What Do Worker Flows Tell Us About Cyclical Fluctuations in Employment?

BY SHIGERU FUJITA

Many official surveys give us important information about labor markets and unemployment, as well as other statistics. However, these surveys reveal only the *net* gains or losses in employment over a given period. Consequently, how many *gross* hires and separations lie behind the net changes is missing from these statistical releases. Data on gross flows turn up additional valuable information. In this article, Shigeru Fujita uses such data to examine cyclical changes in the pace of the worker reallocation process and its effects on the U.S. labor market.

The number of jobs added or lost in the U.S. economy every month is one of the most eagerly awaited statistics among policymakers and market participants. For example, we may recall the recent episode of a "jobless recovery," in which even though the recession was officially over in the fourth quarter of 2001, the apparent weakness of the labor market continued into 2002 and 2003. During that period, newspapers and magazines thoroughly scrutinized the job numbers from the Bureau of Labor Statistics' (BLS) establishment survey, often called the payroll survey.[1]

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The payroll survey includes important information about labor market developments in the U.S. — not only the total number of jobs added or lost but also a detailed industry breakdown, hourly and weekly earnings, average workweek, and so forth. We can also look at the results from the BLS's monthly household survey, which tells us the unemployment rate and labor market participation rate, as well as other statistics. Undoubtedly, these statistics are very useful in assessing in a timely manner the current state of the U.S. labor market or, more generally, the well-being of the overall economy.

However, they reveal only the net gains or losses in employment over a given period, and therefore, how many *gross* hires and separations lie behind the net changes is missing from these statistical releases. Data on gross flows turn up additional valuable information that is buried in the monthly releases of those surveys. Specifically, think of the following two situations in the labor market. In the first scenario, firms increase the number of hires while the pace of separation of workers is held constant. In the second, the pace of separation of workers slows down while the pace of hiring stays the same as before. These two scenarios could yield the same number of net job gains, but their implications for the economy are very different. In particular, since workers and firms made very different decisions in the two scenarios, the distinction between the two is essential in tracing the true sources of job gains.

Another way of seeing the importance of gross worker flows is to notice the fact that finding a job is not an easy task. As an example, suppose that in one part of the country, a shopping mall is closed, laying off all the workers, while the same kind of shopping mall is opened in another location far away. Those who have lost their jobs may be qualified for jobs at the new location, but they may not be able to find those new job opportunities. Even if they do, they may not want to move to the new location for one reason or another. Because of the time-consuming nature of finding a job, those workers may be unemployed for a long time.

More generally, if separated workers, whether they quit or were fired,

[1] In fact, *Time* (December 29, 2003) chose "jobless recovery" as one of the buzzwords that characterized 2003.

could find their next suitable job opportunities immediately, "unemployment" — defined as those who want a job but do not have one — would not even exist to begin with. But because reallocating workers across jobs is time consuming, unemployment always exists. We can see now that how smoothly workers are reallocated across jobs is an important factor in determining the amount of joblessness and thus of well-being in the economy. With the data on gross flows at hand, we can directly assess the pace of this time-consuming process. In particular, the pace of hiring and separation varies systematically with the state of the economy, as we will see in this article. Studying these cyclical changes in the pace of the worker reallocation process enriches our understanding of the U.S. labor market.

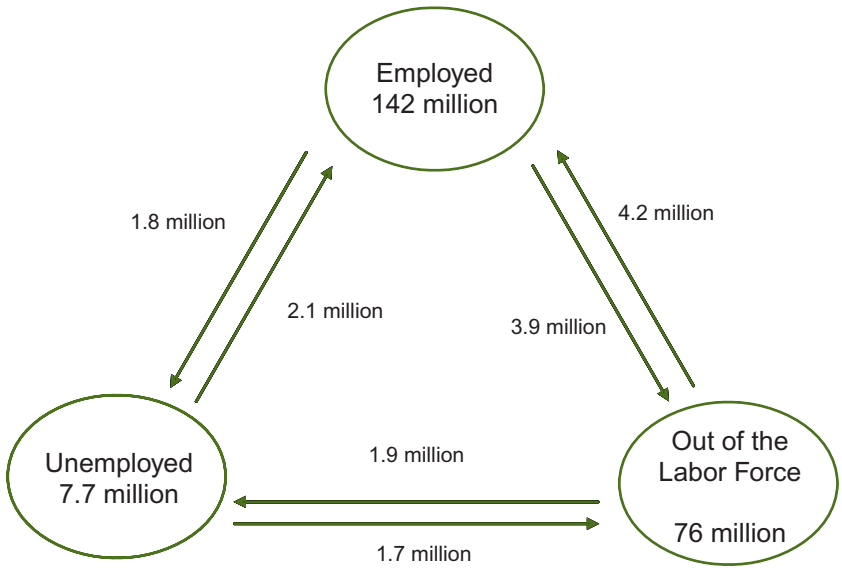
MAGNITUDE OF GROSS WORKER FLOWS

Before looking at movements of gross flows over time, let's look first at how large the worker flows are relative to net changes in employment. At any point in time, workers are either employed, unemployed, or out of the labor force. We call this a worker's labor market state. Figure 1 summarizes the average monthly worker flows among the three labor market states in 2005.[2] The numbers in the circles indicate the stock of workers in each corresponding state, and the numbers next to the arrows indicate the size of the flows.[3] People are classified as unemployed if they do not have a job, have actively looked for work in the past four weeks, and are currently available for work. Those who have no job and are not looking for one are counted as not in the labor force. The figure indicates that there is a flow into employment not only from those who are officially unemployed but also from those who are out of the labor force. This flow looks strange because those who are out of the labor force are, by definition, not looking for jobs. However, there are quite a few people outside the labor force who want a job but who, for one reason or another, are not reportedly seeking jobs.[4] The CPS data suggest that this group of workers accounts for 6.5 percent of total nonparticipants in 2005.

Combining these two sources produces gross flows of 6 million workers (or 2.7 percent of the civilian population of 16 years and older) into new employment relationships every month. A somewhat smaller number of workers separate from their employers, either becoming unemployed or moving out of the labor force. Although these numbers are very large, they are still underestimated relative to the

FIGURE 1

Average Monthly Worker Flows in 2005



Average Net Monthly Employment Growth = 230,000 in 2005

Note: Based on the data constructed by Fujita and Ramey (2006).

[2] Figure 1 is based on data presented in my recent paper with Garey Ramey.

[3] The data in the figure are originally taken from the Current Population Survey (CPS), which is often referred to as the household survey, mentioned in the introduction. The CPS, which is conducted by the BLS, is the source of the official measures of unemployment, labor force participation, and employment. Thus, we can associate the CPS-based gross flows directly with those official statistics. Further, we can compute the long-term and high-frequency (monthly) gross flows, which are useful in examining the cyclical regularities of gross flows of workers. The payroll survey, which was mentioned at the beginning of the article, is another source for gauging the national employment outlook. However, it does not help with the assessment of gross flows.

[4] Similarly, there are large flows from employment not only into unemployment but also into and out of the labor force.

"true" gross flows for this reason: They ignore the employment-to-employment flows that arise when people switch jobs without experiencing a period of unemployment. In fact, in their article, Bruce Fallick and Charles Fleishman show that, on average, 2.8 million workers changed jobs without experiencing unemployment spells in a given month between 1996 through 2003. Although the size of employment-to-employment flows is very large, in this article, we'll ignore these flows because they do not affect the change in net employment, at least in a statistical sense.

Small Changes in the Pace of Hiring and Separation Generate Large Swings in Employment Growth. We can appreciate the size of the gross flows if we compare them with the size of net changes in employment. Consider the numbers in 2005. In that year, according to our data, average monthly flows out of employment amounted to almost 6 million workers, whereas the average net employment growth was only about 230,000 per month. This implies that a small change in the size of the gross flows may have a large impact on the net change in employment. Consider an example in which, in a particular month, 6,100,000 workers are hired and 6,000,000 workers lose their jobs, so that the net employment gain that month is 100,000 jobs. Suppose now that the number of hires decreases 1 percent, to 6,039,000, and the number of people who lose their jobs increases 1 percent, to 6,060,000. As a result, the net change in employment becomes negative. As noted earlier, the presence of large flows in both directions indicates that firms and workers face diverse economic situations. An important lesson to be drawn from this example is that a small shift in the pace of hiring and separation induced by some change in economic conditions, such as a change in a surge in oil prices or a change in tax rates, could cause large swings in net employment. Let's look at how these flows move in response to business cycles.

CYCLICAL PROPERTIES OF TRANSITION RATES

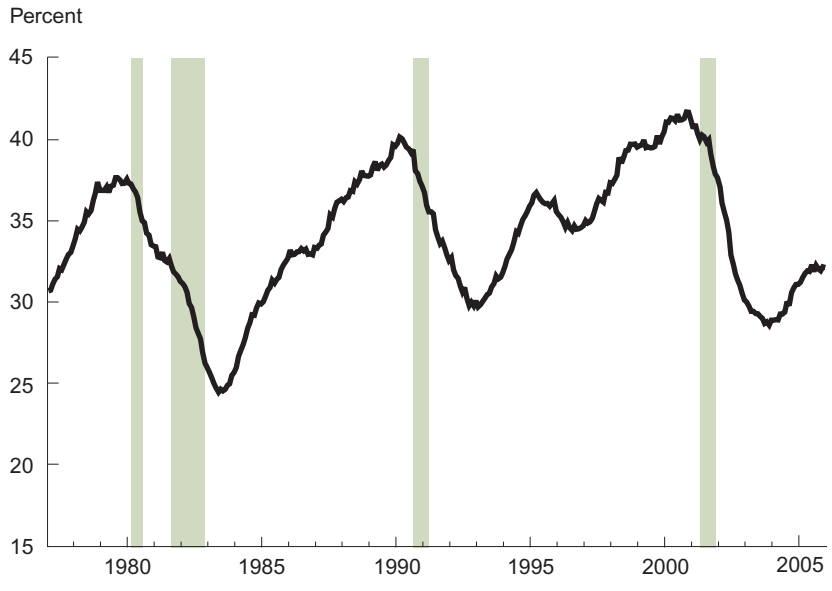
From here on, I will focus on the transition between unemployment and employment, ignoring the transition from out of the labor force into the labor force. That way, I can focus on the process of "job loss" (involuntary separation) and subsequent job finding. Accordingly, I use the term job loss in place of separation.

First, note that the stock of unemployment in a given month is determined by the level of unemployment in the previous month plus job losses that occurred in this month minus new employment relationships formed from the unemployment pool. Furthermore, gross flows may be thought of as the product of the transition rate and the size of the pool. More specifically, gross hires can be considered as the product of the rate at which unemployed workers find jobs (the job finding rate) and the size of the unemployment pool. Similarly, gross job losses can be expressed as the product of the rate at which employed workers lose their jobs (the job loss rate) and the size of employment.

The Job Finding Rate Is Strongly Positively Correlated with Business Cycles. Figures 2 and 3 plot 12-month moving averages of the job finding rate and the job loss rate, respectively. Figure 2 shows that, historically, the job finding rate fluctuates around 30 to 35 percent. This means that of all unemployed workers, about 30 to 35 percent find their next job

FIGURE 2

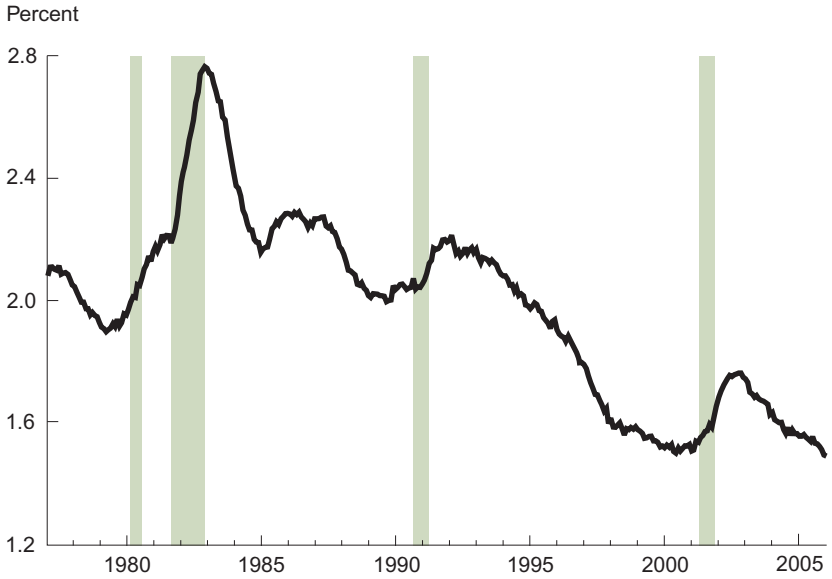
Job Finding Rate of Unemployed Workers



Y-axis measures the probability that unemployed workers find jobs. 12-month moving average. The shaded bars indicate NBER-dated recessions.

FIGURE 3

Job Loss Rate into Unemployment



Y-axis measures the probability that employed workers lose their jobs, becoming unemployed. 12-month moving average. The shaded bars indicate NBER-dated recessions.

within a month. Another feature we see in Figure 2 is that the job finding rate is procyclical; that is, it moves along with the business cycle, going up during economic booms and going down in recessions. (See *Explaining Fluctuations in the Job Finding Rate*.) This feature makes sense because during recessions unemployed workers have more difficulty finding jobs than in nonrecessionary times. Also, we can see that changes in the job finding rate over business cycles are considerable. In the most recent recession in 2001, it fell below 30 percent from a level of more than 40 percent in the pre-recession period.

The Job Loss Rate Is Trending Down as Labor Force Attachment Increases. Now, consider the job loss rate. Figure 3 shows that the number fluctuates around a much lower level. To see why there is such a big difference in levels between the job finding rate and the job loss rate, notice that the job finding rate is calculated as a ratio to the unemployment pool and the job loss rate is computed as a ratio to the employment pool. Obviously, the size of the employment pool is much larger than the size of the unemployment pool. Thus, the level of the job loss rate is much lower than that of the job finding rate. A noticeable fact about the historical trend of the job loss rate is that it has been drifting downward since the late 1980s. The article by Hoyt Bleakley and co-authors and one by Robert Shimer (2005b) point to demographic factors in explaining this fact: The labor force has aged in the past two decades. Aging reduces turnover because older workers are more likely to stay with a job, and younger workers engage in much more job shopping. Shimer also emphasizes the fact that as more women have participated in the labor force, women's labor force attachment has risen since the late 1980s, and turnover for men between the ages of 25 and 54 does not exhibit such a decline over this period.

The Job Loss Rate Moves Opposite to Business Cycles. Turning to how the job loss rate varies over business cycles, we can see that it moves countercyclically, which means that it goes down during booms and up during recessions. This pattern is again very intuitive because it implies that people are more likely to become unemployed during recessions and less likely to become unemployed during booms. Historically, the cyclicality of the job loss rate was less pronounced in the two most recent recessions, compared with the two recessions in the early 1980s. However, the job loss rate still exhibits clear countercyclicality. Steven Davis, Jason Faberman, and John Haltiwanger highlight two factors that contributed to the less dramatic increases in the job loss rate in recent years. The first is the shrinking employment share of goods-producing industries. Traditionally, goods-producing industries, in particular, durable goods industries, have been more susceptible to recessions than service industries, giving rise to bursts of employment outflows, mainly due to layoffs, at the onset of recessions. Given this pattern, the declining employment share of the goods-producing sector reduces the responsiveness of the job loss rate in the economy as a whole. The second factor is the mildness of the two recent recessions relative to preceding recessions. In particular, the authors point out that shallow recessions induce only (disproportionately) small rises in job loss, whereas deep recessions could

Explaining Fluctuations in the Job Finding Rate

Figure 2 in the text shows that the job finding rate for unemployed workers changes dramatically over business cycles. In the academic literature, researchers often imagine that a large number of job seekers and employers form "matches" in the labor market and that the speed at which unemployed workers find jobs is positively influenced by so-called "matching market tightness," that is, the level of vacant jobs relative to the number of job seekers. The theory says that when the ratio is high (the matching market is tight), the rate at which each job seeker finds a job is faster because many vacant positions are available relative to the number of job seekers. On the other hand, when the labor market is "crowded" with jobless workers relative to the number of available positions, each job seeker has difficulty finding employment.

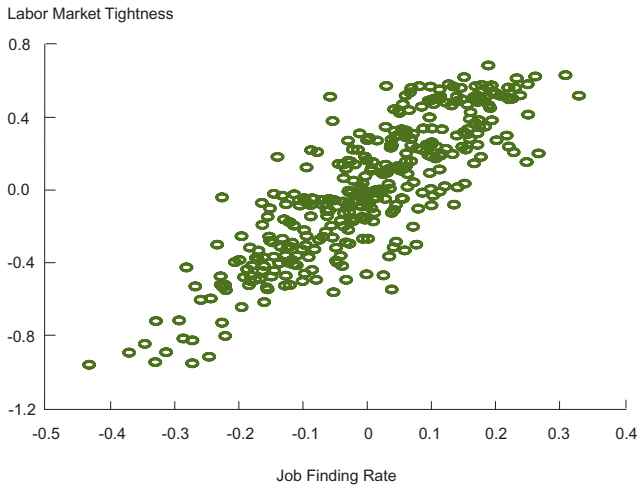
Labor market tightness may be measured by taking the ratio between the number of help-wanted advertisements[a] and the number of people unemployed. Shimer's article (2005b) shows that there is, in fact, a stable, positive relationship between the job finding rate and matching market tightness. The Figure is a scatter plot of the two variables, and it displays a strong positive relationship. Recent studies have devoted much effort to accounting for the cyclical behavior of matching market tightness. In particular, many researchers have investigated the sources of large fluctuations in firms' recruiting efforts (represented by the level of job vacancies) over the business cycle.[b]

[a] One may think that the number of help-wanted advertisements is a poor approximation of actual job vacancies. For example, each newspaper ad includes multiple job offers, and the number of help-wanted advertisements may reflect only a small fraction of actual job openings, especially since recruitment methods have been shifting toward Internet job postings in recent years. However, there is quite a bit of evidence that the cyclicality of the series tracks that of actual vacancies well. See Katharine Abraham's article and the 2005a article by Robert Shimer.

[b] For example, see the study by Robert Hall (2005b).

FIGURE

Relation Between the Job Finding Rate and Labor Market Tightness



Each variable is logged first and then detrended by regressing it on time polynomials of up to second order. Each axis therefore measures deviations from the trends in log scale. For example, "0.1" means the data are higher than the trend level by approximately 10 percent.

induce (disproportionately) sharp increases in job loss.

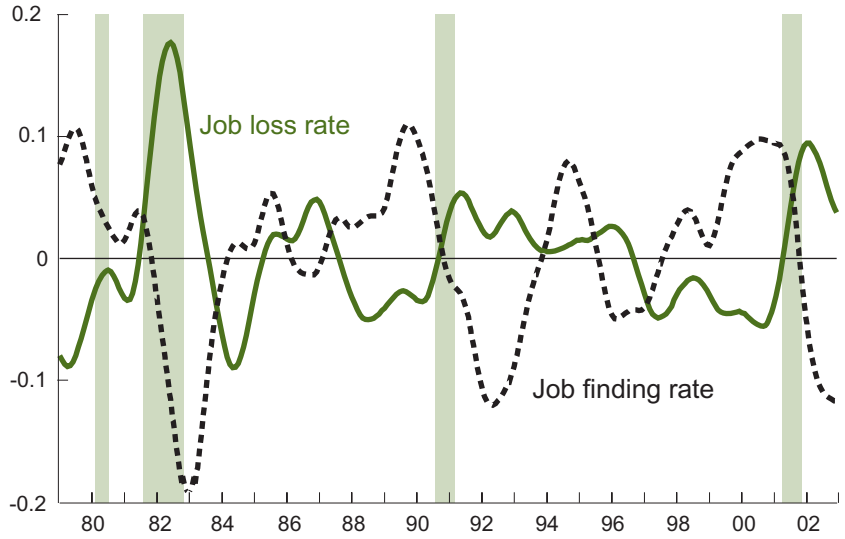
Which Is More Volatile: Job Finding Rate or Job Loss Rate? So far, I have shown that the job finding rate is procyclical and the job loss rate is countercyclical, both of which are intuitive phenomena. But which is more volatile? In my paper with Garey Ramey, we compute standard deviations of the business cycle components of the two series. Since the two data series have different average levels, we take the logarithm of the series first and then use a method called band-pass filter to isolate only the variations that are useful for business cycle analysis.[5] Figure 4 plots the isolated business cycle movements of the two series. Although both of the series are volatile,[6] it looks like the job finding rate is somewhat more volatile than

[5] To extract the business cycle movements of the data, we use the band-pass filter developed by Marianne Baxter and Robert King. Intuitively, it takes a two-sided moving average of the series, but instead of taking a simple average with equal weights, the weights are computed in a way that isolates the business cycle movements of the data.

[6] In the paper, we show that the standard deviations of the two series are much larger than those of the index of industrial production, a typical measure of the economy's production activity.

FIGURE 4

Business Cycle Movements of Job Finding and Job Loss Rates



Business cycle component is extracted by using a method called the band-pass filter developed by Baxter and King (1999). The shaded bars indicate NBER-dated recessions.

the job loss rate. In fact, the standard deviation of the job finding rate is 35 percent more volatile than that of the job loss rate. Does this mean that the job finding rate is more important in explaining the unemployment rate? Not necessarily.

To see why, recall that the changes in unemployment equal the number of workers who have lost jobs minus the number of workers who have found jobs. Also, remember that the number of job losses can be expressed as the product of employment and the job loss rate, and similarly that the number of hires can be expressed as the product of unemployment and the job finding rate. What I have compared here is the volatility of the two transition rates, and what matters for the change in unemployment is the difference between the number of gross job losses and hires. Importantly, the pool of employment is much larger than the pool of unemployment: In recent U.S. history, the unemployment rate has been less than 10 percent most of the time; thus, the rest of the workers in the labor force are employed. This fact implies that even a small change in the job loss rate will have a big impact on the number of job losers, whereas a large change in the job finding rate will not necessarily result in large changes in the number of hires.

CYCLICAL PROPERTIES OF GROSS FLOWS

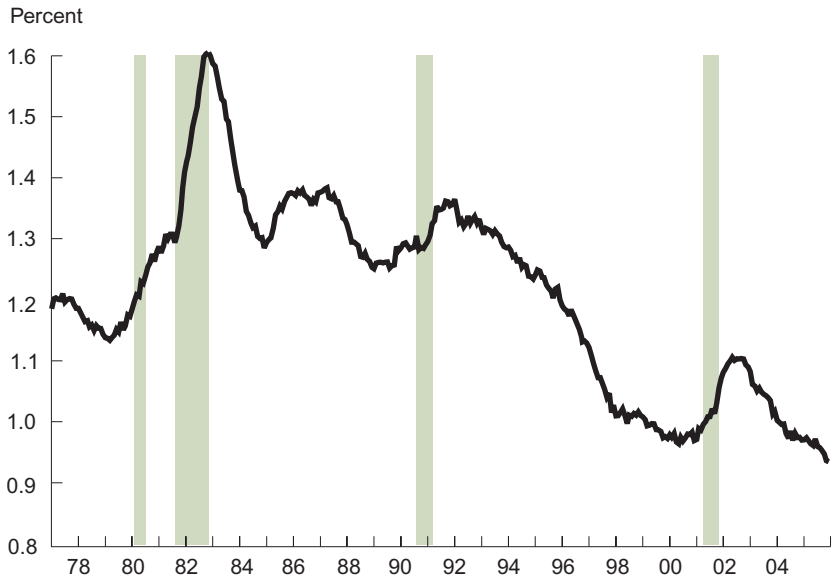
To take into consideration the difference in pool sizes, our paper also computes the volatility of the business cycle movements of gross job losses and hires. The result shows that gross job losses are almost 40 percent more volatile than gross hires. This indicates that the larger pool size produces greater volatility in job losses, even though the job loss transition rate fluctuates less than the job finding transition rate.

The Number of Hires *Increases* in Recessions. Our paper also points to another piece of evidence that indicates that fluctuations in the job loss rate are more important than the job finding rate in thinking about the driving force behind unemployment. To see this, Figures 5 and 6 plot gross job losses and hires, respectively. Figure 7 displays the business cycle movements of the two gross flow series together. Not surprisingly, these figures show that job losses rise during recessions. However, somewhat surprising is the fact that the number of hires also tends to *increase* during recessions. This is less intuitive because the job finding rate decreases by a large amount, as we saw above, but nevertheless the data indicate that the number of hires increases during times when economic activity is sluggish.

This pattern indicates that job loss is more important in driving unemployment fluctuations. Consider a thought experiment where the job finding rate does not move at all, whereas the job loss rate goes up in response to some kind of recessionary pressure, such as a slowdown in the housing market or higher oil prices. In this hypothetical case, the increase in the job loss rate is indeed the driving factor of labor market adjustments because the job finding rate is not moving. After the increase in the job loss rate, the number of job losses increases and thus unemployment goes up. However, those unemployed workers find jobs at the same rate as before. Because the increased job losses result in there being more job seekers (unemployment), the number of hires surely increases as well. This pattern of adjustments is consistent with the behav-

FIGURE 5

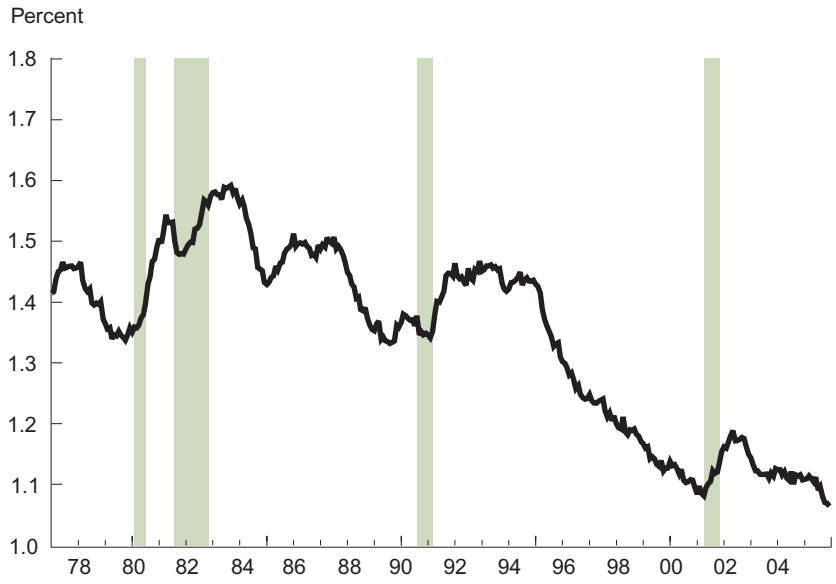
Gross Job Losses as Percent of Working-Age Population



Y-axis measures the number of employed workers who become unemployed each month, expressed as a percent of 16+ population. 12-month moving average. The shaded bars indicate NBER-dated recessions.

FIGURE 6

Gross Hires as Percent of Working-Age Population



Y-axis measures the number of workers who are hired from the unemployment pool each month, expressed as a percent of 16+ population. 12-month moving average. The shaded bars indicate NBER-dated recessions.

ior of the data described above. On the other hand, the actual behavior of the data is not replicated in the opposite thought experiment where the job loss rate is assumed fixed and the job finding rate moves as observed. In this opposite case, the lower job finding rate induces fewer hires, failing to replicate the observed pattern. The fact that the pattern of labor market adjustments can be reconciled only in the first case suggests that the job loss rate is likely to be playing a more important role in unemployment fluctuations.

TIMING OF CHANGES IN JOB LOSS AND JOB FINDING RATES: JOB LOSS RATE MOVES FIRST

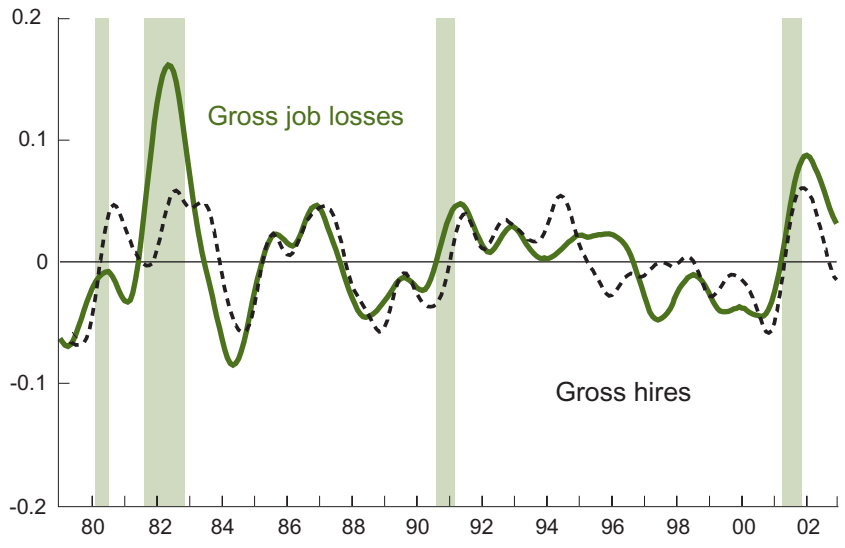
Another important dimension we can investigate is the timing of changes in the variables of interest. My paper with Garey Ramey also computes another kind of statistic called cross-correlation coefficients. This statistic, simply a correlation coefficient between the two series, is computed by shifting one of the data series forward or backward. The correlation coefficient can be computed for each length of the shifts in the data series. In our paper, we compute cross correlations of each series plotted in Figures 4 and 7, with respect to the business cycle component of the index of industrial production, an often-used indicator of the business cycle.

Cross correlations between the job loss rate and the business cycle indicator reveal that the negative correlation between the two series is strongest when the job loss rate is lagged by three months,[7] indicating that the job loss rate starts to rise earlier than the

[7] Because the job loss rate is high when the business cycle indicator is low and low when it is high, the correlation coefficients are always negative. Thus, "lowest" means that the negative relationship is strongest between the two variables.

FIGURE 7

Business Cycle Movements of Gross Job Losses and Hires



Business cycle component is extracted by using a method called the band-pass filter developed by Baxter and King (1999). The shaded bars indicate NBER-dated recessions.

production measure starts to decline. Moreover, the negative correlation is very strong (the lowest correlation is -80 percent). On the other hand, cross correlations between the job finding rate and the business cycle indicator achieve the highest level of 80 percent. However, this occurs when the job finding rate is shifted forward two months, implying that the movements of the job finding rate trail the business cycle indicator.

We also conduct the same calculations using the business cycle components of gross job losses and hires with respect to the business cycle indicator. As noted above, both of these series tend to go up during recessions; therefore, the cross correlations are negative. However, a noticeable fact is that gross job losses lead the business cycle indicator, whereas hires trail the business cycle indicator. This pattern is also consistent with the view that job loss plays a key role in labor market adjustments.

CONCLUSION

In this article, I first showed that there are large flows of workers behind the net changes in employment and unemployment. I then discussed driving forces behind fluctuations in unemployment. Based on the evidence presented in my paper with Garey Ramey, I summarized the business cycle characteristics of labor market adjustments as follows: (1) During recessions, the job loss rate goes up sharply, whereas the job finding rate plunges. (2) At the same time, both gross job losses (flows into unemployment from employment) and gross hires (flows into employment from unemployment) increase. The fact that gross hires go up when the economy is sluggish can be understood by noting that the size of the unemployment pool is larger in those times. This "pool size effect" outweighs the declines in the job finding rate. (3) The job loss rate and gross job losses start to react to recessionary pressures early in the business cycle, while the job finding rate and gross hires react later.

These findings strongly counter the view put forth by Robert Shimer (2005b) and Robert Hall (2005a) that emphasizes fluctuations in the job finding rate in accounting for fluctuations in unemployment.[8] Undoubtedly, fluctuations in the job finding rate are important. However, it is misleading to dismiss changes in the job loss rate. In fact, our findings indicate that job loss is actually a more important factor.

Clearly, our statistical portrait of the worker reallocation process adds to the understanding of the sources of unemployment fluctuations. However, the simple analysis here has a number of limitations. One is that I look at the data as if everybody in the labor force faces the same job loss and job finding rate. This is problematic because workers are different along many dimensions. For example, as shown in my paper with Ramey, the labor force adjustment process is very different between young workers and prime-age workers. (See *Differences Across Demographic Groups*.) Another missing piece of the analysis is how worker reallocation interacts with workers' wages and productivity. For example, I emphasize the fact that the number of hires increases during recessions, but the discussion ignores what kinds of jobs those initially displaced workers end up with. These issues are important topics for further research.

[8] For example, Robert Hall says in his article (2005a) that "recessions do not begin with a burst of layoffs. Unemployment rises because jobs are hard to find, not because an unusual number of people are thrown into unemployment."

Differences Across Demographic Groups

In my paper with Garey Ramey, we conduct the same analysis as in the main text after breaking down the data into different demographic groups. We find that there is a large difference in the labor adjustment pattern across young workers and prime-age workers when we incorporate the transition rate into and out of the labor force.*

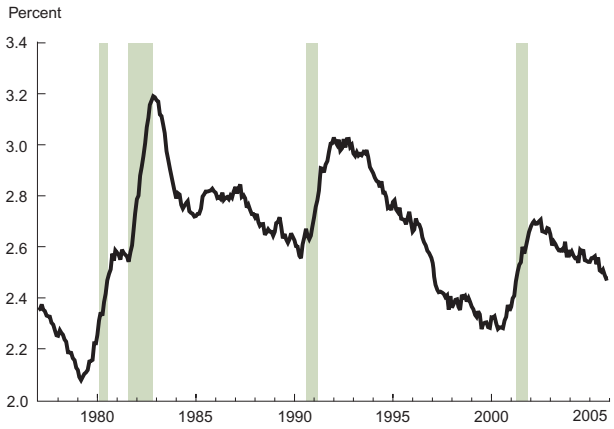
We find that all three points in the conclusion to the main text strongly hold among prime-age (25-54) male workers. For example, the countercyclicality of the job loss rate is very strong for these workers (Figure A). On the other hand, for young workers (16-24), movements of the job loss rate become less clear (Figure B). It no longer shows a clear pattern with respect to business cycles. Comparing the two figures, we can further see that the job loss rate among young workers is much higher than that among prime-age male workers, indicating an important difference in labor force attachment between these groups of workers. Our paper further shows that for young workers, gross hires go down in recessions as opposed to the overall picture. These characteristics in the data for young workers are consistent with the idea of job shopping, whereby young workers pass rapidly through multiple jobs over a short period of time, and this process is driven by firms' hiring attitudes.

The contrast of the worker reallocation process between prime-age workers and young workers may further indicate that different labor market policies should be adopted for each group of workers. For example, prime-age workers tend to be attached to long-term, high-wage jobs, and thus, job loss induces larger welfare losses for these workers. Therefore, a policy to reduce job losses during recessions may potentially be important. For young workers, a policy to expand available job opportunities during downturns may be effective.

* The labor force consists of those who are employed and are looking for jobs (unemployment). Thus, when workers lose (or quit) their jobs and do not look for new jobs, they are considered to be out of the labor force. Remember that the analysis in the text focuses on the transition between employment and unemployment.

FIGURE A

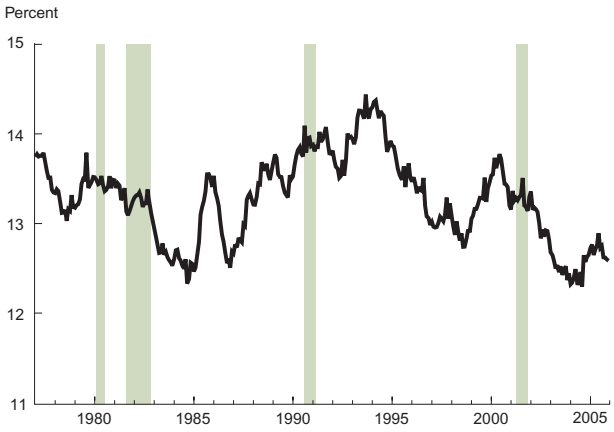
Job Loss Rate (Prime-Age Male Workers)



Y-axis measures the probability that prime-age (25-54) employed workers go to the unemployment pool or out of the labor force. 12-month moving average. The shaded bars indicate NBER-dated recessions.

FIGURE B

Job Loss Rate (Young Workers)



Y-axis measures the probability that young (16-24) employed workers go to the unemployment pool or out of the labor force. 12-month moving average. The shaded bars indicate NBER-dated recessions.

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