectation that there is a productivity-related reason that accounts for their long jobless spell (e.g., Kroft, Lange and Notowidigdo, 2013 and Ghayad, 2013). Either

of these explanations would imply that the long-term unemployed are on the margins of the labor market, and have a different effect on the macroeconomy than the short-term unemployed. Moreover, the demand-side and supply-side effects of long-term unemployment can be viewed as complementary and reinforcing of each other as opposed to competing explanations, as statistical discrimination against the long-term unemployed could lead to discouragement, and skill erosion that accompanies long-term unemployment could induce employers to discriminate against the long-term unemployed.

Motivated by the apparent stability of the Phillips and Beveridge Curves when the short-term unemployment rate is used to measure labor market slack, we assemble varied evidence to assess the hypothesis that the long-term unemployed are on the margins of the labor market. To preview our main findings, we tentatively conclude that the long-term unemployed exert relatively little pressure on the economy, although the international evidence that we have been able to assemble to this point is more mixed than the evidence for the U.S., and suggests that long-term unemployment means different things in different countries and contexts.

We first briefly review evidence from the U.S. showing that the price Phillips Curve, expected real wage Phillips Curve and Beveridge Curve are all stable if the short-term unemployment rate is used to measure labor market slack, and that the long-term unemployment rate has a comparatively modest effect when it is included in regression models. This result is consistent with Llaudes's (2005) conclusion that the long-term unemployment rate was a much less significant determinant of price inflation and wage growth than the short-term unemployment rate in many OECD countries prior to the Great Recession. We also create two new measures of the unemployment rate, one in which the duration of unemployment is weighted by a measure of search intensity and another in which duration is weighted by the

callback rate from audit studies. Both alternative measures have greater predictive power than the total unemployment rate. We also extend this analysis to estimate the Beveridge Curve in the U.K., which saw a sharp rise in long-term unemployment in the early 1980s, and Sweden, which saw a sharp rise in long-term unemployment in the early 1990s, and then a gradual decline. Sweden and the U.K. in these periods were selected because, compared to other countries, their pattern of long-term unemployment as a share of the unemployed more closely resembles that of the U.S. over the last decade.

Next we provide a detailed profile of the long-term unemployed in 2012, and examine how the composition of the long-term unemployed has varied over time. While some notable industries (e.g, construction) and demographic groups (e.g., African Americans) are over represented among the long-term unemployed, the long-term unemployed are ubiquitous, spread throughout all corners of the economy. Fully 36 percent of the long-term unemployed last worked in the sales and service sector, suggesting that weak aggregate demand was the driver of long-term unemployment. Using the relationship between workers' characteristics and wages from 2004 to 2006 to project earnings for the long-term unemployed, we find modest changes in the composition of the long-term unemployed over the business cycle, with workers with more highly rewarded characteristics more likely to be represented among the long-term unemployed in recessions, although the differences are small.

We next examine the rates at which unemployed workers find employment or exit the labor force, by duration of unemployment. Importantly, we examine transition rates both over a month and over a year or longer. Longer durations of unemployment are associated with a lower transition rate into employment, and available evidence suggests that observed duration-dependent transition rates are not primarily a result of heterogeneous job searchers (e.g.,

Heckman and Singer, 1984). From 2008 to 2012, only 11 percent of those who were long-term unemployed in a given month returned to steady, full-time employment a year later.[1] This low-transition rate into steady employment is considerably lower than what would be predicted from monthly transition rates if such rates were independent over time and groups, highlighting that the long-term unemployed frequently are displaced soon after they gain reemployment.

The long-term unemployed normally have a higher rate of labor force withdrawal than the short-term unemployed, although following a recession the labor force withdrawal rates for all duration groups tend to collapse to a common, relatively low level. We explore whether the process of labor force withdrawal rates gradually returning to their historical norm—with higher exit rates for the long-term unemployed— as well as a lower match rate for the long-term unemployed, can cause the Beveridge Curve to loop around a stable path following a sharp downturn. Specifically, we extend the calibration-type model of Kroft, et al. (2013) to allow for varying labor force exit rates and differential match efficiency for the long-term unemployed to project the path of the Beveridge Curve under a stable matching function. The results suggest that from 2002-07 the long-term unemployed were about 60 percent as efficient in job matching as the short-term unemployed. Using the matching function estimated for the 2002-07 period, the calibrated model does a reasonably good job capturing the rise in unemployment and shift of the Beveridge Curve in the 2008-13 period, as well as the rise in the share of unemployed workers who are long-term unemployed. Future projections predict a gradual return to the original Beveridge Curve as the share of long-term unemployment declines due to labor force exits or (less likely) transitions to employment.

[1] Steady employment in this context means that someone who was unemployed for 27 weeks or longer in month t was employed full-time for four consecutive months starting in month t+12.

An alternative explanation for the Beveridge Curve gradually returning to its original position is that a stronger labor market enables more of the long-term unemployed to transition into employment. To explore this possibility, we compare trends in long-term and short-term unemployment in different regions of the U.S. Our preliminary analysis suggests that the long-term unemployment rate has remained elevated even in low-unemployment rate states (defined as the 13 states with the lowest unemployment rates in the U.S. as of October 2013). In addition, we do not find evidence that the long-term unemployed are faring better in terms of transitioning to employment in the low-unemployment states than in the high-unemployment states. Indeed, the long-term unemployed appear to be following a similar path of transition rates both into employment and out of the labor force in both the low- and high-unemployment states. These findings suggest that the long-term unemployed will continue to encounter difficulty finding employment even if the unemployment rate continues to fall, although a stronger economy would undoubtedly raise the prospects of the long-term unemployed.

We conclude the paper by briefly considering some of the policy implications of the hypothesis that the long-term unemployed are on the margins of the labor market. Because the short-term unemployment rate has returned to its pre-recession average, one important implication—if the hypothesis that the long-term unemployed are largely on the margins of the labor market is correct—is that further declines in short-term unemployment would be expected to be associated with rising inflation and stronger real wage growth. More importantly, our findings also suggest that a concerted effort will be needed to raise the employment prospects of the long-term unemployed, especially as they are likely to withdraw from the job market at an increasing rate if they follow the same path as in the previous recovery.

The Duration of Unemployment and Inflation, Wage Growth and Vacancies

This section summarizes movements in the price Phillips Curve, expected real wage growth (which we call the wage Phillips Curve), and the Beveridge Curve since the Great Recession, and provides econometric evidence suggesting that the rise in long-term unemployment has caused these historical relationships to shift. We start with evidence from the United States and then turn to two European countries that had previously experienced substantial rises in long-term unemployment: the United Kingdom and Sweden.

The Price Phillips Curve

We start by estimating a simple short-run expectations-augmented Phillips Curve for core price inflation using the following specification:

$$\pi_t - \pi_{t-1} = \alpha + \beta\mu_t + \varepsilon_t$$

where π_t denotes the annual average percent change in the consumption expenditures chain price index excluding food and energy items ("core PCEPI") in year t and μ_t denotes the average annual unemployment rate.[2] Expectations are captured by lagged inflation. We restrict our sample to the period from 1976 through 2013 to avoid complications from the oil shock and stagflation of the early 1970s. Nevertheless, the results are robust to the inclusion of data back to 1960, the first year for which core PCEPI inflation can be officially estimated. Despite the parsimonious nature of this model, our specification of the price Phillips Curve illustrates the previously noted shift in the relationship between changes in price inflation and the unemployment rate since the Great Recession.[3]

[2] That is, π_t is the percent change in the average price level from year t-1 to year t. Similar results were obtained with the Q4 to Q4 percent change in inflation.
[3] For alternative specifications of the price Phillips Curve, see Gordon (2013) and Staiger, Stock, and Watson (1997).

As shown in Figure 1(a), based on the fit of this Phillips Curve from 1976 to 2008, the unemployment rates that have been observed since 2009 would have been expected to correspond to declines in core consumer price inflation during this period. Given that the unemployment rate averaged 8.7 percent from 2009 to 2013, a linear price Phillips Curve would have predicted an average decline in core inflation of 1.0 percentage point per year during this period. By contrast, the annual rate of inflation in the core personal consumption expenditures price index has fallen an average of 0.2 percentage point per year since 2009.

A more detailed look at the composition of unemployed workers since the Great Recession suggests that the unprecedented rise in long-term unemployment may have been responsible for dampening the traditional relationship between price inflation and labor market slack. In light of our hypothesis that a worker's labor market attachment wanes as the duration of unemployment lengthens, we estimate a "short-term" unemployment rate by calculating the share of the civilian labor force that has been unemployed for less than 26 weeks. We then re-estimate the core price inflation Phillips Curve relationship using this short-term unemployment rate rather than the traditional measure. As shown in Figure 1(b), this modified price Phillips Curve relationship appears to be more accurate in predicting the observed changes in the rate of core inflation since 2009. Indeed, the average error between the observed and predicted price Phillips Curve estimates since 2009 declines from 0.8 percentage point per year using the overall unemployment rate to 0.1 percentage point per year using the short-term measure.[4]

[4] These results were also robust to our attempts to account for the effects of the 1994 redesign of the Current Population Survey, which found a greater proportion of unemployed workers who had long spells of joblessness. See Polivka and Miller (1994). In particular, if we adjust the short-term and long-term unemployment rate series to be more consistent using Polivka and Miller's factors, the results are qualitatively similar. For simplicity, we use the official data in the paper.

Figure 1(a). Change in Core Consumer Price Inflation vs. Unemployment Rate

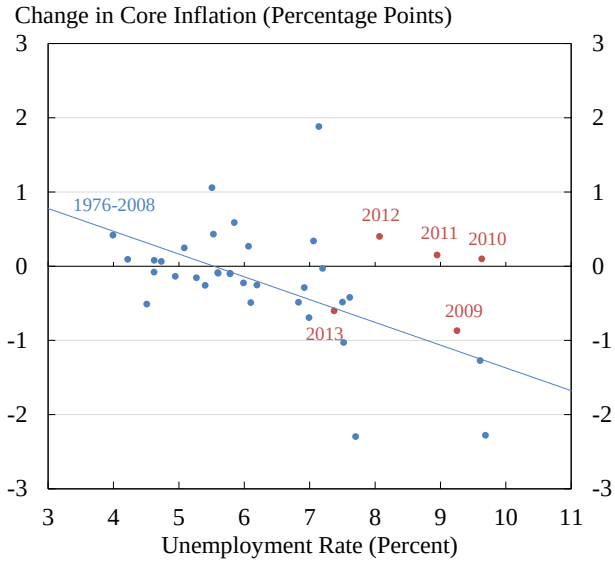
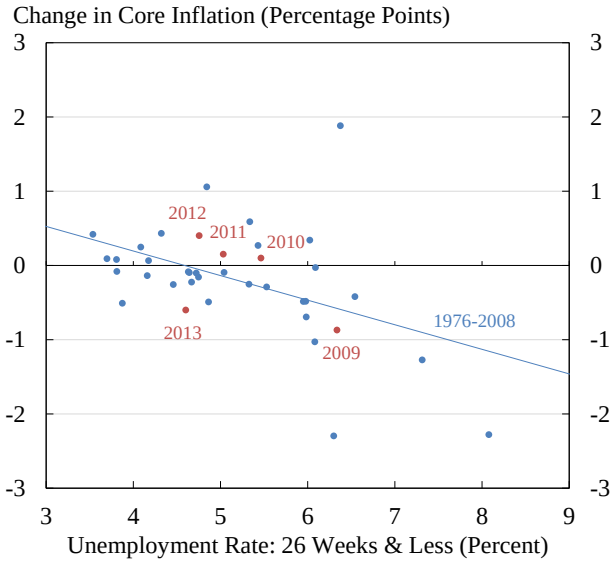


Figure 1(b). Change in Core Consumer Price Inflation vs. Short-Term Unemployment Rate



Note: Core consumer price inflation is defined as the annual average percent change in the personal consumption expenditures chain price index excluding food and energy items.
Source: Bureau of Economic Analysis (National Income and Product Accounts), Bureau of Labor Statistics (Current Population Survey).

We also construct two alternative measures of unemployment to more directly account for aspects of the supply-side and demand-side factors that appear to affect unemployed workers' job-finding prospects. First, we leverage previous research on the amount of time that jobless workers typically spend looking for a job (Krueger and Mueller, 2011) to adjust the overall unemployment rate by the estimated "search intensity" of the unemployed. In their longitudinal analysis of unemployed workers in New Jersey in 2009 and 2010, Krueger and Mueller find that the amount of time that jobless workers devoted to job search declined by approximately 1.5 minutes with each additional week of unemployment.[5] Following Davis (2011), we apply the coefficients from Krueger and Mueller's fixed effects specification to the overall mean duration of unemployment as published in the Current Population Survey in order to estimate a search-time adjusted unemployment rate.[6] We then index this measure of search intensity relative to

[5] Similarly, Wanberg et al. (2013) find that an unemployed worker's job search declines from roughly 18 hours per week during the first week of joblessness to about 11 hours per week during the 20th week of joblessness.
[6] Because Krueger and Mueller's specification is linear, results are unchanged if we use the average duration within bins and assign the corresponding effects estimated by Krueger and Mueller.

2001 and apply it to scale the overall unemployment rate in an attempt to reflect the degree of search intensity among jobless workers. One important caveat to this exercise, however, is that Krueger and Mueller find much sharper within-worker declines in job search than across workers with varying durations of unemployment. Although they provide some evidence suggesting that the person fixed effects estimates more accurately reflect worker search behavior, it is also possible that repeated questioning causes workers to reduce their reported job search activities (time spent in search activities, applications submitted, etc.), but not their actual search behavior.

Second, we incorporate previous research on the probability that a job applicant receives an interview after submitting an application for a job opening in order to adjust the overall unemployment rate by the expected "callback rate" experienced by unemployed workers of various durations. According to Kroft, Lange and Notowidigdo's (2013) analysis, which randomly assigned durations of unemployment to resumes that had been submitted to job postings in 100 U.S. cities between 2011 and 2012, the likelihood of receiving a callback in response to an application declines with time spent unemployed.

Specifically, Kroft, Lange, and Notowidigdo estimate the equation:

$$y_{i,c} = 0.047 - 0.011 \log(D_{i,c}) - 0.020\, E_{i,c} + X_{i,c}\, \Gamma + \varepsilon_{i,c}$$

where $y_{i,c}$ denotes the probability of being called back for an interview for applicant "i" in location c, log(D) denotes the logarithm of the duration of the worker's spell of unemployment, E is a dummy variable indicating whether or not the applicant was already employed, and X is applicant and location characteristics. The average callback rate was 4.7 percent in this sample. Using the coefficients from this regression model, we estimate the probability that the median worker in each category of unemployment duration—less than 5 weeks, 5 to 14 weeks, 15 to 26 weeks, and at least 27 weeks—would receive a callback. Then, we convert these callback

probabilities into weights for each category of unemployment duration in order to adjust the overall unemployment rate in an attempt to reflect the degree to which employers are considering job applicants given the duration distribution of the unemployed.[7] Table 1 reports estimates of the simple price Phillips Curve using the conventional unemployment rate (column 1), the short-term and long-term unemployment rates as separate regressors (column 2), and the two alternative measures that reweight the unemployment rate to reflect declining search intensity and callback probabilities with duration of unemployment (columns 3, 4, and 5). Although the standard errors are relatively large, the short-term unemployment rate is a significant predictor of inflation, and the long-term rate is not in the model shown in column 2; a joint test, however, does not reject equality of the coefficients at conventional significance levels. We also find that the alternative measures of labor market slack appear to have more predictive power for changes in price inflation than does the traditional unemployment rate. Because the two measures are highly collinear, we present results with only one of the alternative unemployment measures in columns 3 and 4, and then with both measures simultaneously in column 5.

[7] We normalize the weights relative to the lowest category, those unemployed for less than 5 weeks. Under this framework, the number unemployed for less than 5 weeks is unadjusted, while the number unemployed 5 to 14 weeks is adjusted by a factor of 0.79, the number unemployed 15 to 26 weeks is adjusted by a factor of 0.58, and the number unemployed for 27 weeks or more is adjusted by a factor of 0.37.

Table 1: Estimated Core Price Phillips Curve

	Dependent Variable: Annual Average Percent Change in Core Inflation Less Previous Year's Annual Average Percent Change in Core Inflation				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Intercept	1.106	1.545	1.311	1.466	1.505
	(0.568)	(0.573) *	(0.505) *	(0.551) *	(0.532) **
Unemployment Rate	-0.200				
	(0.095) *				
Unemployment Rate: 26 Weeks or Less		-0.321			
		(0.133) *			
Unemployment Rate: 27 Weeks or More		-0.054			
		(0.141)			
Unemployment Rate: Search-Weighted			-0.261		-0.137
			(0.098) *		(0.148)
Unemployment Rate: Callback-Weighted				-0.340	-0.186
				(0.121) **	(0.164)
Wald Test for Equal Unemployment Variables: p-value		0.266			0.869
Adjusted R-Squared	0.153	0.176	0.183	0.185	0.177

Note: Annual data from 1976 to 2013 (38 observations). Newey-West standard errors with 3 lags shown in parentheses.
Levels of Significance: *** = 0.01, ** = 0.05, * = 0.10
Source: Bureau of Economic Analysis (National Income and Product Accounts), Bureau of Labor Statistics (Current Population Survey), authors' calculations.

The Real Wage Phillips Curve

We next estimate an expected real wage growth Phillips Curve using the following specification:

$$\omega_t - \pi_{t-1} = \alpha + \beta\mu_t + \varepsilon_t$$

where ω denotes the annual average percent change in average hourly earnings of production and nonsupervisory employees, π is the annual average percent change in the core PCEPI, and μ denotes the average annual unemployment rate.[8] Again, we limit our analysis to the period from 1976 through 2013 in order to avoid measurement issues surrounding the oil shock and stagflation of the early 1970s. Nevertheless, the main conclusions are robust to the inclusion of data back to 1965, the first year for which growth in average hourly earnings can be officially estimated. Furthermore, despite the relatively modest structure of this model, our specification of

[8] This follows the specification, for example, of Katz and Krueger (1999). The dependent variable subtracts lagged inflation from wage growth to reflect expected real wage growth. Results are qualitatively similar if contemporaneous inflation is used instead.

the real wage Phillips Curve effectively illustrates the shift in the relationship between changes in expected real wage growth and the unemployment rate since the Great Recession.

Figure 2(a). Change in Real Expected Average Hourly Earnings vs. Unemployment Rate

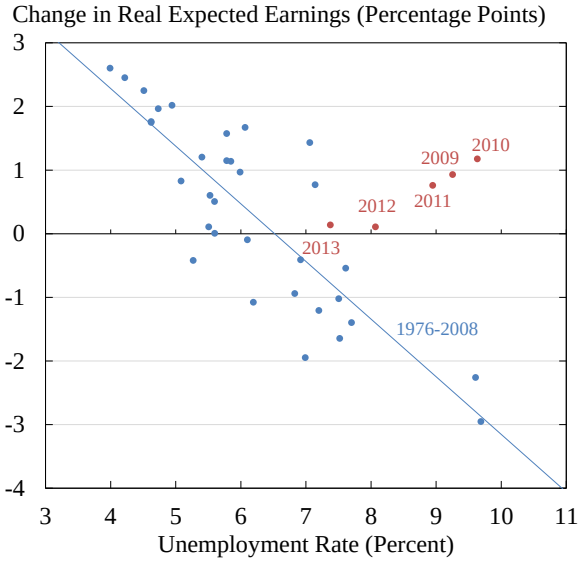
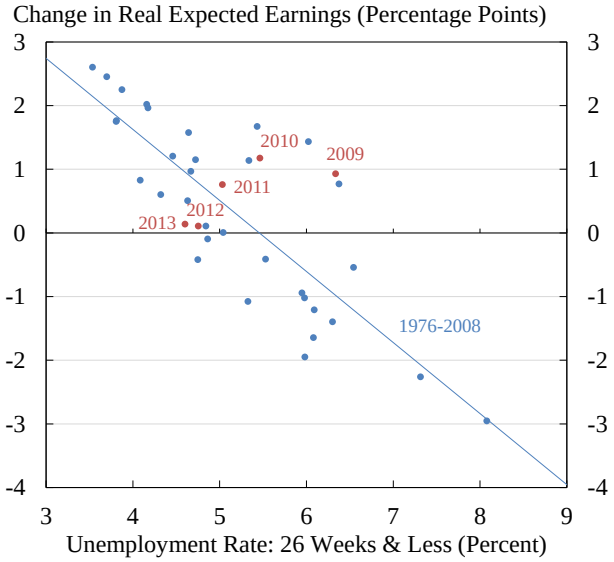


Figure 2(b). Change in Real Expected Average Hourly Earnings vs. Short-Term Unemployment Rate



Note: Change in real expected earnings is defined as the annual average percent change in average hourly earnings of production and nonsupervisory employees less the previous year's annual average percent change in the personal consumption expenditures chain price index excluding food and energy items.
Source: Bureau of Economic Analysis (National Income and Product Accounts), Bureau of Labor Statistics (Current Employment Statistics and Current Population Survey).

The scatter diagram in Figure 2(a) shows the fitted expected real wage Phillips Curve using data from 1976 to 2008, and the observed data since 2008. It is clear that the historical relationship between real wage growth and unemployment would have predicted sharp real wage declines over the past five years. Based on the average unemployment rate of 8.7 percent from 2009 to 2013, the real wage Phillips Curve would have predicted an average decline in expected earnings of 1.9 percentage points per year. Instead, however, the annual rate of change in real expected earnings has risen an average of 0.6 percentage point per year since 2009.

Comparable to our analysis of the price Phillips Curve, Figure 2(b) reports the real wage Phillips Curve relationship using the short-term unemployment rate instead of the total unemployment rate. Again, we find a better and more stable fit. The average error between the observed and predicted real wage Phillips Curve declines from 2.6 percentage points per year

using the overall unemployment rate to 0.4 percentage point per year using the short-term measure. Furthermore, as shown in Table 2, the alternative measures of labor market slack appear to have considerably larger effects on changes in expected real wages than does the traditional unemployment rate, and a Wald test rejects an equal effect of short-term and long-term unemployment. When both alternative measures are included in the regression (column 5), the callback-weighted unemployment rate has a statistically significant negative effect, although one cannot reject the hypothesis that the search-weighted and callback-weighted unemployment rates have equal coefficients.

Table 2: Estimated Expected Real Wage Phillips Curve

	Dependent Variable: Annual Average Percent Change in Average Hourly Earnings Less Previous Year's Annual Average Percent Change in Core Inflation				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Intercept	3.936	5.718	4.723	5.459	5.529
	(1.322) **	(0.715) ***	(1.041) ***	(0.793) ***	(0.750) ***
Unemployment Rate	-0.550				
	(0.224) *				
Unemployment Rate: 26 Weeks or Less		-1.045			
		(0.169) ***			
Unemployment Rate: 27 Weeks or More		0.041			
		(0.230)			
Unemployment Rate: Search-Weighted			-0.759		-0.245
			(0.181) ***		(0.222)
Unemployment Rate: Callback-Weighted				-1.046	-0.772
				(0.184) ***	(0.319) *
Wald Test for Equal Unemployment Variables: p-value		0.003			0.318
Adjusted R-Squared	0.371	0.582	0.490	0.557	0.558

Note: Annual data from 1976 to 2013 (38 observations). Newey-West standard errors with 3 lags shown in parentheses.
Levels of Significance: *** = 0.01, ** = 0.05, * = 0.10
Source: Bureau of Economic Analysis (National Income and Product Accounts), Bureau of Labor Statistics (Current Employment Statistics and Current Population Survey), authors' calculations.

The Beveridge Curve

Figures 3(a) and 3(b) graphically depict the Beveridge Curve, or relationship between job openings and the unemployment rate. It has been well documented that, since the Great Recession ended, the job openings rate has shifted rightward relative to the previous relationship with the unemployment rate that had prevailed from 2001 to 2007 (Hobijn and Sahin 2012), and

this is apparent in Figure 3(a). In Figure 3(b), which displays the Beveridge Curve using the short-term unemployment rate, however, the relationship appears notably more stable, with little evidence of a shift.

Figure 3(a). Job Openings Rate vs. Unemployment Rate

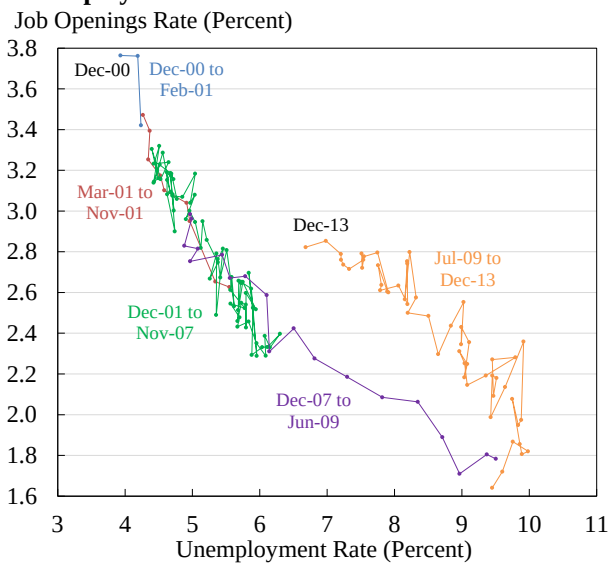
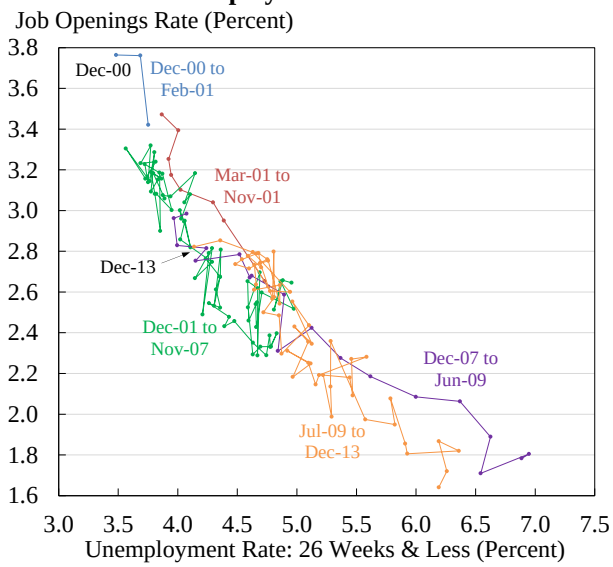


Figure 3(b). Job Openings Rate vs. Short-Term Unemployment Rate



Note: Job openings rate is defined as job openings as a percentage of the sum of job openings and total nonfarm payroll employment.
Source: Bureau of Labor Statistics (Job Openings and Labor Turnover Survey and Current Population Survey).

Table 3 summarizes estimates of a Beveridge Curve using the following specification:

$$\nu_t = \alpha + \beta\mu_t + \varepsilon_t$$

where ν denotes monthly job openings as a percentage of job openings plus total nonfarm payroll employment and μ denotes the monthly unemployment rate. We begin our analysis in December 2000, the first year available from the Job Openings and Labor Turnover Survey (JOLTS). Given that the unemployment rate averaged 8.6 percent from July 2009 to December 2013, a Beveridge Curve relationship estimated from 2001 to 2007 would have predicted an average job openings rate of 0.9 percent from mid-2009 to the end of 2013. By contrast, the job vacancy rate has averaged 2.4 percent during this period.

The results in Table 3 indicate a large role for the short-term unemployment rate in determining job openings, but the long-term rate is statistically insignificant (column 2).

Moreover, both the search-weighted unemployment rate and the callback-weighted unemployment rate have statistically significant, negative effects on job openings in column 5.

Table 3: Estimated Beveridge Curve

Dependent Variable: Job Openings as a Percent of Total Nonfarm Payroll Employment Plus Job Openings	(1)	(2)	(3)	(4)	(5)
Intercept	3.876	5.077	4.708	4.550	4.835
	(0.184) ***	(0.234) ***	(0.237) ***	(0.191) ***	(0.184) ***
Unemployment Rate	-0.188				
	(0.028) ***				
Unemployment Rate: 26 Weeks or Less		-0.514			
		(0.057) ***			
Unemployment Rate: 27 Weeks or More		-0.026			
		(0.029)			
Unemployment Rate: Search-Weighted			-0.395		-0.224
			(0.041) ***		(0.037) ***
Unemployment Rate: Callback-Weighted				-0.420	-0.225
				(0.040) ***	(0.045) ***
Wald Test for Equal Unemployment Variables: p-value		0.000			0.994
Adjusted R-Squared	0.653	0.833	0.769	0.759	0.842

Note: Monthly data from December 2000 to December 2013 (157 observations). Newey-West standard errors with 12 lags shown in parentheses.
Levels of Significance: *** = 0.01, ** = 0.05, * = 0.10
Source: Bureau of Labor Statistics (Job Openings and Labor Turnover Survey and Current Population Survey), authors' calculations.

Further Evidence from the United Kingdom and Sweden

While high long-term unemployment had been an unusual phenomenon in the United States in the post-World War II era, it has been much more prevalent in Europe. In a prescient empirical study, Llaudes (2005) argued that the rise in long-term joblessness distorted the determination of prices and wages in many European countries. Llaudes employed alternative measures of unemployment that were re-weighted to account for the duration of joblessness, and found that measures that down-weighted the long-term unemployed tended to produce more accurate predictions of changes in prices and wages than the traditional unemployment rate.

For example, consistent with our findings for the United States since the Great Recession, Llaudes finds that the long-term unemployed had a relatively smaller effect on changes in prices and wages in the United Kingdom from 1973 to 2002 than did those who had shorter durations

of joblessness. A modified unemployment rate in which workers who have been unemployed for at least a year are weighted by roughly 20 percent as much as the short-term unemployed does a better job of predicting price changes in the United Kingdom than does the overall aggregate measure in which all unemployed workers are weighted equally. Likewise, an adjusted unemployment rate in which workers who have been unemployed for at least a year are weighted by 17 percent as much as the short-term unemployed does a better job of predicting wage changes in the United Kingdom than does the overall aggregate measure.

Nevertheless, the degree to which the long-term unemployed affect changes in prices and wages can vary considerably across countries. For instance, in his specification of the price Phillips Curve for Sweden from 1971 to 2002, Llaudes estimates a weight of about 50 percent for workers who have been unemployed for at least a year in his adjusted measure of labor market slack. Similarly, Llaudes calculates a weight of about half for the long-term unemployed in his alternative measure of the unemployment rate when estimating the wage Phillips Curve for Sweden.

More recently, Hobijn and Sahin (2012) provide a careful examining of the Beveridge Curve in 14 OECD countries, both since the Great Recession and during earlier periods. They find that the Beveridge Curve shifted out notably in the U.S. and four countries since the Great Recession: Portugal, Spain, the U.K., and Sweden. While they do not explore the role of unemployment duration, they suggest (p. 26-27): "The common policy response to reduce the burden of displacement for the unemployed by increasing the generosity and duration of unemployment insurance further contributes to the rightward shift of the Beveridge [C]urve." They also highlight the potential effects of "house lock" and skills mismatch for explaining rightward shifts of the Beveridge Curve since the Great Recession.

Rather than replicate Llaudes's and Hobijn and Sahin's work for a large set of countries, we examine whether long-term unemployment had a differential effect on the Beveridge Curve in the U.K. and Sweden. We selected the United Kingdom and Sweden because those countries experienced sharp run-ups in overall and long-term unemployment and then returned to a more normal situation in the 1980s and 1990s; as a result, they may yield more useful insights for the United States than is the case in countries that experienced persistently high long-term unemployment. In addition, we examine their experience up to the most recent period to probe the robustness of our findings.

Tables 4 and 5 summarize estimates of the Beveridge Curve for the United Kingdom and Sweden. Columns 1 and 2 incorporate data from 1983 to 2005—reflecting the period during which long-term unemployment rose sharply and then declined. As in the analysis for the United States, we decompose the overall unemployment rate into short-term and long-term measures. In both countries, the short-term unemployment rate is a more important predictor of vacancies than the long-term rate through 2005. Although these results are similar to the findings for the United States, the results are not robust if we extend the data through the Great Recession (columns 3 and 4). In particular, in the longer sample, long-term unemployment appears to have at least as great an effect on vacancies as short-term unemployment. Thus, we have not found robust evidence that a differential matching efficiency of the short-term and long-term unemployed can consistently account for movements in the Beveridge Curve in the U.K. and Sweden.

Table 4: United Kingdom: Estimated Beveridge Curve

Dependent Variable: Job Openings as a Percent of Total Employment Plus Job Openings	(1)	(2)	(3)	(4)
Intercept	2.727	3.492	3.011	2.851
	(0.480) ***	(0.542) ***	(0.386) ***	(0.917) **
Unemployment Rate	-0.210		-0.233	
	(0.055) **		(0.045) ***	
Unemployment Rate: Less Than 6 Months		-0.484		-0.178
		(0.144) **		(0.305)
Unemployment Rate: 6 Months or More		-0.170		-0.241
		(0.066) *		(0.062) ***
Wald Test for Equal Unemployment Variables: p-value		0.089		0.855
Adjusted R-Squared	0.637	0.641	0.632	0.619
Number of Observations	23	23	29	29

Note: Annual data from 1983 to 2005 in columns 1 and 2. Annual data from 1983 to 2011 in columns 3 and 4. Newey-West standard errors with 3 lags shown in parentheses.
Levels of Significance: *** = 0.01, ** = 0.05, * = 0.10
Source: Organisation for Economic Cooperation and Development, authors' calculations.

Table 5: Sweden: Estimated Beveridge Curve

Dependent Variable: Job Openings as a Percent of Total Employment Plus Job Openings	(1)	(2)	(3)	(4)
Intercept	1.061	1.247	1.035	0.974
	(0.106) ***	(0.104) ***	(0.110) ***	(0.140) ***
Unemployment Rate	-0.077		-0.059	
	(0.014) ***		(0.018) **	
Unemployment Rate: Less Than 6 Months		-0.211		-0.015
		(0.063) **		(0.053)
Unemployment Rate: 6 Months or More		0.048		-0.108
		(0.057)		(0.041) *
Wald Test for Equal Unemployment Variables: p-value		0.039		0.310
Adjusted R-Squared	0.596	0.693	0.327	0.331
Number of Observations	23	23	30	30

Note: Annual data from 1983 to 2005 in columns 1 and 2. Annual data from 1983 to 2012 in columns 3 and 4. Newey-West standard errors with 3 lags shown in parentheses.
Levels of Significance: *** = 0.01, ** = 0.05, * = 0.10
Source: Organisation for Economic Cooperation and Development, authors' calculations.

A Profile of the Unemployed

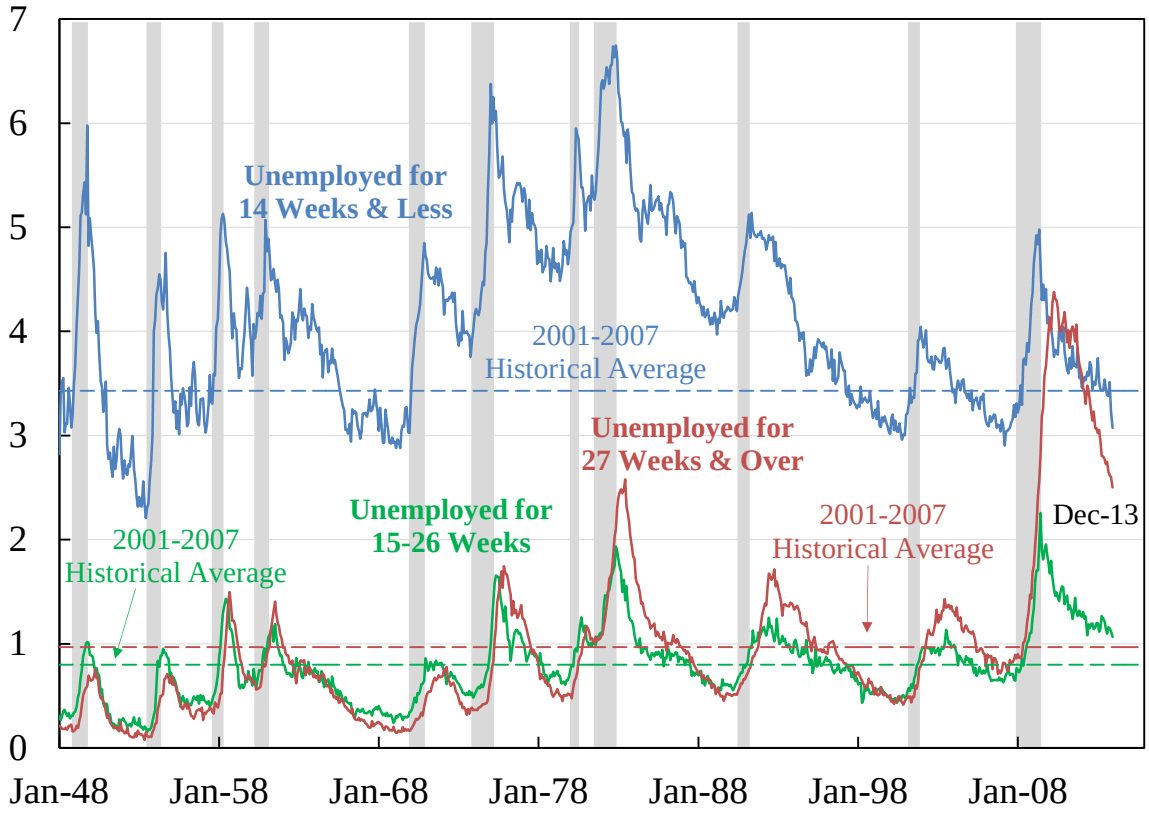
This section provides a detailed portrait of the long-term unemployed in comparison to employed workers and short-term unemployed workers. We begin by reviewing trends in the incidence of long-term unemployment, both in the U.S. and in other economically advanced

countries, then summarize characteristics of the long-term unemployed, and then examine how a summary measure of the composition of the long-term unemployed (based on earnings prospects) has varied over time.

Figure 4 reports duration-specific unemployment rates in the U.S. based on published seasonally adjusted monthly data from BLS from January 1948 through the end of 2013. The red line indicates the long-term unemployment rate (defined as the number unemployed for 27 weeks or longer divided by the labor force), whereas the blue line is the similarly defined unemployment rate for those unemployed for 14 weeks or less, and the green line is the rate for the intermediate group unemployed for 15 to 26 weeks. Notice that the long-term unemployment rate, which tends to rise during periods of recession and peak shortly afterwards, jumped to record heights during the Great Recession, and peaked in early 2010 before starting to decline. Despite declining over the last four years, the long-term unemployment rate still exceeds its previous peak, reached in the aftermath of the deep 1981-82 recession, and is well above its average in the last recovery. The two measures of short-term unemployment, however, are close to their average rates experienced during the last recovery. Thus, as an accounting matter, unemployment remains elevated because of the large number of people who have been unemployed for more than half a year.

Figure 4. Unemployment Rates by Duration

Percent of Civilian Labor Force (Seasonally Adjusted)



Note: Shading denotes recession.
Source: Bureau of Labor Statistics (Current Population Survey), National Bureau of Economic Research.

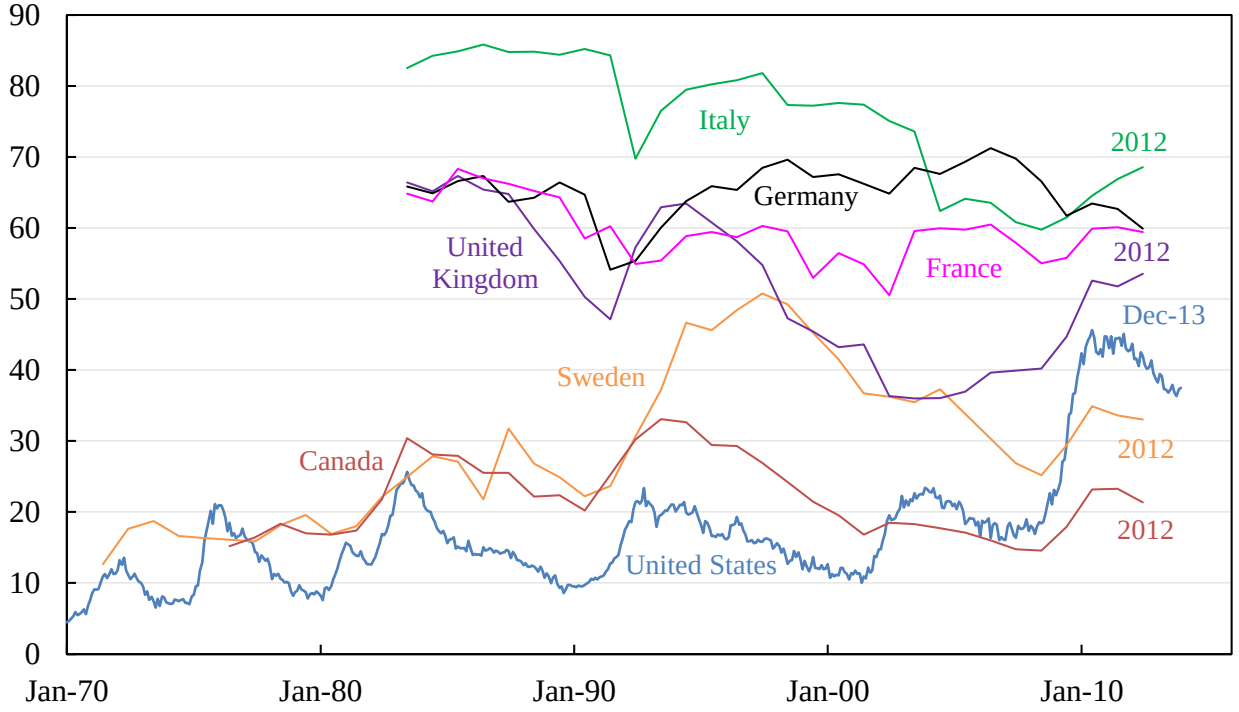
As Figure 5 shows, for most of the four decades prior to the Great Recession, the share of the unemployed in the U.S. who were out of work for more than half a year oscillated between 10 and 20 percent during recoveries and recessions.[9] By contrast, at least since the 1980s, a much higher share of the unemployed have been on long-term unemployment spells in the U.K., France, Germany and, especially, Italy. The share of the unemployed who were long-term jumped from 20 percent to 50 percent in Sweden after its severe financial crisis in the early 1990s, and slowly fell to near its pre-crisis levels, before rising again in the latest recession. The

[9] See Abraham and Shimer (2002) for a careful analysis of why the duration of unemployment in the U.S. rose relative to the unemployment rate in the 1980s and 1990s.

long-term unemployed typically made-up a higher share of the unemployed in Canada than in the U.S., although its share of long-term unemployed workers trended down from the early 1990s to the Great Recession, and is now almost half the U.S. share. These disparate trends, particularly the high-share of the unemployed who have been out of work for longer than half a year in France, Germany, Italy, and the U.K., often exceeding 60 percent, suggest that long-term unemployment affects different segments of the workforce in different countries, and can be a more or less persistent phenomenon depending on a nation's institutions and social benefits.

Figure 5. Long-Term Unemployment in Selected Countries

Percent of Total Unemployed in Each Country



Note: Data for the United States are at monthly frequency and represent those who have been unemployed for at least 27 weeks. Data for all other countries are at annual frequency and represent those who have been unemployed for more than 6 months.

Source: Bureau of Labor Statistics (Current Population Survey); Organization for Economic Cooperation and Development.

Table 6 reports the distribution of employees, short-term unemployed workers and long-term unemployed workers along several dimensions for the U.S. using the 2012 Current

Population Survey (CPS) survey. For example, the table indicates that 34 percent of employed individuals are age 16 to 34, 33 percent are age 35 to 49, and 33 percent are age 50 and older. Compared to their share of employment, young people are notably over represented among the short-term unemployed, while the middle age group is under represented. Compared to their share of the short-term unemployed, the oldest group is over represented among the long-term unemployed, although their share of the long-term unemployed roughly matches their share of unemployment.

If the unemployed as a whole are compared to the employed, notably larger shares of the unemployed are younger, unmarried, and less well educated. For example, although about one third of employed workers have earned a bachelor's degree, less than 20 percent of the unemployed have done so. By contrast, nearly 20 percent of the unemployed lack a high school diploma, which is twice the rate for the employed. African Americans and Hispanics are also over represented among the ranks of the unemployed compared with the employed. Not surprisingly given the housing bubble, a higher proportion of the unemployed previously worked in the construction industry than the share of workers currently employed as construction workers; nonetheless, only 11 percent of the unemployed are former construction workers.

If the long-term unemployed are compared to the short-term unemployed, a larger proportion of the long-term unemployed are over age 50 and do not have a spouse. Fully 44 percent of the long-term unemployed were never married, while nearly 20 percent are either widowed, separated, or divorced. In addition, African Americans comprise 22 percent of the long-term unemployed, compared with just 10 percent of the employed population.

Among many other dimensions, however, the long-term unemployed appear similar to the short-term unemployed. Other than high school dropouts, the educational achievement of the

two groups is comparable, and both the industry distribution and occupational distribution are similar. Differences across regions and between urban and rural areas are also typically small.

Table 6: Profile of the Employed, Short-Term Unemployed and Long-Term Unemployed, 2012

	Percent of Employed	Percent of Short-Term Unemployed (< 14 Weeks)	Percent of Long-Term Unemployed (> 26 Weeks)
Gender			
Male	53	54	55
Female	47	46	45
Age			
16-34	34	57	40
35-49	33	23	29
50+	33	19	31
Marital Status			
Married	56	33	37
Widowed/Divorced/Separated	15	15	19
Never Married	29	52	44
Race			
White, Nonhispanic	67	55	51
African American	10	16	22
Hispanic	15	22	19
Asian/Pacific Islanders	6	4	5
Other	2	3	3
Education			
Less than High School	9	23	18
High School	27	33	36
Some College	19	20	20
Associate's Degree	11	8	9
Bachelor Degree or Higher	34	17	18
Industry			
Construction	6	12	11
Manufacturing	10	9	11
Wholesale and Retail Trade	14	15	16
Finance and Real Estate	7	4	5
Prof. and Business Services	12	14	14
Education and Health Care	23	16	15
Leisure and Hospitality	9	15	12
All Other	19	16	15
Occupation			
Professional and Technical	22	13	12
Managerial and Financial	16	7	10
Administrative	12	12	14
Sales and Service	32	39	36
Blue Collar	18	29	28

Source: Authors' calculations from the Current Population Survey.

A majority of the long-term unemployed last held jobs in just two occupational categories, blue-collar jobs (28 percent) and sales and service jobs (36 percent). The former category tends to be dominated by men, while the latter is divided roughly equally between men and women. Professional and technical workers, administrative workers, and managerial and financial workers, each comprise notably smaller shares of the long-term unemployed.

We compared tabulations analogous to those in Table 6 for Italian employees in 2013Q1.[10] Italy provides an interesting contrast because long-term unemployment is persistently a much higher share of the unemployed in Italy than in the U.S. One striking difference is that young workers were vastly over represented among the long-term unemployed in Italy, especially in comparison to their share of employment. Just under a quarter of all workers are age 15-34 in Italy, while nearly half of the long-term unemployed are age 15-34. Only 15 percent of the long-term unemployed in Italy are age 50 or older, compared with 31 percent in the U.S. Additionally, a notably high percentage (56 percent) of Italian long-term unemployed workers had less than a high school education, and nearly half of the long-term unemployed in Italy were in the south and islands, almost twice their share of national employment. In the U.S., by contrast, long-term unemployment is distributed more evenly across regions.

The high concentration of the long-term unemployed among the young, less educated and southern region in Italy suggest that the nature of long-term unemployment is different there than in the U.S. In particular, rather than a sharp rise in long-term unemployment that hit all segments to a considerable extent, the Italian predicament of long-term unemployment appears to be more of a persistent, structural phenomenon. The disproportionate share of unemployment borne by the young in Italy is consistent with an insider-outsider model, where older workers are

[10] We thank Tito Boeri for providing these tabulations to us. The tabulations were based on the ISTA RCFL (Labor Force Survey).

the insiders, and where they retire if they lose their jobs. The higher share of young workers among the long-term unemployed in Italy suggests that the long-term unemployed may have a longer term commitment to staying in the job market and finding a job in Italy than in the U.S.

Composition of the Long-Term Unemployed over Time in U.S.

Table 6 summarizes the characteristics of the unemployed at a point in time. To create a single summary measure of the characteristics of the long-term unemployed that can be tracked over time we used the following procedure. We first estimated a wage regression using data from 2004-06, which was a more or less "normal" period for the labor market, and then we combined the coefficients from this regression with the characteristics of the long-term unemployed each year to track the earnings potential of long-term unemployed workers each year from 1995 to 2013. Specifically, the wage regression related the log hourly wage of workers to their education, experience, industry, occupation , race, gender and marital status. The estimated coefficients from this regression were then combined with the characteristics of the long-term unemployed (defined as those unemployed for longer than 26 weeks at the time of the survey) each year to derive a simple summary of the composition of the long-term unemployed with respect to their earnings prospects.[11]

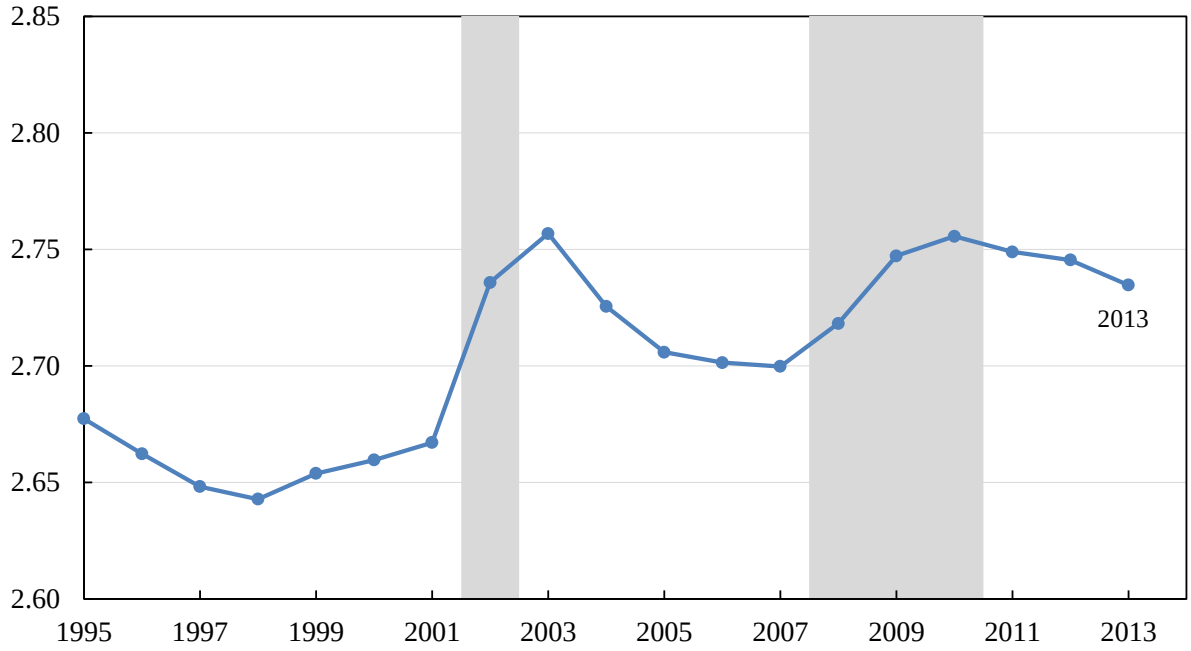
Figure 6 contains the results of this exercise. There appears to be both a mild secular trend and a mild cyclical pattern in the composition of the long-term unemployed, at least as far as their characteristics that predict earnings are concerned. The composition of the unemployed

[11] We use CPS data from 1995 forward because we limit the sample to the period after the 1994 redesign of the CPS, which affected the share of long-term unemployed workers and improved the ability to track individuals over time. Industry and occupation were measured on a consistent two-digit basis. The description in the text ignores one complication. For the minority of unemployed workers who are new entrants, information on occupation and industry is lacking. To include these workers, we estimated the wage regression a second time, but omitted industry and occupation from the model. The coefficients from this second regression were used to predict earnings for those lacking industry and occupation data. The results are qualitatively unchanged if the new entrants are excluded from Figure 6, however.

has tilted towards those with characteristics associated with higher earnings, such as more education, since the mid 1990s. In addition, the mix of the long-term unemployed with characteristics associated with higher earnings tends to rise during downturns. Predicted earnings of the long-term unemployed rose by about 5 log points in the past two recessions. This pattern is consistent with Andreas Mueller's (2012) finding that in recessions the pool of the unemployed tends to shift towards those with higher earnings in their previous job because such workers are more likely to be displaced in recessions. In the section on transition rates below, we perform a similar exercise to examine changes in the composition of the long-term unemployed with respect to measured characteristics that predict job finding and labor force withdrawal.

Figure 6. Mean Predicted Log Wages for the Long-Term Unemployed Based on Their Characteristics

Log 2013 Dollars



Note: Annual averages. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research; Authors' calculations using Current Population Survey Longitudinal Population Database (see Nekarda, 2009).

Industry and Occupation Distributions

Table 7 reports the previous and new occupations and industries, respectively, of short-term and long-term unemployed workers who regained employment in 2012 based on CPS data. For a benchmark, the share of employed workers in each occupation and industry is also reported. The results are striking in that the new job distribution closely replicates the pre-unemployment job distribution for those who were fortunate enough to be reemployed in 2012. For example, 27 percent of long-term unemployed workers who were reemployed in 2012 had previously worked in blue collar jobs, and 26 percent of the short-term workers who found work in 2012 were employed in blue collar jobs. The corresponding figures for short-term unemployed workers who regained employment are that 33 percent came from blue collar jobs and 32 percent were reemployed in blue collar jobs.

A similar pattern holds for the industry distributions: the distribution of the industries that both short-term and long-term unemployed workers regained employment in closely replicate the industries from which they were displaced. There is no tendency in these data for reemployed workers to gravitate to growing industries or occupations relative to the industries from which they were displaced. These results suggest that assisting unemployed workers to transition to expanding sectors of the economy, such as health care, professional and business services, and management, is a major challenge. Instead, unemployed workers who do return to work tend to return to jobs in their previous sectors.

Table 7: Previous and New Occupations and Industries of Short-term and Long-term Unemployed Workers who Regained Employment in 2012

Occupations of Workers Who Were Employed or Found Work in 2012
(Percent of Total in Each Category of Employed Workers)

Occupation	Total Employed	Employees Who Had Previously Been Unemployed Short-Term But Found Work		Employees Who Had Previously Been Unemployed Long-Term But Found Work	
		Old Work	New Work	Old Work	New Work
Blue-Collar Occupations	17.5 %	33.4 %	31.9 %	26.8 %	25.6 %
Sales & Services	32.2	37.1	38.2	37.4	40.1
Administrative	12.4	9.1	9.5	12.9	12.9
Professional & Technical	22.0	14.7	14.8	12.1	12.8
Managerial & Financial	15.9	5.7	5.6	10.8	8.5

Note: Short-term unemployed defined as 26 weeks or fewer of unemployment. Long-term unemployed defined as 27 weeks or more of unemployment.
Source: Estimates from the 2012 Current Population Survey.

Industries of Workers Who Were Employed or Found Work in 2012
(Percent of Total in Each Category of Employed Workers)

Industry	Total Employed	Employees Who Had Previously Been Unemployed Short-Term But Found Work		Employees Who Had Previously Been Unemployed Long-Term But Found Work	
		Old Work	New Work	Old Work	New Work
Construction	6.3 %	14.3 %	13.6 %	10.9 %	11.5 %
Manufacturing	10.3	8.1	7.7	9.5	6.5
Wholesale & Retail Trade	14.0	13.2	12.9	15.0	15.7
Financial Activities	6.7	3.1	2.9	5.4	3.7
Professional & Business Services	11.6	13.2	13.4	15.5	16.9
Educational Services	9.1	9.1	8.6	5.2	6.0
Health Care Services	13.6	8.2	8.7	10.6	10.4
Leisure & Hospitality	9.3	14.6	16.2	12.2	12.6
All Other	19.1	16.3	16.1	15.7	16.6

Note: Short-term unemployed defined as 26 weeks or fewer of unemployment. Long-term unemployed defined as 27 weeks or more of unemployment.
Source: Estimates from the 2012 Current Population Survey.

Transition Rates

This section explores labor market activity of the long-term unemployed over time. Specifically, we use longitudinally linked CPS data (see Nekarda, 2009) to study how the long-term unemployed fare in later survey months. In particular, we investigate the factors underlying whether the long-term unemployed move into employment, continue actively searching for employment, or transition from unemployment to not in the labor force. As others have shown (e.g., Valetta, 2011), the long-term unemployed have disparate labor market flows compared to short-term unemployed workers. We begin by reviewing basic trends in labor force flows by duration of unemployment. We then discuss some explanations for the observed patterns, and explore the implications for the future labor market. One channel that is most important in our view for the future path of long-term unemployment in the U.S. is how the decision to continue searching for a job conditional on not having become employed evolves. We will later embed different assumptions about movement from unemployed to out of the labor force into a calibration model along the lines of Kroft, et al. 2013 to see how outcomes differ, focusing especially on the evolution of the Beveridge Curve, the macroeconomic relationship which arguably most directly reflects the operation of the job market. Our findings suggest that we could see a return to the original Beveridge Curve following the labor force exit of many of the long-term unemployed.

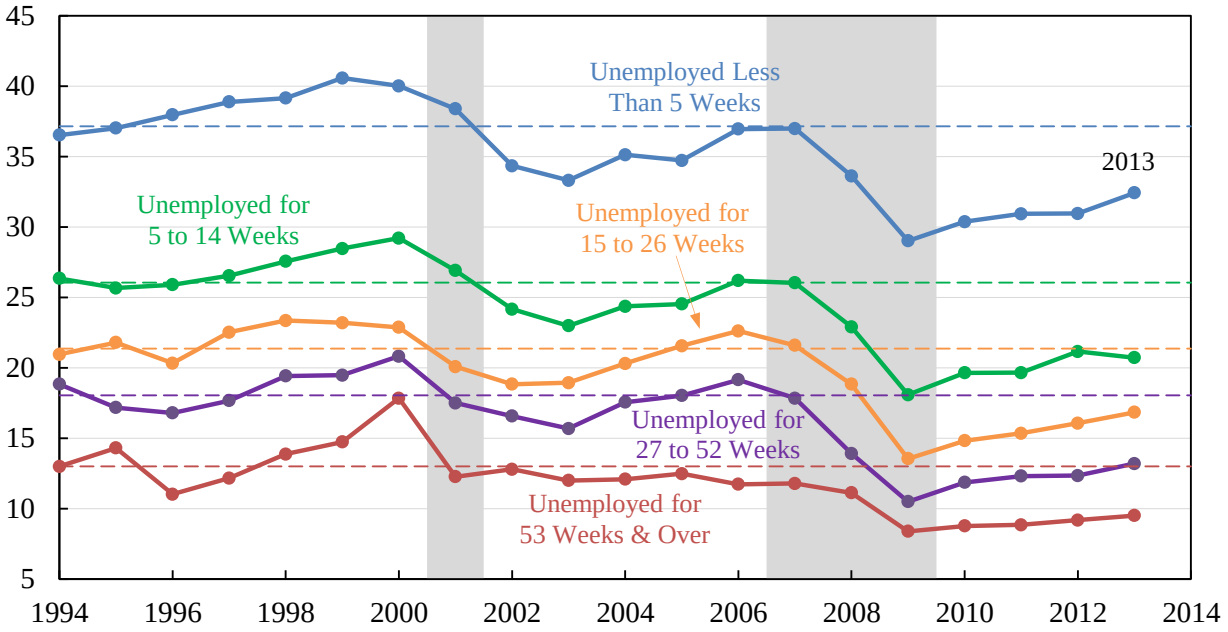
Figure 7 displays annual averages of monthly transition rates from unemployment to employment each year since 1994, based on BLS's published transition rates for five duration of unemployment categories. Although many researchers have documented that CPS data can severely misstate gross labor market flows because of classification errors, which require caution in interpreting the data, the series nonetheless convey some signal and reflect movements in the

official unemployment rate (Abowd and Zellner, 1985, Summers and Poterba, 1986 and Shimer, 2012). A few patterns are clear. First, the job-finding rate is lower for those with a longer duration of unemployment, with the long-term unemployed finding jobs at less than half the rate of those very short-term unemployed. Second, the cyclicality of job finding is clear in these data, with all rates declining during the recession of the early 2000s, and declining more dramatically during the Great Recession. Third, job finding rates for all groups remain well below their pre-Great Recession averages. Fourth, the job finding rate has risen for each group in the last four years, although it has barely increased for those unemployed longer than a year. In 2013, just under 10 percent of those who had been unemployed for more than one year transitioned into employment in the average month. This rate, though higher than in many European countries (Elsby, et al. 2011), might overstate how well the long-term unemployed are faring due to measurement error and the fact that the long-term unemployed are more likely to take low-paying, part-time jobs and temporary jobs; a point we revisit below.

Observed duration-dependence in job finding rates could reflect worker heterogeneity (i.e., as those with the most marketable skills tend to find jobs more quickly), or an effect of discouragement, skill erosion and employer statistical discrimination against the long-term unemployed. Available evidence suggests that observed duration-dependent transition rates are not primarily a result of heterogeneous job searchers (e.g., Heckman and Singer, 1984), although econometric evidence on the respective roles of heterogeneity and duration dependence remains unsettled.

Figure 7. Probability of Transitioning From Unemployment to Employment by Duration of Unemployment

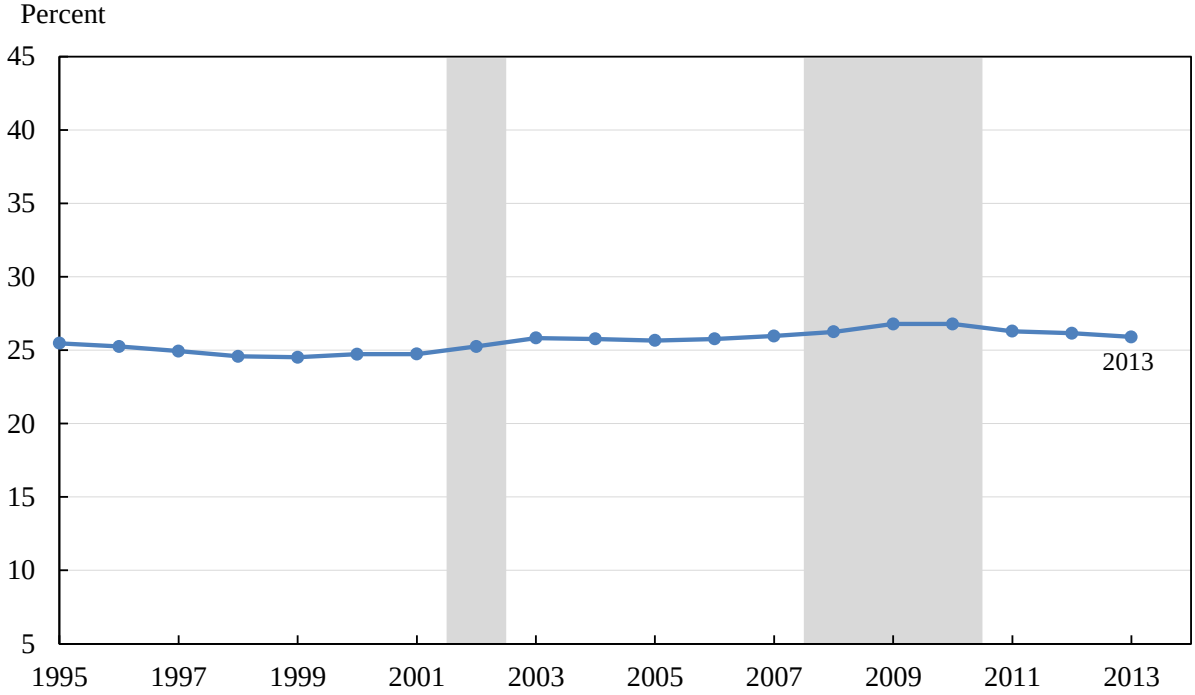
Percent of Each Category of Unemployment Duration



Note: Dotted lines represent 1994-2007 averages. Shading denotes recession.
Source: Bureau of Labor Statistics (Current Population Survey); National Bureau of Economic Research.

Figure 8, which uses the same scale for the *y*-axis as Figure 7, suggests that any effect of *changing* heterogeneity on the pattern of job finding rates over the business cycle for the long-term unemployed is small. To construct this figure, we first used the same characteristics that were used to predict wages in the last section to estimate a logistic model where the dependent variable was one if a worker who was unemployed in month t was classified as employed in month t+1, and zero otherwise (i.e., if the worker remained unemployed or exited the labor force). The model was estimated for the years 2004-06. We then used the coefficients from this model to predict the job finding rate of the long-term unemployed (27 weeks or longer) based on their characteristics each year.

Figure 8. Mean Predicted Probability of Transitioning From Unemployment to Employment for the Long-Term Unemployed Based on Their Characteristics



Note: Annual averages. Shading denotes recession. Predicted transition rate was derived by estimating a logistic model where the dependent variable was one if a worker who was unemployed in month t was classified as employed in month t+1, and zero otherwise (i.e., if the worker remained unemployed or exited the labor force). Explanatory variables were: education, experience, industry, occupation, race, gender and marital status. The model was estimated for the years 2004-06. The estimated coefficients from this model were then combined with the characteristics of the long-term unemployed (defined as those unemployed for longer than 26 weeks at the time of the survey) each year to predict the probability of transitioning to employment in the next month.
Source: National Bureau of Economic Research; Authors' calculations using Current Population Survey Longitudinal Population Database (see Nekarda, 2009).

The cyclical pattern suggests that there is a very slight shift in the characteristics of the long-term unemployed in recessionary periods toward those that are more favorable for finding a job, but the shift in the composition is very modest, predicting a rise in the job finding rate of only about 1-2 percentage points. This is in contrast to the roughly 5 percentage point fall in the job finding rate for the long-term unemployed in the past two recessions.

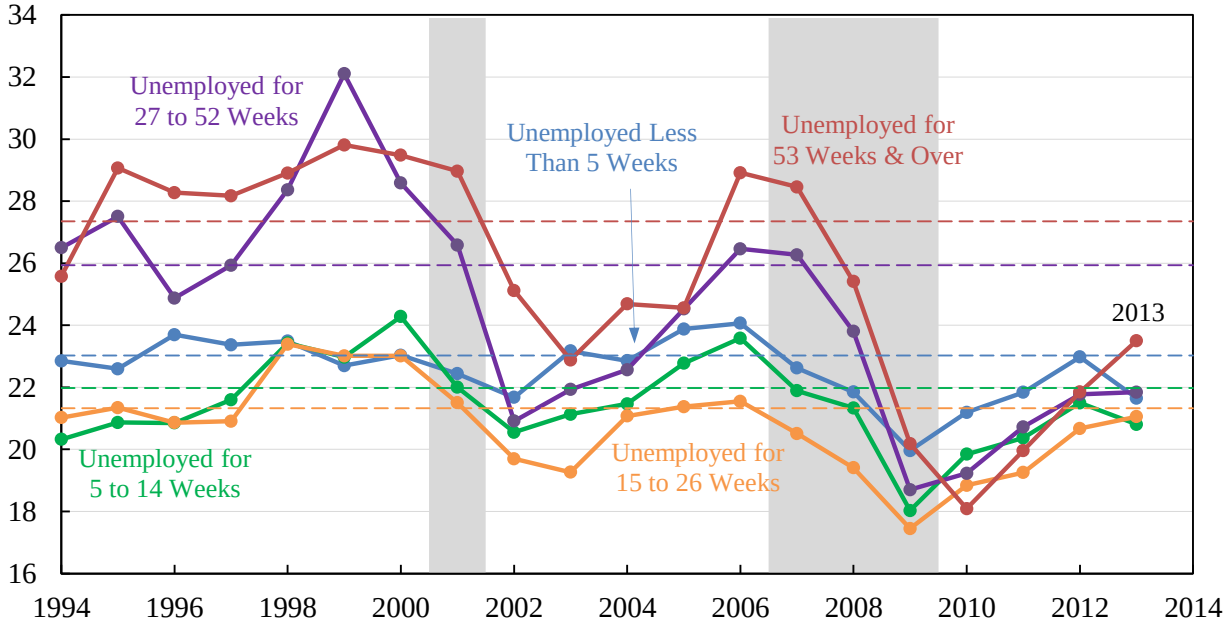
Notice also that the predicted job finding rate for the long-term unemployed based on their characteristics is consistently around 25 percent according to Figure 8. However, Figure 7 shows that the job finding-rate for the long-term unemployed is consistently below that rate,

even in periods of a relatively strong job market. This contrast is consistent with the view that the long-term unemployed face discrimination in the job market or become discouraged, or that they possess unobserved characteristics that lead to lower job finding prospects – or some combination of all three.

Figure 9 displays the monthly labor-force withdrawal rates for the unemployed in each of the duration groups from 1994 to 2013. A few patterns are noteworthy. First, the long-term unemployed tend to have a higher rate of labor force exit than the short-term unemployed, perhaps partly reflecting discouragement on the part of the long-term unemployed. Second, labor force exit rates tend to drop in a recession, especially for the long-term unemployed. Indeed, in the mild recession in the early 2000s, the labor force exit rate for the long-term unemployed almost fell around 10 percentage points, to about the same level as the rate for recently unemployed workers, and in the deep recession in 2008-09, the labor force withdrawal rate force exit rate for the long-term unemployed again fell by around 10 percentage points, to virtually the same level as that of the short-term unemployed. Third, the labor force exit rate gradually rises for all duration groups after a recovery takes hold, and the rate rises more for the long-term unemployed. In other words, after labor force exit rates collapse in recession to about the same level for all duration groups, the exit rate tends to move towards its historical norm in the recovery, with a higher exit rate for the long-term unemployed.

Figure 9. Probability of Transitioning From Unemployment to Out of the Labor Force by Duration of Unemployment

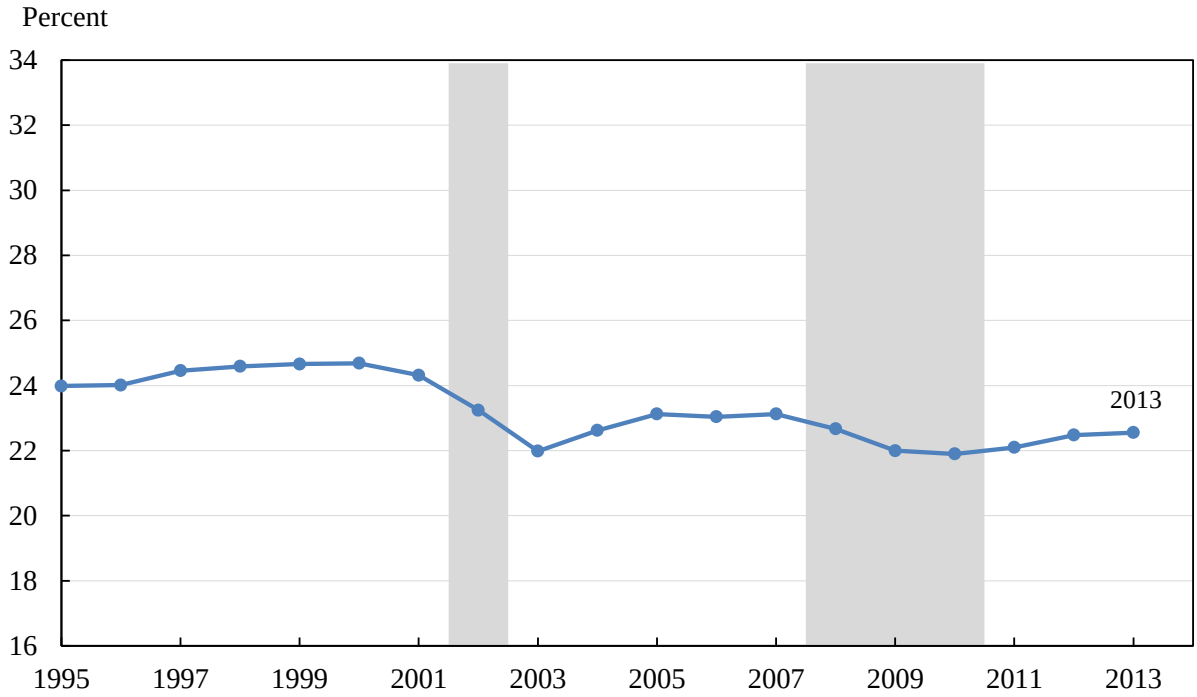
Percent of Each Category of Unemployment Duration



Note: Dotted lines represent 1994-2007 averages. Shading denotes recession.
Source: Bureau of Labor Statistics (Current Population Survey); National Bureau of Economic Research.

Figure 10 suggests that a relatively small part of the cyclical pattern in the labor force exit rate for the long-term unemployed is due to compositional shifts. The figure shows the predicted unemployment-to-out-of-the-labor-force transition rate based on the same characteristics and approach used to construct Figure 8. Again, the scale is the same as in Figure 9. Although there is a cyclical pattern in the composition of the unemployed, with those with a stronger attachment to the labor force becoming long-term unemployed during a recession, movements in composition would predict only about a 2 percentage point decline in the labor force withdrawal rate in a recession, in contrast to the roughly 10 percentage point drop observed in the last two recessions.

Figure 10. Mean Predicted Probability of Transitioning From Unemployment to Out of the Labor Force for the Long-Term Unemployed Based on Their Characteristics



Note: Annual averages. Shading denotes recession. Predicted transition rate was derived by estimating a logistic model where the dependent variable was one if a worker who was unemployed in month t was classified as out of the labor force in month t+1, and zero otherwise (i.e., if the worker remained unemployed or was classified as employed). Explanatory variables were: education, experience, industry, occupation, race, gender and marital status. The model was estimated for the years 2004-06. The estimated coefficients from this model were then combined with the characteristics of the long-term unemployed (defined as those unemployed for longer than 26 weeks at the time of the survey) each year to predict the probability of transitioning to employment in the next month.

Source: National Bureau of Economic Research; Authors' calculations using Current Population Survey Longitudinal Population Database (see Nekarda, 2009).

Labor force exits and their effect on the unemployment rate have been neglected in much past research, although recent work by Elsby et al. (2013) suggests that changes in the participation margin account for 33 percent of the cyclical variation in the unemployment rate. For now, we focus on these flows in isolation, but it is important to bear in mind Shimer's (2013) observation that a decrease in the job-finding rate will indirectly raise the measured transition rate from employment to unemployment, so the flows are best considered as part of a system.

As mentioned, during the most recent recession, and similarly to the recession of the early 2000s, the rate of labor force withdrawal dropped for all durations of unemployment, but

most markedly for the long-term unemployed, and only a small part of this drop was a result of compositional shifts. This phenomenon probably reflects, in part, the extension of unemployment insurance benefits, which require workers to search for a job and has been shown to induce unemployed workers to stay in the labor force, thus elevating the measured unemployment rate (see Rothstein 2011, Farber and Valletta 2013). Many commenters have predicted that as these benefits are exhausted or scaled back, the withdrawal rate for the long-term unemployed may begin to rise towards its historical average. By 2013, it appears that this process has begun to take place for those who have been unemployed for over one year, but it is less apparent for those who have been unemployed between 26 and 52 weeks.

As shown in the simulations below, the process of the labor force withdrawal rates of the long-term unemployed moving toward their historical averages has important implications for the unemployment rate, and, relatedly, the Beveridge Curve. Nevertheless, barring an extraordinarily fast rebound in the labor force exit rates of the long-term unemployed relative to their short-term unemployed counterparts, it appears likely that the long-term unemployment rate will remain persistently high for a considerable amount of time, as was the case in Sweden and the United Kingdom after their long-term unemployment rates spiked up.

Longer-Term Transitions

To investigate more fully whether the long-term unemployed are on the margins of the labor market, we also look at transition rates for the long-term unemployed over longer periods of time using matched data from the CPS. The CPS's rotation group design (interviewed four consecutive months, out of the survey for eight months, and interviewed four more months) makes it possible to examine transitions over a 15 month interval. The monthly transitions could

overstate the prospects of the unemployed if there are classification errors or if the jobs to which the unemployed gain reemployment tend to be transitory.

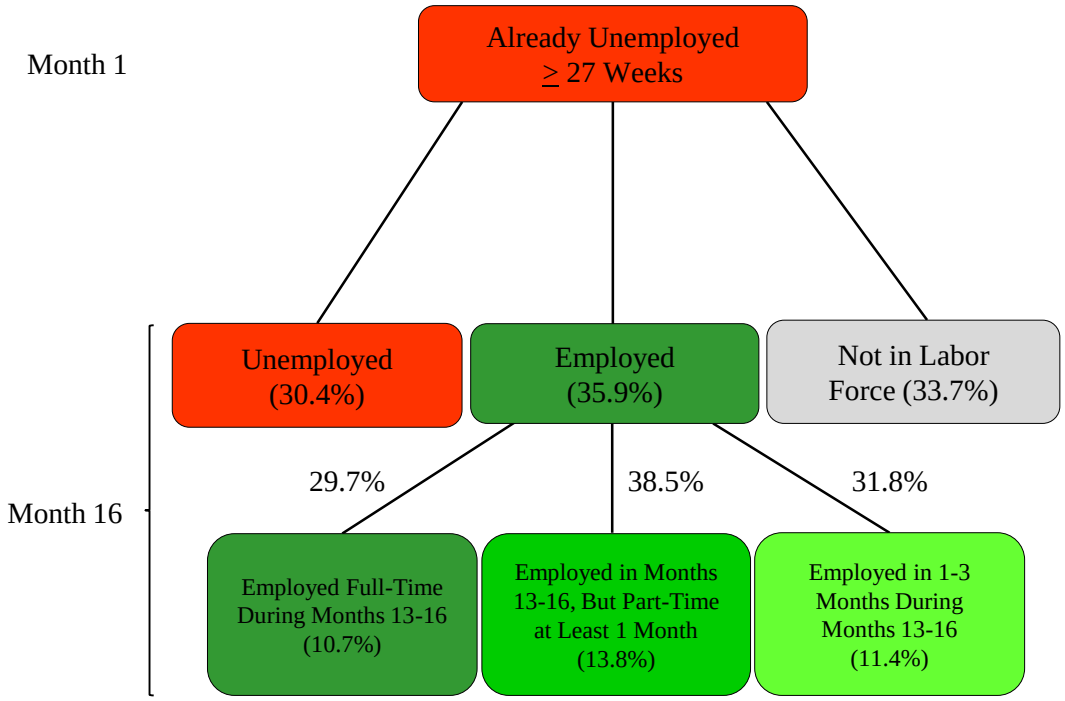
A useful benchmark with which to compare longer term job finding rates is the implied fraction of the unemployed who would be employed 15 months hence if the monthly job-finding rate is constant for all workers and employment were an absorbing state. Then, given a flow into employment of approximately 10 percent for the long-term unemployed, one would expect nearly 80 percent of those who were long-term unemployed in a given month to be employed 15 months later, and 20 percent to remain jobless (either unemployed or out of the labor force).[12] Of course, this calculation exaggerates the actual reemployment rate because workers can lose their job soon after finding one or withdraw from looking for a job if they don't find one after a period of time, but it provides a handy benchmark for thinking about the monthly labor force transition rates, and would suggest that a job finding rate as low as 10 percent implies that the long-term unemployed still have a reasonable attachment to employment.

In fact, however, actual long-term transition rates are considerably lower than those implied by the monthly data. Figure 11 shows that since the beginning of the Great Recession, 36 percent of those who were long-term unemployed in a given month were employed 15 months later. Another 34 percent were not in the labor force, and 30 percent were unemployed 15 months later. Furthermore, of the 36 percent who were employed 15 months later, less than one third had been employed full-time for four consecutive months. As a result, from 2008 to 2012, only 11 percent of those who were long-term unemployed in a given month returned to steady, full-time employment a year later.[13]

[12] Assuming independence and a constant 0.10 probability of finding a job in any given month, the proportion of unemployed workers who gained employment within 15 months would be $1-(1-0.10)^{15} = 0.794$.

[13] Steady employment in this context means that someone who was unemployed for 27 weeks or longer in month t was employed full-time for four consecutive months starting in month t+12.

Figure 11. Longitudinal Transition Rates for the Long-Term Unemployed, 2008-2013



Source: Authors' calculations using Current Population Survey Longitudinal Population Database (see Nekarda, 2009).
Note: Chart reflects the experience of those who were long-term unemployed in their fist Current Population Survey interview (2008-2012) and their labor force status 15 months later (2009-2013).

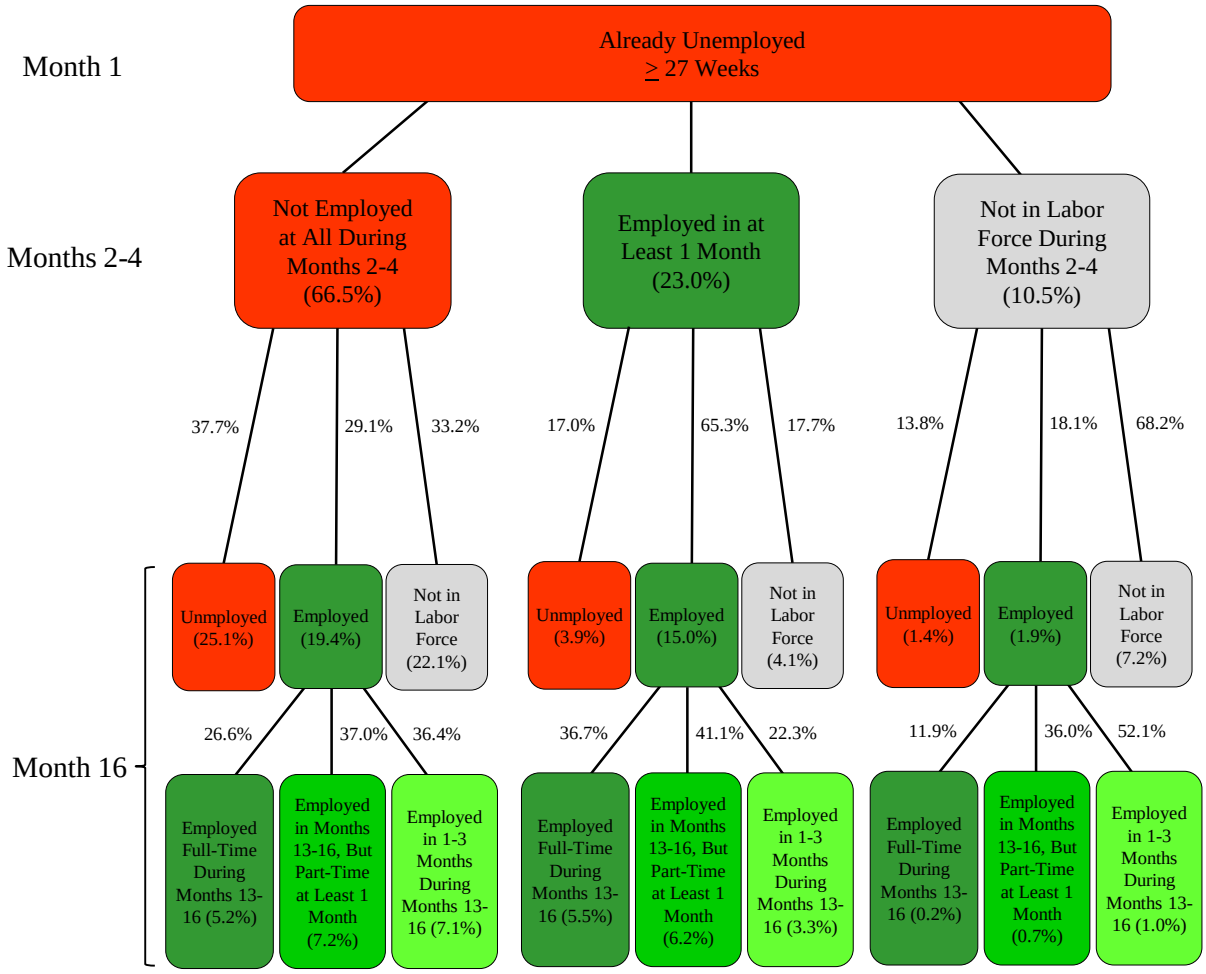
If we compare these rates to an earlier period, we find that the longer term transition rates for the long-term unemployed who were first surveyed in the CPS from 2008 to 2012 are not very different from those exhibited by those who became long-term unemployed before the Great Recession. In particular, the chance of a long-term unemployed worker transitioning to employment 15 months later was 39 percent in 2005-07, as compared with 36 percent in the period starting with the Great Recession. Likewise, only 12 percent of the long-term unemployed were continuously reemployed in full-time jobs in month 13-16 in the 2005-07 period, versus 11 percent in the 2008-13 period. These results suggest that the major difference between the 2008-13 period and the end of the last recovery is that there were many more long-

term unemployed workers in the latter period, not that they fared dramatically differently in the labor market once they became long-term unemployed.

We should also note that the longer term employment transition rates for those who were initially unemployed for less than 27 weeks when they entered the survey are substantially below what might be suggested by their monthly transition rates. Only 50 percent of the short-term unemployed in 2008-13 were employed 15 months later, which is higher than the 36 percent rate for the long-term unemployed but still relatively low, and suggestive of the high risk of long-term unemployment facing the newly unemployed in this period.

Figure 12 provides a further disaggregated look at the transitions of the long-term unemployed, which highlights the transitory nature of their employment opportunities. In particular, the diagram divides the data by labor market status in the second, third, and fourth months in the sample. The first notable observation from this figure is that only 23 percent of the long-term unemployed in month one report being employed for one month or more in months two through four. This compares to 11 percent who report being out of the labor force in months two, three and four, and 67 percent who report having been unemployed in one month between months two and four without moving to employment. Once the long-term unemployed leave the labor force for three straight months, they were likely to stay out of the labor force, with only 32 percent reentering: a slightly larger share move into employment than unemployment, consistent with Barnichon and Figura (2013).

Figure 12. Longitudinal Transition Rates for the Long-Term Unemployed, 2008-2013



Source: Authors' calculations using Current Population Survey Longitudinal Population Database (see Nekarda, 2009).
Note: Chart reflects the experience of those who were long-term unemployed in their fist Current Population Survey interview (2008-2012) and their labor force status 15 months later (2009-2013).

Those who did move from not in the labor force for three straight months to employment were mostly employed intermittently in the previous four months. Of the 23 percent who were employed at least one of months 2 through 4 after having been long-term unemployed in period 1, 65 percent were also employed in month 16. But, even for this group, steady employment is not as prevalent as may be expected. Those who stay unemployed in one of months 2 through 4 without moving into a job, displayed similar behavior to those who were initially long-term unemployed as described in Figure 11, though with slightly greater movement to unemployment

than employment and not in the labor force. All of these results underscore that the long-term unemployed face difficulty regaining full-time, steady work over the longest period we can observe in CPS data. It appears that reemployment does not fully reset the clock for the long-term unemployed.

The Meaning of "Not in the Labor Force" for the Long-Term Unemployed

We next explore the reasons the long-term unemployed state when they leave the labor force. This provides some purchase on whether the long-term unemployed are on the margins of the labor force, and whether there will be continued movement toward the historical labor force exit rate. Furthermore, it is important to know whether those who leave the labor force are likely to be classified as "marginally attached," since the marginally attached are more likely to re-enter the labor market than others who are out of the labor force (see Barnichon and Figura, 2013 and Krusell, Mukoyama, Rogerson, and Sahin, 2011). Currently, the official BLS measures of discouraged workers and marginally attached are relatively low. The U-5 measure of labor underutilization, which includes all marginally attached workers and has as its denominator the civilian labor force plus all persons marginally attached stood at 8.1 percent in December, just 1.4 percentage points above the headline unemployment rate.

Using linked CPS data, we tabulated responses by those who had been long-term unemployed but then left the labor force to the following question, "(Do / Does) (name/you) currently want a job, either full or part time?" This question is critical for the BLS's classification scheme. Someone who is out of the labor force but indicates that he or she wants a job is asked follow-up questions to determine their potential degree of discouragement.

Conversely, someone who is out of the labor force but indicates that he or she does *not* want a job is precluded from being classified as “marginally attached” to the labor force.

Since the Great Recession, fully 73 percent of those who had been long-term unemployed in month 1 and then left the labor force by month 16 indicated that they did not want a job in month 16 of the survey. This number had been trending up over time (Barnichon and Figura, 2013). If the long-term unemployed were leaving the labor force for "economic reasons," it would seem reasonable for such workers to indicate that they might still want a job. The apparently high rate of permanent exits is consistent with the view that many of the long-term unemployed were induced to search for a job and remain in the labor force longer than they otherwise desired in order to qualify for extended UI benefits, and then left the labor force once benefits expired (Rothstein, 2011 and Faber and Valletta, 2013). The large number of long-term unemployed who say they do not want a job once they leave the labor force is consistent with the hypothesis that the long-term unemployed are, to a large extent, on the margins of being in the labor force.

This analysis included all respondents who classified themselves as “long-term unemployed” in their first month of the survey, and thus, it is possible that a substantial portion of these workers may have already been effectively out of the labor force by the time they were surveyed in the CPS in month 16. To test whether or not this result essentially reflects a misclassification of “long-term unemployed” workers in month one of the survey, we also looked at those who reported being long-term unemployed every single month during months one-four and months 13-15, and then left the labor force in month 16. Even with this severe restriction on the consistency of reported long-term unemployment, more than 40 percent of

these long-term unemployed workers indicated that they did not want a job in the first month that they left the labor force.

A follow-up question for those who report they do not want a job is, "What best describes (name's/your) situation at this time? For example, (are / is) (you/he/she) disabled, ill, in school, taking care of house or family, or something ELSE?" Typically, those who leave the labor force because they no longer want a job report that they are either "taking care of house or family" or "in school" (Hotchkiss, Pitts, and Avila, 2012).

Since the Great Recession, those who had been long-term unemployed in the initial interview and then left the labor force by month 16 of the survey and reported that they no longer wanted a job indicated that they were currently "taking care of house or family" (56 percent), engaged in "other" unspecified activities (19 percent), and "in school" (16 percent).[14] Other possible responses, including "retirement" (2 percent), "disability" (3 percent), and "illness" (1 percent), had modest response rates.

The low rate of long-term unemployed workers who withdraw from the labor force and report a disability as their reason for not wanting a job suggests that the Disability Insurance (DI) program plays, at most, a minor role in incentivizing the long-term unemployed to withdraw from the labor force, or in supporting them once they do withdraw from the labor force. This observation is also consistent with Mueller, Rothstein and von Wachter's (2013) conclusion that Unemployment Insurance exhaustions and DI take up are unrelated.

[14] In comparison to the long-term unemployed, those who had been unemployed for less than 27 weeks in month 1 and then left the labor force by month 16 and reported that they no longer wanted a job were: (1) twice as likely to report that they were currently in school (32 percent versus 16 percent), and (2) less likely to report that they were currently "taking care of house or family" (43 percent versus 56 percent).

Calibration Model

We previously presented time-series evidence suggesting that the shift in the Beveridge Curve is due to the increase in long-term unemployment during the Great Recession. The relationship between vacancies and unemployment appears to be stable if one uses the short-term unemployment rate. One possibility is that, after a severe shock, the Beveridge Curve shifts out because of slow job growth, a rise in long-term unemployment, and a decline in labor force exits, particularly among the long-term unemployed. Moreover, the path of unemployment and vacancies could eventually loop back to the original Beveridge Curve position because many of the long-term unemployed exit the labor force or (less likely) find a job, and the unemployment rate primarily reflects the historical share of short-term unemployed workers after a time.[15] Our goal in this section is to explore these two hypotheses with a calibrated model of labor force flows and job matching in which the participation rate by duration eventually moves back to its historical norm.

Specifically, we extend the calibration model in Kroft, et al. (2013). The approach has at its core a straightforward method of accounting for the disparate labor market flows of the unemployed by duration of unemployment. Kroft, et al.'s partial equilibrium model focuses on a search and matching framework that is a simplification of Mortensen and Pissarides (1994) and Shimer (2005), ignoring the firm side, with slight tweaks to help fit the data (e.g., to adjust for population growth and inconsistencies in flow data and reported durations). They focus on workers age 25 to 54 to avoid issues concerning the aging of the baby boom and increased school attendance. Their model, which was calibrated using data from 2002 to 2007, generates predictions about the labor force movements of the unemployed by duration of unemployment. Kroft, et al.'s model captures most of the rise in the share of long-term unemployed workers as a

[15] See Blanchard and Diamond for a discussion of loops around the Beveridge Curve.

result of the slowdown in job vacancies that accompanied the Great Recession. Their model does not appear to generate a loop around the Beveridge Curve, however.[16]

We extend their model in two important respects. First, using data from 2002-07, we estimate a matching function of the form:

$$J = (U_S + \delta U_L + \xi N)^{\alpha}(V)^{1-\alpha}$$

where J is the number of jobs being filled by the nonemployed, U_S is the number of short-term unemployed workers, U_L is the number of long-term unemployed workers, N is the number of nonparticipants, and V is the number of vacancies. The parameters δ and ξ reflect the lower match efficiency for the long-term unemployed and nonparticipants. The short-term unemployed are defined as those with less than 27 weeks of unemployment, while the long-term unemployed are those with 27 weeks or more of unemployment. We estimate coefficients of δ=0.60 and ξ= 0.29. Kroft, et al. did not allow for a differential match parameter for the short-term and long-term unemployed; their estimate of $\xi$was similar to ours.

Kroft, et al. also assumed the same labor force withdrawal rate for the short-term and long-term unemployed. While this is plausible in the immediate aftermath of a recession, over time the labor force withdrawal rate tends to rise, especially for the long-term unemployed (see Figure 7). Consequently, we allow for differential labor force withdrawal rates by duration of unemployment.

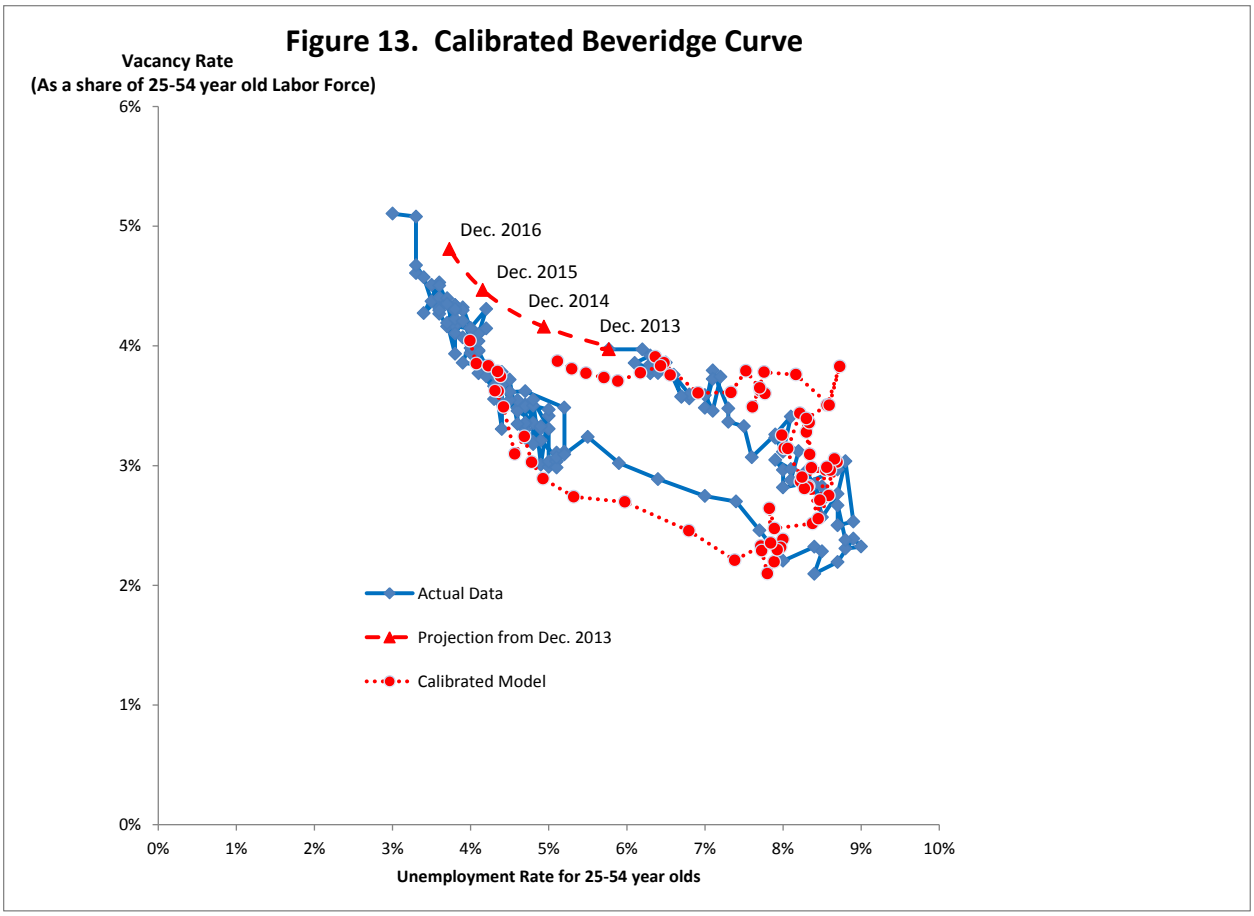
We follow Kroft, et al. in using the observed number of vacancies, labor force withdrawal rates, and transitions into unemployment as forcing variables in the model. We also

[16] This observation is based on our replication of their model. In particular, when we replicated their exact model we also found a rise in the share of the long-term unemployed that mirrored the observed data. When we projected the Beveridge Curve using their model there was no shift in the curve after the Great Recession. Intuitively, this finding resulted because their matching function generated job growth, and a consequent drop in unemployment, that was stronger than observed in the recovery because it did not allow for a lower match rate of the long-term unemployed.

follow Kroft, et al. and assign a duration of unemployment to those who initially transition from nonparticipant to unemployed, and from employed to unemployed based on the observed distributions in that calendar year. For those who remain unemployed from one period to the next, we increment their duration of unemployment by one month.

Figure 13 uses the 2002-07 matching function to project the Beveridge Curve from 2008 to 2013. The projection seems to match the broader trends in the data reasonably well. The calibrated model predicts an outward shift in the Beveridge Curve similar to what has been observed. Moving into 2012 and 2013, the projection begins to move back towards the original Beveridge Curve. There are some notable points where the simulation deviates from the data. The projection initially under predicts the 5 percentage point rise in the unemployment rate from January 2008 to October 2009 by one percentage point. This finding is consistent with Hall and Schulhofer-Wohl (2013), who found that there has been a steady downward drift in matching efficiency in the 2000s.[17] After initially under predicting the actual unemployment rate, as the number of long-term unemployed grows and the unemployed as a whole thus have a lower matching efficiency, the job finding rate falls and the unemployment rate rises above the level actually observed. As the labor force exit rate of both the long- and short-term unemployed began to rise, however, the projection began to move back towards the original Beveridge Curve. As of December 2013, the model predicts that the unemployment rate would be 0.7 percentage point lower than the actual rate. As a whole, however, the calibrated model seems to capture the broad outlines of the shift of the Beveridge Curve. The root mean square error between the actual unemployment rate and projection based on the calibrated model is 0.8 percentage point.

[17] Hall and Schulhofer-Wohl's analysis focuses on eight different types of job seekers to control for heterogeneity.



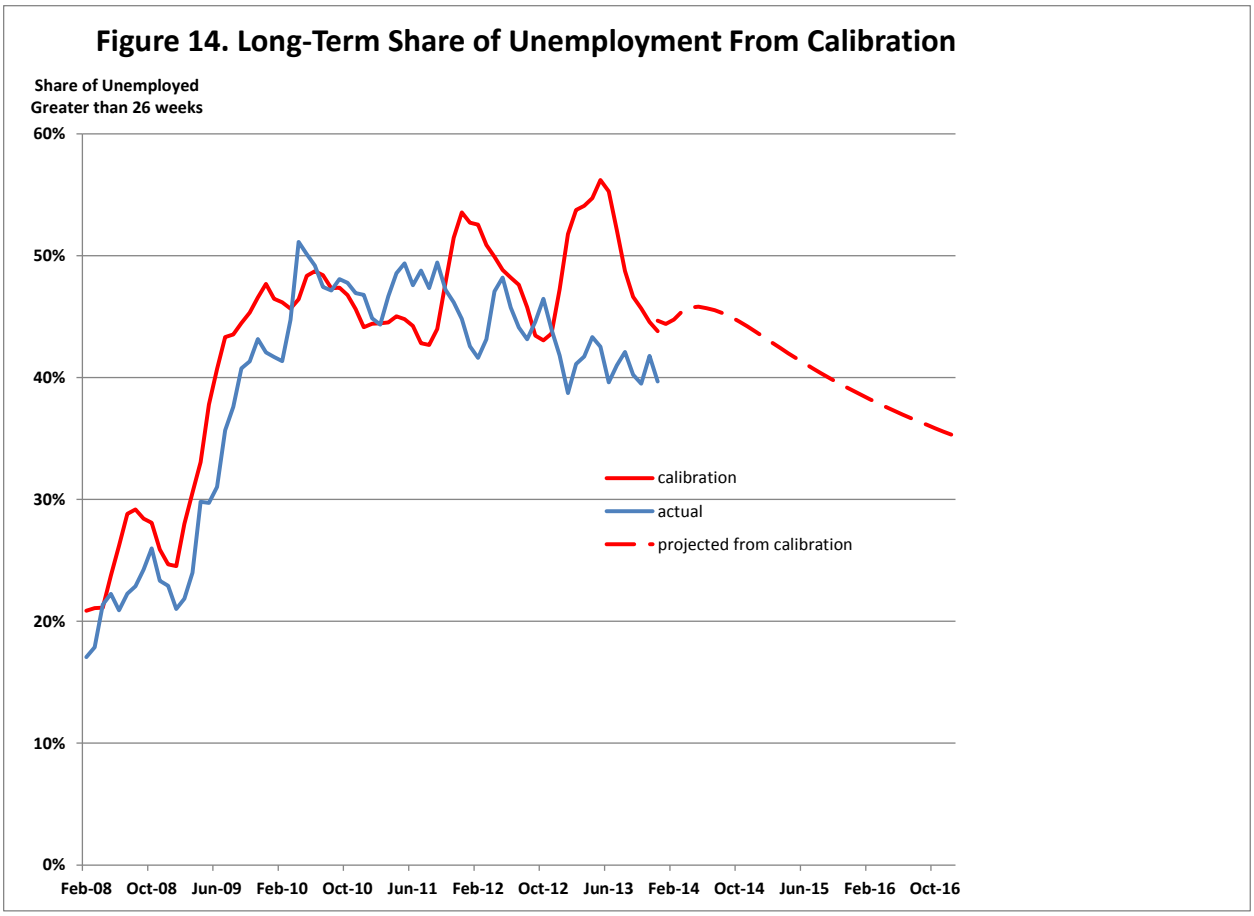
To probe what the calibration exercise implies going forward, we extended the calibration projections through 2016 starting with the data observed for December 2013. Vacancies are treated as exogenous in the model; we assume that vacancies grow at the same rate they had over calendar year 2013 (32,000 per month). The labor force exit rates of the long- and short-term unemployed are assumed to linearly return to their 2006 averages by 2016, an assumption that appears consistent with the 2002-07 recovery and current trends (see Figure 7; notice also that the short-term exit rate is close to its pre-recession level). Under these assumptions, the figure shows that by December of 2016 the labor market would almost have returned to the original Beveridge curve. This implies that the combination of rising labor force

withdrawal rates and lower match efficiency for the long-term unemployed can account for a loop around the Beveridge Curve.

Figure 14 shows the share of prime-aged workers who were predicted by the model to be long-term unemployed. Although the projection does not match the actual data as closely as Kroft, et al., the matching function does a relatively good job of capturing the rise in the share of long-term unemployment from 2009 to 2010.[18] An extension of the calibrated model implies that as vacancies and matches rise, coupled with labor force withdrawal rates returning to their earlier, higher levels, long-term unemployment is expected to decline gradually; though by the end of 2016, however, the share remains well above pre-recession levels.

To assess the extent to which the fit of the calibrated model from 2008-2013 is driven by the varying labor force withdrawal rates for the short-term and long-term unemployed, we also conducted a counterfactual calibration exercise using the 2008-2009 overall average flow rate from unemployed to out of the labor force for all durations each month instead of the duration-specific rate each month. The projections from this exercise fit the actual data much less well. Although there is still a loop in the projected Beveridge Curve in this counterfactual projection due to the fact that the matching function places a lower weight on the long-term unemployed, the projection under predicts peak unemployment by nearly 2.5 percentage points. In total, the omission of the actual unemployed to out of the labor force flows by duration results in a root mean square error that is nearly twice as large as our base model: 0.8 percentage point compared to 1.5 percentage points.

[18] The rises in the share of long-term unemployed at the beginning of 2011 and 2012 are due to a feature of the calibration model: at the beginning of the year the distribution of unemployment spells for those who entered unemployment from employment or out of the labor force is updated to correspond to the actual distribution for such workers in that calendar year.



We conclude from this exercise that the varying pattern of labor force withdrawal by unemployment duration is an important feature of the job market. Moreover, the fact that a similar pattern was observed in the past recovery suggests that labor force withdrawal of the long-term unemployment rate is historically an important (but unfortunate) mechanism by which the labor market returns to equilibrium.

Regional Differences within the U.S.

Some states are further along than others in recovering from the Great Recession than others. We divide the states into those with high and low unemployment, based on their state-wide unemployment rate in October 2013 and examine trends in long- and short-term

unemployment in those groups of states. Our analysis suggests that the long-term unemployment rate has remained elevated even in low-unemployment rate states, defined as the 13 states with the lowest unemployment rates in the U.S. in October 2013. The low unemployment rate states – many of which have benefited from energy production and a rebound in the agricultural sector – are Hawaii, Kansas, Minnesota, Montana, Nebraska, New Hampshire, North Dakota, Oklahoma, South Dakota, Utah, Vermont, Virginia, and Wyoming; the average unemployment rate in these states in December 2013 was 4.3 percent, compared to 7.0 in the rest of the country.

The comparative paths of short-term and long-term unemployment in the two sets of states are shown in Figure 15(a) and 15(b), where the ratio of the short- and long-term unemployment rates to their respective 1996-2007 averages are displayed. The states currently with low unemployment were also on average low-unemployment states prior to the recession; as a consequence, the historical averages we use for each group of states are from those states. The figures show that even in states with low unemployment rates in October 2013, long-term unemployment grew dramatically during the recession, reaching 4.5 times its historical average. This is close to the peak ratio of just below 5.0 in the high-unemployment states. The long-term unemployment rate does appear to be falling faster in the lower unemployment states, but it remains at a historically high level, more than double its historical average as of December 2013.

Figure 15(a). Low Unemployment States: Unemployment Rates by Duration Relative to 1996-2007 Averages

Ratio Relative to Historical Average

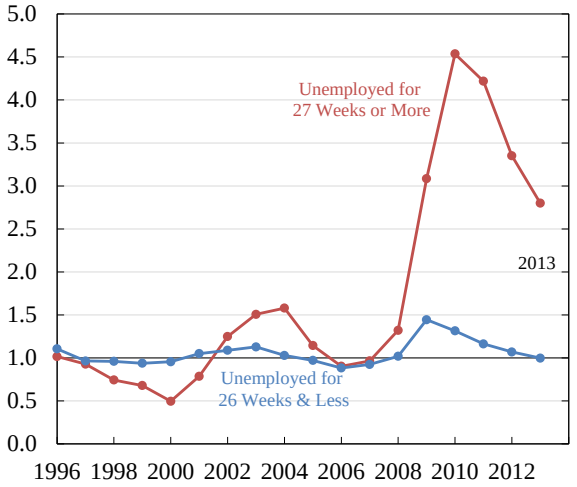
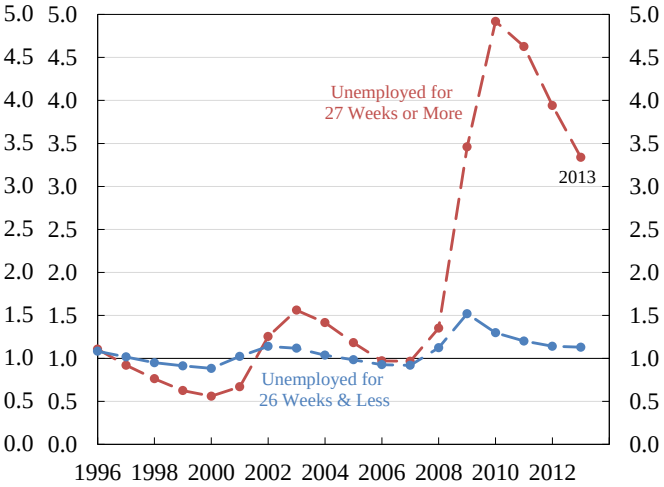


Figure 15(b). High Unemployment States: Unemployment Rates by Duration Relative to 1996-2007 Averages

Ratio Relative to Historical Average



Note: Low unemployment states had a 2013 average unemployment rate below 6.3 percent as of October 2013. High unemployment states had a 2013 average unemployment rate above 6.3 percent as of October 2013.

Source: Authors' calculations from the Current Population Survey.

Lastly, we examine transition rates from unemployment to employment and out of the labor force by duration of unemployment for both sets of states. We do not find evidence that the long-term unemployed are faring notably better in terms of transitioning to employment in the low-unemployment states than in the high-unemployment states, as is shown in Figure 16(a). The long-term unemployed appear to be following similar trends in transition rates into employment in both groups of states, although the low-unemployment states have exhibited slightly higher job-finding rates for the long-term unemployed since 1996. The job-finding rates dropped in both groups of states during the Great Recession and have remained comparably low during the recovery. The job-finding rates for the short term unemployed (not shown) also exhibited similar trends.

Figure 16(a). Transition Rates From Long-Term Unemployment to Employment

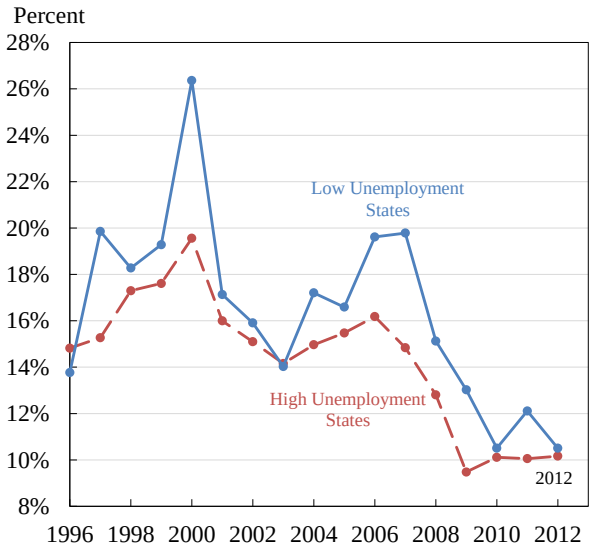
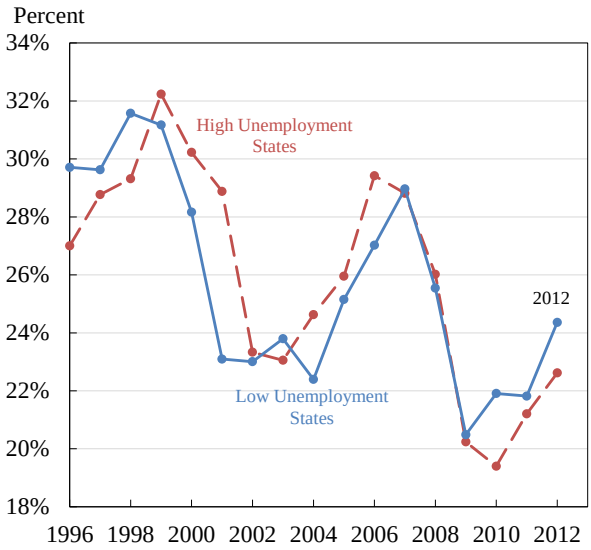


Figure 16(b). Transition Rates From Long-Term Unemployment to Out of the Labor Force



Note: Low unemployment states had a 2013 average unemployment rate below 6.3 percent as of October 2013. High unemployment states had a 2013 average unemployment rate above 6.3 percent as of October 2013.
Source: Authors' calculations from the Current Population Survey.

Figure 16(b) shows the flows from unemployment to out of the labor force by duration of unemployment for high- and low-unemployment states. The graph shows that although the low-unemployment states do have slightly higher labor-force exit rates than the high-unemployment states in the post-recession period, this is consistent with the historical pattern and the exit rates are currently similar.

Overall, there is little evidence in this comparison to suggest that the long-term unemployed fare substantially better in the states with the lowest unemployment rates, consistent with the idea that the long-term unemployed are on the margins of the labor force, even where the economy is stronger.

Conclusion

The Great Recession and subsequent modest recovery have been distinguished by an exceptionally high rate of long-term unemployment. Our calibration exercise suggests that long-term unemployment rose for a simple reason: because job vacancies grew slowly in the economy as a whole. The decline in job vacancies during the Great Recession set in motion a dynamic that led to unprecedented long-term unemployment and a rise in the unemployment rate. Indeed, using parameters of a job matching function that allows for lower match efficiency for the long-term unemployed and that was estimated *prior* to the recession, we are able to capture most of the shift of the Beveridge Curve by the path of vacancies.

Historically, the long-term unemployed have faced great difficulty regaining steady, full-time employment. The long-term unemployed also tend to withdraw from the labor force at a higher rate than the short-term unemployed, although labor force withdrawal rates tend to collapse during a recession. Our calibration exercise suggests that the historical dynamic of the labor force participation rate of the long-term unemployed declining and then returning to its pre-recession level, coupled with lower match efficiency for the long-term unemployed, can account for loops around the Beveridge Curve. The Beveridge Curve tends to return to its original position as the share of long-term unemployed falls.

Although the long-term unemployed have about a one in ten chance of moving into employment in any given month, when they do return to work their new jobs are often transitory. After 15 months, the long-term unemployed are more than twice as likely to have withdrawn from the labor force than to have settled into steady, full-time employment. And when they exit the labor force, the long-term unemployed tend to say that they no longer want a job, suggesting that many labor force exits could be enduring. The subset of the long-term unemployed who do

regain employment tend to return to jobs in the same occupations and industries from which they were displaced, suggesting that significant challenges exist for helping the long-term unemployed to transition to growing sectors of the economy. A stronger macroeconomy helps the long-term unemployed in part because it raises demand in their previous sectors. But even in good times, the long-term unemployed are often on the margins of the labor market, with diminished employment prospects and relatively high labor force withdrawal rates.

The portrait of the long-term unemployed in the U.S. that emerges here suggests that, to a considerable extent, they are an unlucky subset of the unemployed. Their diverse and varied set of characteristics implies that a broad array of policies will be needed to substantially lower the long-term unemployment rate and stem labor force withdrawal, as concentrating on any single occupation, industry, demographic group or region is unlikely to have a substantial impact reducing long-term unemployment by itself. Understanding the labor market and personal hurdles faced by the long-term unemployed should be a priority for future research in order to craft solutions to reduce long-term unemployment.

Some may wish to draw macroeconomic policy implications from our findings. Only time will tell if inflation and real wage growth are more dependent on the short-term unemployment rate than total unemployment rate. To us, the most important policy challenges involve designing effective interventions to prevent the long-term unemployed from receding into the margins of the labor market or withdrawing from the labor force altogether, and supporting those who have left the labor force to engage in productive activities. Overcoming the obstacles that prevent many of the long-term unemployed from finding gainful employment, even in good times, will likely require a concerted effort by policy makers, social organizations, communities and families, in addition to appropriate monetary policy.

References

Abowd, John M., and Arnold Zellner. 1985. "Estimating Gross Labor-Force Flows." *Journal of Business & Economic Statistics* 3, no. 3: 254-283.

Abraham, Katharine, and Robert Shimer. 2002. "Changes in Unemployment and Labor Force Attachment." *The Roaring Nineties*, edited by Alan Krueger and Robert Solow (New York: Russell Sage Foundation), pp. 367-420.

Ball, Laurence, and Sandeep Mazumder. 2011. "The Evolution of Inflation Dynamics and the Great Recession." *Brookings Papers on Economic Activity* Spring 2011: 337-381.

Barnichon, Regis, and Andrew Figura. 2013. "Declining Labor Force Attachment and Downward Trends in Unemployment and Participation." Finance and Economics Discussion Series Working Paper 2013-88. Board of Governors of the Federal Reserve System.

Barnichon, Regis, and Christopher J. Nekarda. 2012. "The Ins and Outs of Forecasting Unemployment: Using Labor Force Flows to Forecast the Labor Market." *Brookings Papers on Economic Activity* Fall 2012: 83-131.

Blanchard, Olivier Jean and Peter Diamond. 1989. "The Beveridge Curve." *Brookings Papers on Economic Activity* 1989:1: 1-76.

Davis, Steven J. "Comment on Krueger and Mueller." 2011. *Brookings Papers on Economic Activity* Spring 2011, 58-70.

Elsby, Michael W.L., Bart Hobijn, Aysegül Sahin, and Robert G. Valletta. 2011. "The Labor Market in the Great Recession—An Update to September 2011." *Brookings Papers on Economic Activity* Fall 2011: 353-384.

Elsby, Michael W.L., Bart Hobijn, and Aysegül Sahin. 2013. "On the Importance of the Participation Margin for Labor Market Fluctuations." *Federal Reserve Bank of San Francisco Working Paper Series* 2013-05.

Farber, Henry S., and Robert G. Valletta. 2013. "Do Extended Unemployment Benefits Lengthen Unemployment Spells? Evidence from Recent Cycles in the US Labor Market." Working Paper no. 19048. National Bureau of Economic Research.

Ghayad, Rand. 2013. "The Jobless Trap." Working Paper. http://media.wix.com/ugd/576e9a_f6cf3b6661e44621ad26547112f66691.pdf.

Gordon, Robert. 2013. "The Phillips Curve is Alive and Well: Inflation and the NAIRU During the Slow Recovery." Working Paper no. 19390. National Bureau of Economic Research.

Hall, Robert E. and Sam Schulhofer-Wohl. 2013. "Measuring Matching Efficiency with Heterogeneous Jobseekers," mimeo, Stanford University.

Heckman, James, and Burton Singer. 1984. "A Method for Minimizing the Impact of Distributional Assumptions in Econometric Models for Duration Data." *Econometrica: Journal of the Econometric Society* 52, no. 2: 271-320.

Hobijn, Bart and Aysegül Sahin. 2012. "Beveridge Curve Shifts across Countries since the Great Recession." *13th Jacques Polak Annual Research Conference*.

Hotchkiss, Julie, M., Melinda Pitts, and Fernando Rios-Avila. 2012. "A Closer Look at Nonparticipants During and After the Great Recession." Federal Reserve Bank of Atlanta Working Paper Series 2012-10.

Katz, Lawrence F. and Alan B. Krueger. 1999. "The High-Pressure U.S. Labor Market of the 1990s." *Brookings Papers on Economic Activity* 1999:1, 1-65.

Kroft, Kory, Fabian Lange, and Matthew J. Notowidigdo. 2013. "Duration Dependence and Labor Market Conditions." *Quarterly Journal of Economics* 128, no. 3: 1123-1167.

Kroft, Kory, Fabian Lange, Matthew J. Notowidigdo, and Lawrence F. Katz. 2013. "Long-Term Unemployment and the Great Recession: The Role of Composition, Duration Dependence, and Non-Participation." Working Paper. http://scholar.harvard.edu/files/lkatz/files/klnk_ltu_and_great_recession_sep16_2013.pdf

Krueger, Alan B. and Andreas Mueller. 2011. "Job Search, Emotional Well-Being, and Job Finding in a Period of Mass Unemployment: Evidence from High-Frequency Longitudinal Data." *Brookings Papers on Economic Activity* Spring 2011, 1-57.

Krusell, Per, Toshihiko Mukoyama, Richard Rogerson, and Aysegül Sahin. 2011. "A Three State Model of Worker Flows in General Equilibrium." *Journal of Economic Theory* 146, no. 3: 1107-1133.

Llaudes, Ricardo. 2005. "The Phillips Curve and Long-Term Unemployment." *European Central Bank Working Paper Series* no. 441.

Mortensen, Dale T., and Christopher A. Pissarides. 1994. "Job Creation and Job Destruction in the Theory of Unemployment." *The Review of Economic Studies* 61, no. 3: 397-415.

Mueller, Andreas. "Separations, Sorting and Cyclical Unemployment." IZA Discussion Paper No. 6849, 2012.

Mueller, Andreas, Jesse Rothstein, Till von Wachter. "Unemployment Insurance and Disability Insurance in the Great Recession," NBER Working Paper No. 19672, November 2013.

Nekarda, Christopher J. 2009. "A Longitudinal Analysis of the Current Population Survey: Assessing the Cyclical Bias of Geographic Mobility." Working Paper. http://chrisnekarda.com/papers/geographic-mobility.pdf. Data were updated through December 2013.

Polivka, Anne E. and Stephen M. Miller. 1994. "The CPS After the Redesign: Refocusing the Economic Lens." *CRIW Labor Statistics Measurement Issues Conference*.

Poterba, James M. and Lawrence H. Summers. 1986. "Reporting Errors and Labor Market Dynamics." *Econometrica: Journal of the Econometric Society* 54, no. 6: 1319-1338.

Rothstein, Jesse. 2011. "Unemployment Insurance and Job Search in the Great Recession." Working Paper no. 17534. National Bureau of Economic Research.

Shimer, Robert. 2012. "Reassessing the Ins and Outs of Unemployment." *Review of Economic Dynamics* 15, no. 2: 127-148.

—. 2005. "The Cyclical Behavior of Equilibrium Unemployment and Vacancies." *American Economic Review* 95, no. 1: 25-49.

Staiger, Douglas, James H. Stock, and Mark W. Watson. 1997. "The NAIRU, Unemployment, and Monetary Policy." *Journal of Economic Perspectives* 11, no. 1: 33-49.

Wanberg, Connie R., Jing Zhu, Ruth Kanfer, and Zhen Zhang. 2012. "After the Pink Slip: Applying Dynamic Motivation Frameworks to the Job Search Experience." *Academy of Management Journal* 55: 261-264.