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Why Labor Force Participation (Usually) Increases when Unemployment Declines

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During the Great Recession, the unemployment rate increased rapidly within two years from about 4 percent in 2007 to about 10 percent in 2009. Yet over the ensuing recovery, the unemployment rate has declined only gradually and, more than four years after the end of the recession, it now stands at about 7 percent. At the same time, the labor force participation rate has declined steadily over this time period and now stands at about 63 percent, a level comparable to the early 1980s. Many observers view the decline in the labor force participation rate as an indication that further declines in the unemployment rate will come only slowly. The expectation is that if the labor market improves, many participants who have left the labor market will return and contribute to the pool of unemployed, and many unemployed participants will no longer exit the labor force but continue to search for work.[1]

Past business cycles have indeed been characterized by a negative correlation between the unemployment rate and the labor force participation (LFP) rate, that is, as the unemployment rate declines, the LFP rate increases. In this article we use observations on gross flows

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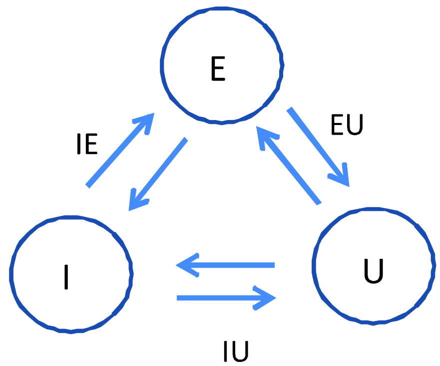
[1] For example, see Daly et al. (2012), Hatzius (2012), Davidson (2013), or Tankersley (2013).

between labor market states to provide a more detailed analysis of why the unemployment rate and the LFP rate are negatively correlated over the business cycle. For our analysis, the total potential workforce is decomposed into three groups: the employed (E), the unemployed (U), and the out-of-the-labor-force group, or inactive (I) for short. The LFP rate is the share of employed and unemployed in the potential workforce, and the unemployment rate is the share of the unemployed in the labor force. We think of labor market participants as transitioning between these three states. Figure 1 provides a stylized representation of these transitions. The arrows connecting the circles represent the gross flows between the three labor market states. For our analysis we look at a gross flow as the product of two terms: the total number of participants that could potentially make a transition and the rate at which the participants make the transition. For example, the total number of unemployed who become employed is the product of the number of unemployed and the probability at which an unemployed worker will become employed. The transition probabilities reflect the opportunities faced and choices made by labor market participants. For example, the probability of an unemployed worker becoming employed depends, among other things, on the number of available jobs (vacancies) and the search effort while unemployed. Given the size of the potential workforce, the transition rates between labor market states determine the LFP rate and the unemployment rate.

We have marked three groups among the transitions in Figure 1: EU, IU, and IE. The first group involves transitions within the labor force, between employment and unemployment, and these transitions have been the focus of much recent research on the determination of the unemployment rate.[2] The working assumption of this research has been that, for an analysis of the unemployment rate, a fixed LFP rate is a reasonable first approximation. The second and third group involve transitions between the labor force and out-of-the-labor-force, that is, they potentially generate changes of the LFP rate. The second group, which involves transitions between inactivity and unemployment, is at the heart of the above mentioned concern that further reductions in the unemployment rate will come only slowly. This concern is based on the assumption that, as the labor market improves, unemployed workers become less likely to exit the labor force and inactive workers become more likely to join the labor force as unemployed; we call this the IU hypothesis.

[2] For example, see Shimer (2012) and other research mentioned below.

Figure 1 Labor Market State Transitions



In this article we argue that observations on transition probabilities obtained from gross flow data are inconsistent with the IU hypothesis. In fact, the opposite is true: As the labor market improves, unemployed workers become more likely to exit the labor force and inactive workers become less likely to join the labor force as unemployed. This pattern for IU transitions would result in a positive correlation between the unemployment rate and the LFP rate. The observed negative correlation between unemployment and LFP must then result from patterns in the EU and IE group transition rates. We calculate the contributions of cylical variations in the transition rates for the three groups—IU, IE, and EU—and indeed find that the variations in the IE and EU group transition rates generate a negative co-movement of the unemployment and LFP rates that dominates the positive co-movement generated by the IU group transition rates. This suggests that an increasing LFP rate is more the by-product of an improving labor market rather than a brake on the declining unemployment rate.

This article is based on a line of research that accounts for changes in labor market ratios through changes in the rates at which labor market participants transition between labor market states. Early work in this literature mostly ignored variations in the LFP rate and focused on variations in transition rates between the two labor market states—employment and unemployment—for example, Elsby, Michaels, and

Solon (2009), Fujita and Ramey (2009), and Shimer (2012). This work finds that variations in unemployment exit rates contribute relatively more to unemployment rate volatility than do variations in employment exit rates. Recently, a similar approach has been applied to a more general accounting framework that adds a third labor market state, out-of-the-labor-force, and allows for variations in the LFP rate, for example, Barnichon and Figura (2010) and Elsby, Hobijn, and Şahin (2013).[3] Our work is closest to Elsby, Hobijn, and Şahin (2013), but their main focus is on accounting for the relative contributions of transition rate volatility to unemployment rate volatility.[4] Nevertheless, they also point out that the cyclical behavior of measured transition rates between unemployment and inactivity is at odds with common preconceptions about that behavior, and they also note that the observed cyclical behavior of these transition rates would induce a positive correlation between the unemployment rate and the LFP rate.

The article is organized as follows. Section 1 documents the negative correlation between the detrended unemployment rate and LFP rate for the total working age population, and men and women separately. Section 2 documents the co-movements between the unemployment rate and transition probabilities between labor market states. Section 3 demonstrates how variations in transition rates contribute to the co-movement of the unemployment rate and the LFP rate. In conclusion, Section 4 speculates on the implications of the recent "unusual" co-movement of unemployment and LFP in the recovery since 2010.

1. UNEMPLOYMENT AND LFP

The U.S. Bureau of Labor Statistics (BLS) publishes monthly data on the labor market status of U.S. households that are based on the Current Population Survey (CPS). The CPS surveys about 60,000 households every month with about 110,000 household members, a representative sample of the U.S. working age population. Household respondents are asked if the household members are employed, and if

[3] Shimer (2012) also develops tools for the analysis of a multi-state labor market model and studies the role of variations in the LFP rate, but the focus of the article is on the two-state model of the labor market.

[4] An important part of Elsby, Hobijn, and Şahin (2013) is their analysis of a measurement issue for gross flows. Since gross flows are derived from survey samples, it is always possible that survey respondents are misclassified with respect to their labor market state. Past research has demonstrated that misclassification is a significant issue. Elsby, Hobijn, and Şahin (2013) argue that allowing for the possibility of misclassification does not substantially affect the conclusions drawn from measured gross flows for the issue studied in this article.

they are not employed, whether they want to work and are actively looking for work. The latter are considered to be unemployed, and employed and unemployed household members constitute the labor force. Household members that are not employed and that are not actively looking for work are considered to be not part of the labor force, or inactive for short. The unemployment rate is the share of unemployed workers in the labor force, and the LFP rate is the share of the labor force in the working age population.[5]

The unemployment rate tends to be more volatile than the LFP rate in the short run, but changes in the LFP rate tend to be more persistent over the long run. Figure 2, panels A and B, display quarterly averages of monthly unemployment and LFP rates for the period from 1948 to 2012. The unemployment rate increases sharply in a recession, and then declines gradually during the recovery. Shaded areas in Figure 2 indicate periods when the unemployment rate is increasing, and these periods match periods of National Bureau of Economic Research (NBER) recessions quite well.[6] Even though the average unemployment rate appears to be somewhat higher than usual in the 1970s, considering the magnitude of short-run fluctuations in the unemployment rate, the average unemployment rate does not change much over subsamples of the period. The 2007–09 Great Recession stands apart by the magnitude of the increase of the unemployment rate and the rather slow decline of the unemployment rate from its peak.

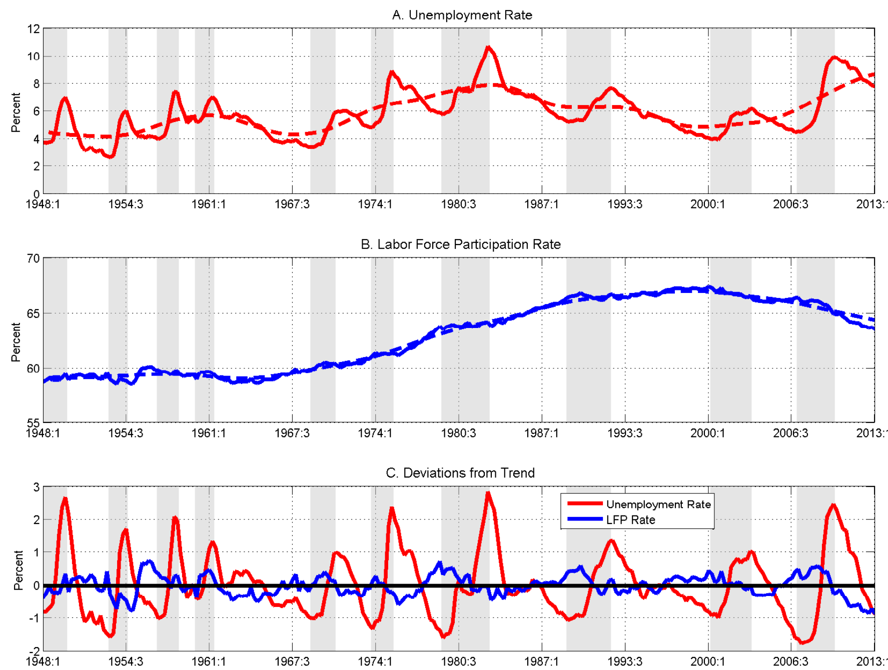
The LFP rate does not display much short-run volatility, rather it is dominated by long-run demographic trends. Starting in the mid-1960s, the LFP rate increased gradually from values slightly below 60 percent to reach a peak of 67 percent in 2000. This slow but persistent increase of the LFP rate can be accounted for by the increasing LFP rate of women and early on by the baby boomer generation entering the labor force. Since 2000, the LFP rate has declined, first gradually, then at an accelerated rate since the Great Recession and is now at about 63 percent. The gradual decline in the LFP rate can be attributed to the aging of the baby boomer generation and declining LFP rates for women and the young (less than 25 years of age).[7] In general, there is not much short-run volatility in the LFP rate, the recent accelerated

[5] Households are asked about other features of their labor market status, but the questions about employment and active search for work when not employed are the main questions of interest for determining the unemployment rate and the LFP rate. For a detailed description of the survey and the methods used, see Bureau of Labor Statistics (2012).

[6] The business cycle dates provided by the NBER are a widely accepted measure of the peaks and troughs of U.S. economic activity.

[7] For example, see Aaronson et al. (2006).

Figure 2 Unemployment and Labor Force Participation, 1948–2013



Notes: The unemployment and LFP rates displayed in panels A and B are quarterly averages of monthly values. Shaded (white) areas are periods when the unemployment rate is increasing (declining). The dashed lines are the trend calculated using a Baxter and King (1999) bandpass filter series with periodicity more than 12 years for the trend. Panel C displays the difference between actual and trend values of the unemployment rate and the LFP rate.

decline following the Great Recession being the exception. This accelerated decline in the LFP rate after the Great Recession shows up in the declining LFP rates of mature workers between 25 and 55 years of age, especially men, and also in declining participation rates of the young.

Table 1 Cyclicality of Unemployment and Labor Force Participation

Sample	σ_u	σ_l	Corr($u(t)$,$l(t+s)$) for s=								
			−4	−3	−2	−1	0	1	2	3	4
Total											
1952:Q1–2007:Q4	0.89	0.29	−0.09	−0.20	−0.30	−0.38	−0.45	−0.52	−0.55	−0.54	−0.48
1952:Q1–1991:Q4	0.93	0.31	−0.09	−0.19	−0.29	−0.37	−0.43	−0.49	−0.53	−0.51	−0.44
1992:Q1–2007:Q4	0.79	0.21	−0.08	−0.21	−0.39	−0.55	−0.65	−0.71	−0.70	−0.69	−0.68
1992:Q1–2013:Q1	0.98	0.33	0.08	−0.07	−0.24	−0.41	−0.53	−0.63	−0.70	−0.75	−0.75
Men											
1952:Q1–2007:Q4	1.01	0.28	−0.03	−0.18	−0.30	−0.39	−0.45	−0.52	−0.55	−0.55	−0.48
1952:Q1–1991:Q4	1.04	0.28	−0.09	−0.22	−0.34	−0.41	−0.46	−0.52	−0.55	−0.53	−0.44
1992:Q1–2007:Q4	0.92	0.27	0.14	−0.03	−0.27	−0.48	−0.61	−0.70	−0.74	−0.77	−0.77
1992:Q1–2013:Q1	1.19	0.41	0.07	−0.09	−0.27	−0.45	−0.57	−0.67	−0.73	−0.78	−0.78
Women											
1952:Q1–2007:Q4	0.77	0.36	−0.16	−0.22	−0.28	−0.34	−0.37	−0.42	−0.45	−0.43	−0.37
1952:Q1–1991:Q4	0.81	0.40	−0.13	−0.20	−0.25	−0.32	−0.35	−0.41	−0.45	−0.43	−0.36
1992:Q1–2007:Q4	0.65	0.23	−0.26	−0.30	−0.38	−0.43	−0.43	−0.46	−0.38	−0.35	−0.31
1992:Q1–2013:Q1	0.77	0.32	0.07	−0.04	−0.17	−0.29	−0.39	−0.49	−0.58	−0.63	−0.64

Notes: Standard deviations and cross-correlations of detrended unemployment, u, and labor force participation rate, l, for total, men, and women. The trend for each variable is calculated as a Baxter and King (1999) bandpass filter with periodicity more than 12 years for monthly data, from January 1948 to March 2013. Unemployment and LFP rate are in percent, and detrended values are the difference between actual values and trend. Statistics are calculated for quarterly averages of monthly data for the indicated subsamples.

The average unemployment rate in the 1960s, when the LFP rate was low, does not appear to be much different from the average unemployment rate in the 1990s when the LFP rate was high. In other words, the unemployment rate and the LFP rate do not appear to be correlated over the long run. Over the short run, the unemployment rate and the LFP rate are, however, negatively correlated, that is, the LFP rate increases as the unemployment rate declines.

We define short-run movements of the unemployment rate and the LFP rate as deviations from trend, and we define the trend of a time series as a smooth line drawn through the actual time series. To be precise, we construct the trend using a bandpass filter that extracts movements with a periodicity of more than 12 years.[8] The dashed lines in Figure 2, panels A and B, display the trends for the unemployment rate and the LFP rate.[9] In panel C of Figure 2 we display the deviations from trend, that is, the difference between the actual and trend values, for the LFP rate and the unemployment rate. Clearly, deviations from trend are more volatile for the unemployment rate than for the LFP rate. Furthermore, the LFP rate tends to be above trend whenever the unemployment rate is below trend and vice versa. In Table 1 we display the standard deviations and cross-correlations between the detrended unemployment rate and the LFP rate for the total working age population, and for men and women separately.

The unemployment rate is about three times as volatile as the LFP rate, and the LFP rate increases as the unemployment rate declines, with the LFP rate lagging about half a year.[10] When we split the sample in the early 1990s, we can see that both the unemployment rate and the LFP rate are less volatile since the 1990s, but they remain negatively correlated.[11] Including the Great Recession and its

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[8] We use the method of Baxter and King (1999) to construct the trend. This is just one of several alternative methods to calculate trends. The results do not differ much if instead we use a Hodrick and Prescott (1997) filter, or a random walk bandpass filter as described in Christiano and Fitzgerald (2003).

[9] At the beginning and end of the sample, our procedure delivers an ill-defined measure of the trend. Essentially, the trend of a series is a symmetric moving average of the series. Thus, at the beginning and end of the sample, we do not have enough data points to calculate the trend. For these truncated periods we simply choose to truncate the moving average filter and reweigh the available data points. This procedure is arbitrary, and it implies that current data points receive much more weight in determining the trend, which explains the high trend value for the unemployment rate in 2012. For the statistical analysis below we therefore discard some observations at the beginning and end of sample, and start the sample in 1952:Q1 and end the sample in 2007:Q4.

[10] We define the length of the lead/lag by the correlation that is largest in absolute value.

[11] This is consistent with the period being part of the "Great Moderation" in the United States, which indicates an economy-wide decline in volatility starting in the mid-1980s. We choose to split the sample in 1992 because in the next section we study how changes in labor market transition rates contribute to the co-movement of the

aftermath significantly increases the measured volatility of the unemployment rate and LFP rate, but, again, it does not much affect the measured negative correlation between the two variables.[12] Finally, the cyclical co-movement between unemployment and LFP is similar for men and women, but the unemployment rate is relatively more volatile for men, the LFP rate is relatively more volatile for women, and the LFP rate is lagging the unemployment rate more for men than for women.

We now study if this negative correlation between the unemployment rate and the LFP rate can be accounted for by inactive workers becoming more likely to enter the labor force and unemployed workers becoming less likely to exit the labor force.

2. TRANSITIONS BETWEEN LABOR MARKET STATES

The CPS household survey not only contains information on how many people are employed, unemployed, and inactive in any month, but it also contains information on how many people switch labor market states from one month to the next. We can use these gross flows between labor market states to calculate the probabilities that any one household member will, within a month, transition from one labor market state to a different state. This information can be used to see if, for example, variations in the transition rates between inactivity and unemployment are consistent with the usual interpretation of the negative co-movement of the unemployment rate and the LFP rate.

Households are surveyed repeatedly in the CPS. In particular, the survey consists of a rotation sample, that is, once a household enters the sample it is surveyed for four consecutive months, then it leaves the sample for eight months, after which it reenters the sample and is once more surveyed for four consecutive months. Thus, in any month, for three-fourths of the household members in the sample, we potentially have observations on their current labor market state and their state in the previous month. We can use this information to calculate the gross flows between labor market states from one month to the

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unemployment rate and the LFP rate. We calculate transition rates from data on gross flows for the period after 1990, and again we discard some of the beginning and end of sample data on deviations from trend to minimize the problems arising from an ill-defined trend.

[12] Related to the discussion in footnote 9, we should note that if the unemployment rate continues to decline, then future measures of the trend unemployment rate that include these data points will indicate a lower trend unemployment rate than do our current measures. Thus, our current measure very likely understates the cyclical deviations from trend for the unemployment rate.

next. The measurement of gross flows suffers from two problems, missing data points and misclassified data points. We will use data series for gross flows that have been adjusted for missing data but not for misclassification.[13]

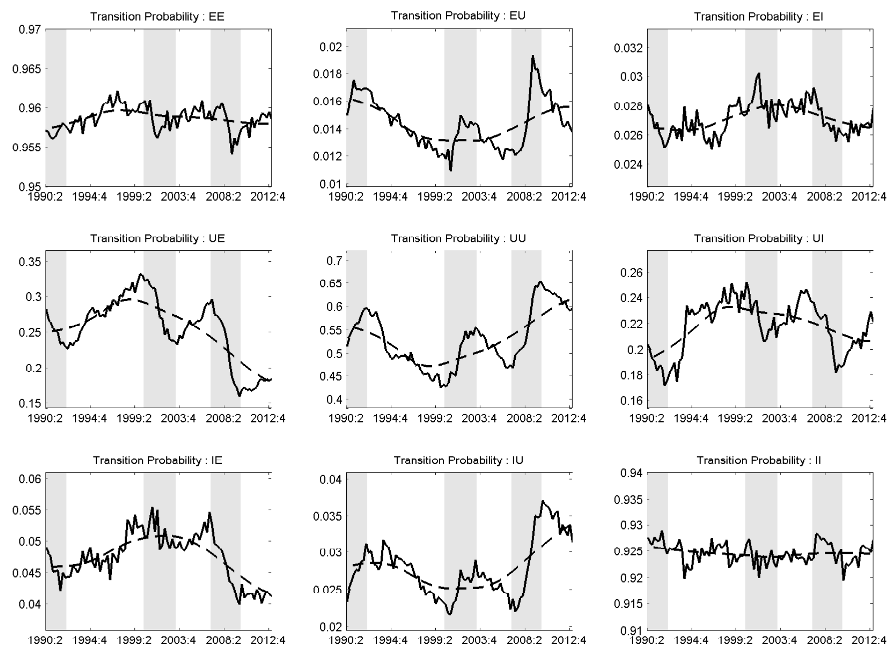
Data points are missing because the actual unit of observation in the CPS is not a particular household, but the household that is residing at a particular address. Thus, even for those addresses that have entered the sample in the previous month, we may not have observations on the previous month's labor market states for the members of the current resident household. This might happen for various reasons. The household could have a new member who did not live at the current address in the previous month, for example, a dependent returning to the family household after a longer absence. Alternatively, the household previously residing at the address moved away and a new household moved in. About 15 percent of the potential observations cannot be matched across months, and these observations are not missing at random (Abowd and Zellner 1985). One can use "margin adjustment" procedures to generate gross flow data consistent with unconditional marginal distributions, and these procedures take into account the possibility that observations are not missing at random. In the following, we use the BLS-provided margin adjusted research series on labor force status flows from the CPS.[14]

Gross flows from one labor market state to another can be interpreted as the product of two terms: the total number of participants in the initial state and the probability that any one of these participants makes the transition from the initial state to another state. For example, more people might make the transition from unemployment to inactivity because there are more unemployed people, or because each unemployed worker is more likely to make the transition. In Figure 3 we display the transition probabilities between employment (E), unemployment (U), and inactivity (I) that are implied by the observed gross flows between labor market states for the period from 1990 to 2012. A panel labeled AB denotes the probability that a participant who is in labor market state A will transition to state B within a month. For example, the center panel in the bottom row, labeled IU, denotes the probability that a participant who is inactive in the current month will

[13] The evidence for misclassification in the BLS, that is, that a participant is assigned the wrong labor market state in the survey, has been discussed for a long time, see, for example, Poterba and Summers (1986). There is currently no generally accepted procedure to adjust CPS data on labor market states for misclassification. Recently, Elsby, Hobijn, and Şahin (2013) and Feng and Hu (2013) have worked on possible corrections for misclassification.

[14] The research series is available at www.bls.gov/cps/cps_flows.htm. Frazis et al. (2005) describe the BLS procedure used to construct the series.

Figure 3 Transition Probabilities, 1990:Q2–2013:Q1



Notes: Panel AB denotes the probability of making the transition from labor market state A to labor market state B. The dashed lines are the trend calculated using a Baxter and King (1999) bandpass filter series with periodicity more than 12 years for the trend. The probabilities displayed are quarterly averages of monthly values. Shaded (white) areas are periods when the unemployment rate is increasing (declining).

be unemployed in the next month. Regions that are (not) shaded denote periods when the unemployment rate increases (declines). The trend for each transition probability is calculated using the same bandpass filter as in the previous section, and it is displayed as a dashed line in Figure 3. In Table 2, we display the average transition probabilities, the standard deviations of the detrended transition probabilities, and their cross-correlations with the detrended unemployment rate for the total working age population, and for men and women separately.

An increase in the unemployment rate is associated with more churning in the labor market: Employed workers are more likely to

Table 2 Cyclicality of Transition Probabilities

	$\bar{p}_{ij}$	σ_{ij}	Corr($u(t), p_{ij}(t+s)$) for s=								
			−4	−3	−2	−1	0	1	2	3	4
			Total, $\bar{u} = 5.3$, $\sigma_u = 0.76$								
EU	1.4	0.10	0.70	0.83	0.88	0.88	0.85	0.72	0.62	0.51	0.42
UE	27.5	2.35	−0.48	−0.64	−0.78	−0.89	−0.95	−0.94	−0.88	−0.78	−0.65
IU	2.6	0.21	0.36	0.49	0.61	0.71	0.79	0.78	0.77	0.75	0.70
UI	22.4	1.39	−0.59	−0.68	−0.75	−0.79	−0.77	−0.68	−0.55	−0.36	−0.16
IE	4.9	0.21	−0.24	−0.35	−0.50	−0.57	−0.65	−0.66	−0.60	−0.55	−0.45
EI	2.7	0.09	−0.02	−0.02	−0.10	−0.24	−0.32	−0.45	−0.48	−0.45	−0.36
			Men, $\bar{u} = 5.4$, $\sigma_u = 0.88$								
EU	1.5	0.13	0.73	0.85	0.89	0.90	0.86	0.73	0.63	0.53	0.43
UE	29.0	2.54	−0.46	−0.62	−0.76	−0.86	−0.92	−0.91	−0.85	−0.77	−0.65
IU	3.2	0.30	0.47	0.56	0.66	0.76	0.84	0.79	0.76	0.72	0.68
UI	18.9	1.47	−0.54	−0.62	−0.70	−0.77	−0.77	−0.71	−0.59	−0.41	−0.17
IE	5.7	0.27	−0.20	−0.33	−0.45	−0.53	−0.58	−0.62	−0.58	−0.50	−0.43
EI	2.2	0.07	−0.03	0.08	0.09	0.03	−0.00	−0.16	−0.19	−0.23	−0.20
			Women, $\bar{u} = 5.3, \sigma_u = 0.63$								
EU	1.2	0.07	0.39	0.57	0.67	0.68	0.70	0.57	0.48	0.40	0.34
UE	25.8	2.31	−0.50	−0.62	−0.77	−0.86	−0.91	−0.90	−0.84	−0.73	−0.59
IU	2.3	0.18	0.21	0.35	0.48	0.60	0.71	0.68	0.69	0.68	0.61
UI	26.7	1.30	−0.54	−0.62	−0.68	−0.68	−0.66	−0.53	−0.40	−0.22	−0.08
IE	4.5	0.21	−0.21	−0.32	−0.46	−0.48	−0.61	−0.60	−0.53	−0.51	−0.39
EI	3.4	0.14	−0.03	−0.08	−0.18	−0.34	−0.43	−0.53	−0.54	−0.47	−0.36

Notes: The first column lists the sample average for transition probabilities from labor market state i to j, p_{ij}, with labor market states being employed (E), unemployed (U), and out-of-the-labor-force/inactive (I). The second column lists standard deviations of detrended transition probabilities, and the remaining columns list cross-correlations of detrended transition probabilities with the detrended unemployment rate. The trend for each variable is calculated as a Baxter and King (1999) bandpass filter with periodicity of more than 12 years for monthly data, from January 1990 to March 2013. Transition probabilities and the unemployment rate are in percent, and detrended values are the difference between actual and trend values. Statistics are calculated for quarterly averages of monthly data for the sample 1992:Q1 to 2007:Q4.

lose their jobs, and unemployed workers are less likely to return to work, with job loss (finding) rates slightly leading (lagging) the unemployment rate; see the panels labeled EU and UE in Figure 3 and the corresponding correlations in Table 2.[15] Considering the magnitude and volatility of the job finding rate for unemployed workers, the transition rate UE, it is apparent that variations in this rate are a

[15] In fact, when unemployment is high, gross flows between unemployment and employment are both high. Despite the lower probability of the unemployed finding employment, gross flows from unemployment to employment are high because there are more unemployed.

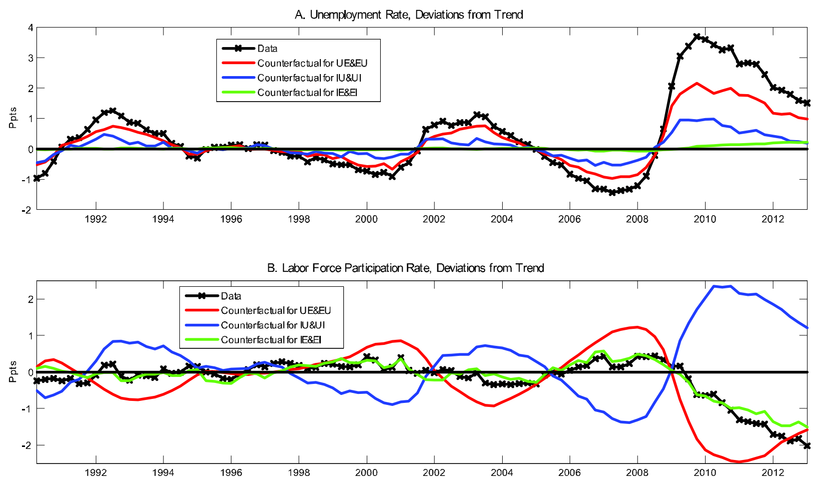
major source of unemployment volatility. Looking at panels IU and UI, we can see that as the unemployment rate declines, it becomes more likely that an unemployed worker exits the labor force and less likely that an inactive worker joins the labor force as unemployed. This pattern is confirmed by the cross-correlations for the detrended rates in Table 2. Thus, the cyclical pattern of the transition rates between inactivity and unemployment is exactly the opposite of what the IU hypothesis proposes as an explanation of the negative correlation between the LFP rate and the unemployment rate. However, the transition probabilities between inactivity and employment do have a cyclical pattern that supports a negative co-movement between the unemployment rate and the LFP rate. As the unemployment rate increases it becomes less likely that people make the transition from inactivity to employment. It also becomes less likely that employed workers leave the labor force, but this probability is always quite low and it is not very volatile over the cycle. The cyclical properties of the transition probabilities for all three groups, EU, IU, and IE, are roughly the same for men and women. The only exception is that transition probabilities for women tend to be somewhat less volatile overall, and that men's transition probabilities from employment to inactivity appear to be acyclical.

So far we have shown that the direct evidence on labor market transitions does not support the IU hypothesis of why the LFP rate increases as the unemployment rate declines. In particular, as the labor market improves and the unemployment rate declines, participants become less likely to make the transition from inactivity to unemployment and they become more likely to make the transition from unemployment to inactivity. So what accounts for the negative correlation of unemployment and the LFP rate?

3. SOURCES OF CO-MOVEMENT

Recent research on labor markets using the stock-flow approach points to the importance of variations in the job finding rate and job loss rate for the determination of the unemployment rate. We now argue that variations in the job finding and job loss rates are also important for the cyclical co-movement between the unemployment and LFP rates. As a first step, note that the exit rate from the labor force is an order of magnitude smaller for employed workers than it is for unemployed workers (see Table 2). This means that as the unemployment rate declines, the average exit rate from the labor force declines, and the LFP rate increases. Furthermore, as we have just seen, when the unemployment rate declines, more people join the labor force without

Figure 4 Counterfactuals for Unemployment Rate and LFP Rate



an intervening unemployment spell. This suggests that cyclical movements of the transition rates in the UE and IE group account for the negative co-movement of unemployment and LFP over the business cycle. We now formalize this argument by constructing counterfactuals for the unemployment rate and the LFP rate.

Consider the trend paths for the transition probabilities that we have calculated for Figure 3 and Table 2. We can interpret the deviations of the unemployment rate and the LFP rate from their respective trends as arising from deviations of the transition probabilities from their respective trends. In the Appendix, we describe a procedure that allows us to decompose the cyclical movements of the unemployment and LFP rates into parts that originate from the cyclical movements of the various transition probabilities.[16] In Figure 4, we graph the contributions to trend deviations of the unemployment rate and LFP rate (black lines) coming from variations in the transition probabilities between (1) employment and unemployment (red lines), (2) inactivity and unemployment (blue lines), and (3) inactivity and employment (green

[16] The procedure used to derive the contributions coming from variations in month-to-month transition probabilities is actually based on a model that allows for continuous transitions between labor market states in between the monthly survey dates.

Table 3 Cross-Correlations between Unemployment Rate and LFP Rate for Counterfactuals, Deviations from Trend, 1992:Q1–2007:Q4

	Corr(u(t), l(t+s)) for s=								
	−4	−3	−2	−1	0	1	2	3	4
UE and EU	−0.20	−0.40	−0.58	−0.74	−0.87	−0.95	−0.99	−0.97	−0.91
IU and UI	0.15	0.31	0.48	0.64	0.82	0.89	0.92	0.90	0.84
UE, EU, UI, and IU	0.41	0.37	0.32	0.24	0.23	0.13	0.04	−0.02	−0.07
IE and EI	−0.33	−0.50	−0.66	−0.86	−0.99	−0.83	−0.65	−0.55	−0.43
Actual	−0.10	−0.22	−0.40	−0.55	−0.65	−0.71	−0.70	−0.69	−0.68

Notes: Cross-correlations of trend deviations for the unemployment rate, u, and the LFP rate, l. The first four rows represent counterfactuals for u and l, and the last row represents actual values for u and l. For a counterfactual all monthly transition rates, except for the ones listed in the counterfactual column, are kept at their trend values. Statistics are calculated for quarterly averages of counterfactual monthly time series. Detrended unemployment rate and LFP rate are level deviations from trend.

lines).[17] These are the three counterfactuals for the trend deviations of the unemployment rate and LFP rate, and they approximately add up to the overall trend deviation of the two rates. In Table 3, we calculate the cross-correlations between the counterfactual unemployment and LFP rates implied by these experiments.

Past research has shown that variations in the transition probabilities between employment and unemployment are a major determinant of the unemployment rate, e.g., Shimer (2012) or Elsby, Hobijn, and Şahin (2013). This observation is confirmed by Figure 4, panel A, in that variations in these probabilities account for a substantial part of the unemployment rate variation. Figure 4, panel B, demonstrates that these variations also introduce substantial volatility into the LFP rate. In fact, the counterfactual LFP rate is more volatile than the actual LFP rate. Furthermore, variations in the transition probabilities between employment and unemployment generate a strong negative

[17] Since our trend is a symmetric moving average filter, we face a problem at the beginning and end of our sample period (see footnote 9). If for this part of the sample the deviations from a presumed trend are very large, such as is the case for the years 2007–12, then this problem is even more pronounced and our adjustment to the filter will understate deviations from trend. For this reason, we replace the calculated trend values from 2008 on with the trend values in the fourth quarter of 2007. This essentially keeps the trend unemployment rate fixed at 6.2 percent and the trend LFP rate fixed at 65.5 percent from 2008 on. Thus, our procedure is likely to overstate deviations from trend from 2008 on, especially for the LFP rate.

co-movement between the unemployment rate and the LFP rate (Table 3, first row).

The co-movement of the actual unemployment rate, with the transition probabilities between inactivity and unemployment, is such that people are more likely to join the labor force as unemployed and less likely to exit the labor force from unemployment when the unemployment rate is high. Thus, these movements simultaneously increase the unemployment rate and the LFP rate. In other words, the observed variations in transition probabilities between inactivity and unemployment contribute to the volatility of the unemployment rate, and they introduce a positive co-movement between the unemployment rate and the LFP rate (see the blue lines in Figure 4 and the second row in Table 3).

For the LFP rate, the variations of transition probabilities between employment and unemployment on the one hand, and between inactivity and unemployment on the other hand, tend to almost offset each other. This means that the joint effect of the variations in these transition probabilities is a weak positive correlation between the unemployment rate and the LFP rate (see the third row of Table 3). The stronger negative actual correlation between the unemployment rate and the LFP rate is then determined by the pattern of transition probabilities between inactivity and employment. As the unemployment rate increases, the probability of making a direct transition from inactivity to employment and vice versa declines. The effect of the reduced transition rate from inactivity tends to dominate, and the LFP rate declines. Adding this feature is enough to generate a significant negative correlation between the unemployment rate and the LFP rate (last row of Table 3).

We can interpret these results using a simplified version of the dynamics between labor market states described in the Appendix. Suppose that participants make the transition from labor market state i to labor market state j at rate $\lambda_{\iota j}$. The transition rates between employment and unemployment are λ_{EU} and λ_{UE}, and the transition rates between unemployment and inactivity are λ_{UI} and λ_{IU}. Assume also that participants can make the transition between in- and out-of-the-labor-force only by going through unemployment, that is, there are no direct transitions between employment and inactivity, $\lambda_{EI} = \lambda_{IE} = 0$.[18] For fixed transition rates, the unemployment rate and LFP rate converge

[18] In part, we can look at this as the limiting case for the observation that $\lambda_{UI} \gg \lambda_{EI}$. It is, however, also true that transitions from inactivity to employment are actually more likely than transitions from inactivity to unemployment, $\lambda_{IE} > \lambda_{IU}$.

to their steady-state values, u^* respectively l^*,

$$u^* = \frac{\lambda_{EU}}{\lambda_{EU} + \lambda_{UE}} \text{ and } l^* = \left[1 + \frac{\lambda_{UI}}{\lambda_{IU}} u\right]^{-1}.$$

In the data, monthly unemployment and LFP rates tend to be close to the steady-state values implied by their monthly transition rates.

This special case illustrates three points. First, the unemployment rate would be independent of transitions between the labor force and inactivity, if it was not for transitions between inactivity and employment. Similar to a simple two-state model of the labor market that ignores variations in the LFP rate, the unemployment rate would be determined by the transition rates between employment and unemployment. Second, even with an unemployment rate that is "exogenous" to the LFP rate, the LFP rate does depend on the unemployment rate and transition rates between unemployment and inactivity. In particular, a lower unemployment rate implies a higher LFP rate, which helps generate the observed negative correlation between the unemployment rate and the LFP rate. Third, the observed cyclical movements in the transition rates between unemployment and inactivity imply that the ratio of λ_{UI} to λ_{IU} is decreasing as the unemployment rate u increases, thereby introducing a positive correlation between the unemployment rate and the LFP rate and dampening the co-movement. Thus, transitions between employment and inactivity have to be considered if one wants to account for the co-movement between unemployment and LFP.

4. CONCLUSION

Many observers of the U.S. labor market perceive the LFP rate to be below its long-run trend and the unemployment rate to be above its long-run trend. In fact, the low cyclical LFP rate is seen as keeping the cyclical unemployment rate from being even higher, because poor employment prospects have induced discouraged unemployed workers to leave the labor force and have prevented marginally attached inactive participants from a return to the job search. In this article, we have documented that direct observations on transition rates between unemployment and out-of-the-labor-force are inconsistent with this perception. It turns out that at times of high unemployment, unemployed workers are less likely to exit the labor force and inactive workers are more likely to return to the labor force as unemployed. This pattern would have introduced a positive correlation between cyclical movements of the unemployment rate and the LFP rate. Yet we have observed a negative correlation between the two rates. We have shown that the negative co-movement is induced by movements in the unemployment rate itself, and by a procyclical transition rate from inactivity to employment without an intervening unemployment spell. To summarize, a low cyclical LFP rate to some extent simply seems to reflect a high current unemployment rate rather than to indicate an elevated future unemployment rate.

We have just described the "usual" co-movements between labor market transition rates, the unemployment rate, and the LFP rate over the business cycle. Since 2010, the unemployment rate has been declining gradually, and if we had observed the usual co-movement pattern, we should have seen the LFP rate increasing with at most a one-year lag, say, starting in 2011. We have not seen that. The LFP rate has been on a long-run declining trend since 2000, with an acceleration of that decline during the Great Recession. It is generally agreed that part of the decline in the LFP rate since 2000 reflects a demographic change that will persist over time. Current forecasts call for a further decline of the LFP rate over the next 10 years (see, for example, Toossi [2012]). But it is also argued that the more recent decline in the LFP rate reflects temporary cyclical effects that will be reversed over time (see, for example, Erceg and Levin [2013]). The recent "unusual" co-movement between the unemployment rate and LFP rate does speak to this issue. In particular, the recent observations on co-movement would appear to be less unusual if we were to attribute more of the decline in the LFP rate to a change in its long-run trend than to short-run cyclical effects.

This interpretation has implications for the medium-run forecast for gross domestic product (GDP). A falling LFP rate will dampen any increase in employment and corresponding increase in per capita GDP, even as the unemployment rate continues to decline. Thus, whereas the increasing trend for the LFP rate contributed to per capita GDP growth before 2000, the declining trend from 2000 will reduce the trend growth rate of per capita GDP. Depending how much the LFP rate is currently below trend, a return to trend might dampen this negative effect for per capita GDP growth in the near term.

APPENDIX: SOME MATH

Let $f_{ij,t}$ denote the gross flow between labor market state i in period $t-1$ and state j in period t, with $i, j \in \{E, U, I\}$. Disregarding inflows to and outflows from the working age population, the total number of people in labor market state i at time $t-1$ is

$$s_{i,t-1} = \sum_k f_{ik,t} = \sum_k f_{ki,t-2}. \tag{1}$$

The probability that a participant makes the transition from state i in period $t-1$ to state j in period t is simply

$$p_{ij,t} = f_{ij,t}/s_{i,t-1}. \tag{2}$$

The unemployment rate and LFP rate are

$$u_t = \frac{s_{U,t}}{s_{U,t} + s_{E,t}} \text{ and } l_t = \frac{s_{U,t} + s_{E,t}}{s_{U,t} + s_{E,t} + s_{I,t}}. \tag{3}$$

Conditional on initial values for the stocks, s_{i0}, we can obtain the sequence of future stocks from the sequence of transition probabilities by iterating on the equation

$$s_{i,t} = \sum_j p_{ji,t} s_{j,t-1}. \tag{4}$$

This defines a mapping from the sequence of transition probabilities, p, to the sequence of stocks, s,

$$s = G\left(p; s_0\right), \tag{5}$$

conditional on initial stocks s_0. Suppose we have a series for the trend transition probabilities, $p^T_{ij,t}$. Then we can use the above mapping to construct the implied trend values for stocks

$$s^T = G\left(p^T; s_0\right), \tag{6}$$

and we calculate the implied trend values for the unemployment rate and LFP rate, u^T and l^T.

In order to evaluate the contribution of a group of transition probabilities to the overall variation of the unemployment rate and LFP rate, we simply construct a counterfactual path for the stocks where we keep all but the probabilities of interest at their trend values and set the probabilities of interest to their actual values. For example, in order to evaluate the contribution of variations in the k-th transition probability, we construct the series

$$s_k^{CF} = G\left(p_k, p^T_{-k}; s_0\right) \tag{7}$$

with implied series for the unemployment rate and LFP rate, u_k^{CF} and l_k^{CF}. The contribution of the k-th probability to unemployment rate variations is then defined as $u_k^{CF} - u^T$.

The actual implementation of the procedure in Section 3 is slightly more complicated in that we allow for inflows and outflows to the working age population, and we replace the discrete time month-to-month transition probabilities with a continuous time process as described in Shimer (2012).

Modeling labor market transitions as a continuous time process deals with issues of time aggregation in the data. For example, if the exit rate from unemployment is relatively high, as it is most of the time, our estimates of entry probabilities to unemployment from month-to-month gross flow data might be biased since we are missing the people who do become re-employed within the month. In fact, the month-to-month transition probabilities between two particular labor market states, for example, employment and unemployment, will be an amalgam of the continuous time transition rates between all labor market states. The procedure of Shimer (2012) simply provides a way to recover the continuous time transition rates between labor market states that give rise to the observed discrete time transition probabilities.

The continuous time representation of labor market transitions also provides a convenient tool to interpret the role of transitions between unemployment and inactivity for the path of the unemployment rate and the LFP rate. The continuous time analog for the discrete time transition equation for labor market states (4) is given by

$$\begin{aligned} \dot{s}_E &= -\left(\lambda_{EU}+\lambda_{EI}\right)s_E+\lambda_{UE}s_U+\lambda_{IE}s_I \\ \dot{s}_U &= \lambda_{EU}s_E-\left(\lambda_{UE}+\lambda_{UI}\right)s_U+\lambda_{IU}s_I \\ \dot{s}_I &= \lambda_{EI}s_E+\lambda_{UI}s_U-\left(\lambda_{IE}+\lambda_{IU}\right)s_I \\ 1 &= s_E+s_U+s_I, \end{aligned} \tag{8}$$

where a dot denotes the time derivative of a variable, λ_{ij} denotes the continuous time transition rate from state i to state j, and we have normalized the size of the working age population to one. For example, on the one hand, employment declines because employed workers make the transition to unemployment at the rate λ_{EU} and exit the labor force at the rate λ_{EI}. On the other hand, employment increases because unemployed workers find employment at the rate λ_{UE} and inactive participants join the labor force and immediately find employment at the rate λ_{IE}. Subtracting outflows from inflows yields the net change of employment.

The continuous time representation of the monthly transition probabilities assumes that the transition rates remain fixed for a month. The observed transitions rates between labor market states tend to be sufficiently large such that the steady state of the system (8) for the given monthly transition rates is a good approximation of the actual stock values. The steady state of the system for fixed transition rates is an allocation of the population over labor market states such that inflows and outflows cancel and the stock values do not change, $\dot{s}=0$. Solving equations (8) for steady-state stocks and the implied steady-state unemployment rate and LFP rate is a bit messy, but it simplifies considerably if we assume that transitions between in- and out-of-the-labor-force have to proceed through unemployment, that is, $\lambda_{EI} = \lambda_{IE} = 0$. For this case we find that the steady-state unemployment rate and LFP rate are

$$u^* = \frac{\lambda_{EU}}{\lambda_{EU} + \lambda_{UE}} \text{ and } l^* = \left[1 + \frac{\lambda_{UI}}{\lambda_{IU}} u\right]^{-1}.$$

For this special case, the unemployment rate is independent of transitions between the labor force and inactivity. Similar to a simple two-state model of the labor market that ignores variations in the LFP rate, the unemployment rate is determined by the transition rates between employment and unemployment. On the other hand, the LFP rate does depend on the unemployment rate and transition rates between unemployment and inactivity. In particular, a lower unemployment rate implies a higher LFP rate, which helps generate the observed negative correlation between the unemployment rate and the LFP rate. From Section 2 we have that the transition rates from unemployment to inactivity (inactivity to unemployment) are negatively (positively) correlated with the unemployment rate. This would imply that the LFP rate increases as the unemployment rate increases. Thus, the movements in the transition rates between in- and out-of-the-labor-force alone would yield a counterfactual positive correlation between the unemployment rate and the LFP rate.

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