New tools for labor market analysis: JOLTS

*As a single, direct source for data
on job openings, hires, and separations,
the Job Openings and Labor Turnover Survey (JOLTS)
should be a useful indicator of the demand for labor
in the U.S. labor market and of other economic conditions*

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Analysis of the U.S. labor market is a difficult and challenging effort. A number of existing economic indicators, including the unemployment rate, payroll employment, and others, serve as useful measures of labor market activity, general economic conditions, and labor supply. However, to facilitate a more comprehensive analysis of the U.S. labor market and to show how changes in labor supply and demand affect the overall economy, the Bureau of Labor Statistics will introduce a new data series measuring labor demand and turnover: the Job Openings and Labor Turnover Survey (JOLTS).[1]

The availability of unfilled jobs—the number of job openings or the openings rate—is an important measure of the tightness of labor markets. JOLTS calculates the number of job openings from a nationwide sample of establishments and computes a job openings, or vacancy, rate. This new survey also collects data on separations by type and hires, providing a single source for these data that will enhance empirical analyses of the economy and the labor market. This article briefly describes the survey and then discusses how JOLTS data will help enrich analysis of the U.S. labor market and the economy as a whole.

The survey

BLS collects and analyzes monthly data on many aspects of the U.S. labor market. One BLS survey, the Current Employment Statistics (CES) survey,

collects data from businesses and produces employment estimates. Another survey, the Current Population Survey (CPS), conducted by the Census Bureau, collects employment status data from households for BLS to determine the unemployment rate, which measures excess labor supply. The BLS Job Openings and Labor Turnover Survey, completes the labor market picture by collecting monthly data from businesses to measure unmet labor demand and job turnover.

This new program involves the collection, processing, and dissemination of job openings and labor turnover data from a sample of 16,000 business establishments. The universe frame for the JOLTS sample consists of approximately 8 million establishments compiled as part of the operations of the BLS Covered Employment and Wages, or ES-202, program. This frame includes all employers subject to State Unemployment Insurance (UI) laws and Federal agencies subject to the Unemployment Compensation for Federal Employees (UCFE) program. The sampling frame is stratified by ownership (public or private), geographic region, major industry division, and size class. The JOLTS sample is representative of private nonfarm establishments as well as Federal, State, and local government entities in the 50 States and the District of Columbia. The sample is rotated so that most establishments participate in the survey for 18 consecutive months. Total employment estimates from JOLTS are controlled to the current month CES employment estimates, and this is used

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to adjust the levels for all other JOLTS data elements.

The data elements collected monthly from each establishment include employment for the pay period that includes the 12th of the month; the number of job openings on the last business day of the month; and hires, quits, layoffs and discharges, and other separations for the entire month. To encourage consistent and accurate reporting, respondents are given detailed definitions for each data element. For example, the definition of a job opening requires that a specific position exists, the job could start within 30 days, and that the employer is actively recruiting from outside the establishment to fill the position. Hires are all additions to the payroll during the month, and a layoff should be counted if it lasts or is expected to last more than 7 days.

BLS anticipates releasing monthly estimates of job openings, hires, and separation rates and levels beginning in early 2002. The JOLTS data series will be considered a developmental series for the first 2 years of publication. Estimates will be released for the Nation as a whole and for four geographic regions. The national estimates for the private sector will be divided into nine industry divisions based on the Standard Industrial Classification (SIC) system. Additional estimates will be published for the Federal Government and for State and local governments combined. JOLTS estimates will be converted to the North American Industry Classification System (NAICS) in 2003.[2]

Anticipated uses of the data

The JOLTS data series on job openings, hires, and separations will assist policymakers and researchers in addressing some fundamental issues concerning labor demand and movements in the labor market. The JOLTS data will provide a basis for improved understanding of the factors driving fluctuations in unemployment and the overall economy, determining appropriate approaches for reducing unemployment, and studying how workers flow in and out of establishments, are matched with jobs, and are distributed across sectors.

Of particular interest to researchers will be the study of the relationship of vacancies and unemployment. The JOLTS job openings rate is expected to have a negative relationship to the unemployment rate. For example, as the economy expands, the unemployment rate generally falls, reflecting a decreased pool of excess workers. Simultaneously, the job openings rate is expected to increase as businesses seek workers to fill new and existing jobs. Alternatively, in a weak economy, the unemployment rate typically increases as businesses shed workers in response to weak demand, and the job openings rate is expected to fall as employers cut back their hiring plans.

The empirical relationship linking vacancies with unemployment and the overall economy is called the Beveridge curve. A stylized version of the Beveridge curve is shown in exhibit 1. First described by William Beveridge in the 1940s,

the curve reflects the negative relationship between vacancies and unemployment.[3] Changes in the business cycle generate movement along the curve, while reallocation of labor and capital between sectors moves the curve further away from or closer to the origin. These forces are not independent of one another, and changes in labor force composition and job search behavior also affect where the Beveridge curve is relative to the origin. Economic researchers can use the JOLTS data to test and refine models that show how such factors affect labor market dynamics and the distribution of workers across sectors.

Another topic of importance to economists is the relationship between changes in wages and changes in employment. Primarily, economists have only been able to examine this in the context of the Phillips curve, a relationship linking deviations from the natural rate of unemployment—or excess labor supply—to wage changes. The JOLTS series on job openings will finally provide a consistent series on excess labor demand that will extend economists' ability to study the relationship between wage and employment changes.

To study the Beveridge curve and its implications, researchers have had to use a variety of proxies for the vacancy rate. Much work in this area has been done using a vacancy series constructed from employment, as measured by BLS, and the Conference Board's Help-Wanted Advertising Index. This proxy has served as an imperfect measure, because the index does not cover the entire country, job openings are not directly counted, there are no precise definitions or adjustments for what constitutes actual job openings, and there are other factors independent of labor demand that can increase the volume of want ads. JOLTS will provide a directly measured vacancy series that can be used for this type of analysis.

The Bureau of Labor Statistics has conducted various surveys to measure job openings in the past, but these were either short lived or were limited to the manufacturing industry. JOLTS was developed to consistently record monthly job openings for all nonagricultural industries, including both public and private businesses, and is representative of the national economy.

Researchers have used the available proxies to study movements in the unemployment-vacancy relationship over the past few decades because a consistent set of vacancy data has not been available. Generally, this work has documented upward movement along the Beveridge curve during the 1960s, and a combination of movement along the curve and outward shifts in the relationship for various periods during the 1970s and 1980s.[4] Recent work by Hoyt Bleakley and Jeffrey C. Fuhrer documents an inward shift of the curve in the early 1990s.[5]

Uses of JOLTS data in economic analysis. The analysis of the co-movement of the unemployment and vacancy rates
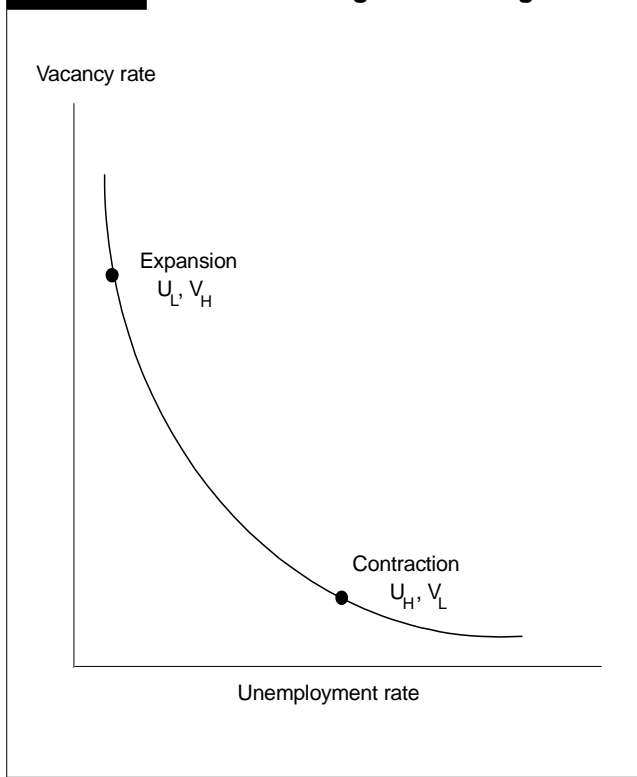
can provide more information about business cycles and the type of unemployment that is prevalent in the economy. When the structure of the economy is fixed, the position on the Beveridge curve reflects whether an economy is expanding or contracting, as shown in exhibit 1. In times of economic expansion, the unemployment-vacancy combination will be high on the curve (low unemployment rate, high vacancy rate), and in contractions it will be low (high unemployment rate, low vacancy rate). The changes in unemployment generated by this movement will mostly reflect cyclical fluctuations in labor demand. The Beveridge curve will shift with changes in the probability that jobseekers and job openings will be matched, as shown in exhibit 2. The curve will shift away from the origin if various factors make it harder for unemployed workers to fill vacancies and shift back when matching efficiency improves. These shifts reflect changes in structural unemployment or frictional unemployment, or both, that result from changes in the composition of the labor force, from reallocation of jobs across sectors or geographic areas, or from other changes in the way workers match with jobs. In considering the curve's shape and movement of the unemployment and vacancy rates over time, economists can determine the differences between unemployment driven by deficient demand and unemployment generated by reduced matching.

For example, suppose the unemployment rate begins to rise substantially. If no corresponding decrease in the vacancy rate is observed, this points to an outward shift in the Beveridge curve and a reduction in matching efficiency. The matching inefficiency could reflect structural unemployment if the individuals who are without a job do not have the right skills to fill the vacancies. To reduce unemployment, training could be provided to workers who lack needed skills. If aggregate shocks are driving the increase in unemployment—that is, there is movement along the Beveridge curve—efforts to train workers will produce little improvement. Rather, macroeconomic efforts to spur job creation may be more effective.

The models that distinguish between the amount of a change in the unemployment rate attributable to cyclical fluctuations and the amount generated by factors that reduce matching efficiency are well described by a number of authors. Katharine G. Abraham and Lawrence F. Katz and Olivier Blanchard and Peter Diamond demonstrate how data on vacancies can differentiate between deficient demand and unemployment generated by reduced matching.[6] An article by Barbara Petrongolo and Christopher A. Pissarides discusses issues regarding the matching function—a relationship that describes how workers match with jobs and which relates changes in hires to changes in vacancies and unemployment.[7] A later section of this article outlines some of the basic ideas behind these models.

JOLTS *elements as indicators of the business cycle.* As described earlier, the job openings rate, in conjunction with the

Exhibit 1. Movement along the Beveridge curve

Vacancy rate

Expansion
U_L, V_H

Contraction
U_H, V_L

Unemployment rate

unemployment rate, provides information about the state of the economy. In addition, hires, quits, and layoffs and discharges data can be useful in analyzing business cycles. Direct measures of all these data series have not been available in the past. Many hypotheses about how these data elements trend against one another and how they relate to the movements of the business cycle over time can be tested once the JOLTS data are available. Economists will be able to examine how the data elements move with business cycles directly. In addition, economists can use the JOLTS series to enhance analyses of how gross employment flows and job creation and job destruction relate to the business cycle.

Movement in the job openings (or vacancy) rate leads economic activity at business cycle peaks and lags at troughs, so that the number of vacancies tends to decrease before the economy begins a downturn and increases after the economy begins a recovery. Because cutting job openings is less costly, employers tend to reduce the number of job postings for new hires or replacement workers before decreasing the firm's current employment level when sensing an economic downturn. When conditions begin to improve, firms will tend to increase hours of work and recall workers from layoff before searching for new employees.

Hires, as well as establishment growth rates, tend to be procyclical, moving in the same direction as general economic

activity. Under good economic conditions, firms replace workers who separate, whereas during downturns, employers may delay hiring until the economic situation improves.

Intuitively, economists expect quits to be procyclical if workers feel safe leaving their jobs when economic conditions are favorable. It also is thought that layoffs and discharges are countercyclical, moving in the opposite direction as economic activity, because employers tend to shed workers when business conditions are unfavorable. Patricia M. Anderson and Bruce Meyer found total separations, which includes quits and layoffs and discharges, to be procyclical.[8] If quits are procyclical, they will decrease during downturns and recessions. Therefore, if total separations are also procyclical, in order for both quits and separations to fall during a downturn, the decrease in quits must more than offset the increase in layoffs and discharges during those periods. However, this aspect may vary by industry, because sensitivities to business cycles can vary. Hoyt Bleakley, Ann E. Ferris, and Jeffrey C. Fuhrer provide evidence that flows between employment and unemployment in manufacturing vary much more with the business cycle than in the nonmanufacturing sector.[9]

Economists have examined how business cycles affect workers moving between jobs, becoming unemployed, and dropping out of the labor force. JOLTS does not measure such flows, but its turnover data should enhance estimates of these flows using other data sources. For example, if quits and hires are procyclical, then employer-to-employer flows should be procyclical. Recent work by Bruce C. Fallick and Charles A. Fleischman, however, found no evidence that such employer-to-employer flows are procyclical using State-level variation in economic conditions during 1994–2000.[10] The evidence on the procyclicality of hires and quits tends to come from data collected during the 1970s and 1980s; the new JOLTS series will be able to help economists understand whether these relationships still hold or if other components need to be incorporated into models of how job turnover and labor market flows relate to the business cycle.

Many of the conclusions that economists have reached about the relationship between the business cycle and job openings, hires, and separations have been based on data series that are not direct measures of these data elements. The JOLTS program's data series will provide a better source for economists to examine these relationships over time.

Uses of JOLTS in economic research. In a simple model in which an economy has fixed structural characteristics, fluctuations in aggregate demand generate movements along the Beveridge curve as the economy expands and contracts. During contractions, there are few vacancies and high unemployment rates; as the economy expands and demand for labor increases, unemployed workers will find jobs and growing firms will be creating new jobs, generating a higher vacancy

rate and lower unemployment rate.

The reallocation of economic activity across industries and geographic areas also generates distinct movements in unemployment and vacancies that will be reflected in shifts of the Beveridge curve. Expanding sectors have greater employment growth and shrinking sectors experience reductions in employment. If workers who lose their jobs in the shrinking sectors are perfectly mobile and have the skills to work in the expanding sectors, then reallocation across sectors would not affect the position of the Beveridge curve. Such seamless transitions are rarely the case; impediments such as the lack of skills or geographic immobility affect jobseekers' ability to match with job openings. As a result, concurrent increases in both vacancies and unemployment can be observed and shift the Beveridge curve further away from the origin.

Demographic changes in the labor force also will affect the degree to which workers match with jobs. Workers have much higher turnover early in their career, so a change in the age distribution of workers towards younger workers can generate shorter job durations. Shorter job durations are usually associated with greater turnover and more openings at any one time. Concurrent increases in both unemployment and vacancies could result, shifting the Beveridge curve further away from the origin. Researchers have found some evidence that the Beveridge curve shifted out when the baby-boom

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Exhibit 2.   A shift in the Beveridge curve
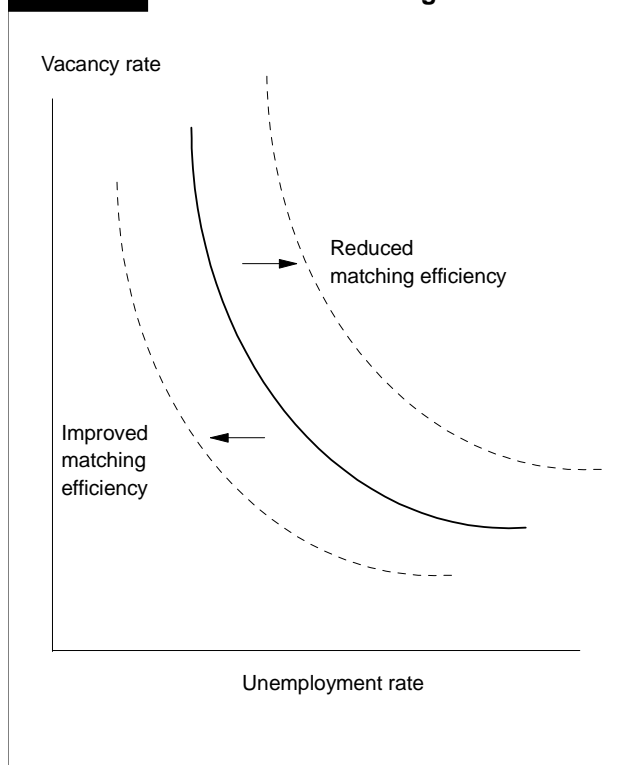
generation entered the labor market and shifted the distribution of the labor force towards younger workers. An anticipated question that economists may be able to examine with the JOLTS data is: What effect will the retirement of the baby-boom generation have on the unemployment-vacancy locus? In addition, the entry of their children into the labor force is also likely to be currently affecting the age distribution of the work force and possibly shifting the Beveridge curve as well.

Others have noted how changes in family structure, work disincentives, and changes in recruiting practices on the part of employers can influence the number of vacancies relative to unemployment.[11] In addition, the increase in the flow of information on job openings, made possible by electronic communication and the Internet, may reduce both structural and frictional unemployment, reduce the duration of job vacancies, and thus shift the Beveridge curve inwards. Such questions cannot be directly examined using the JOLTS data, but its job openings, hires, and separations data could be combined with other microdata to investigate such questions.

Aggregate demand shocks, changes in the distribution of jobs across industries and regions, shifts in the demographic characteristics of the work force, and other changes in the way labor markets operate all can affect the combination of job openings and unemployment that are observed at any one time. Economists are interested in the extent to which each of these factors matter, as well as how long their impact persists. Several researchers used the job vacancy series from the 1970s to estimate the relative importance of each of these on the movement of unemployment and job openings.

In looking at the evidence using earlier vacancy data series, researchers find that aggregate demand shocks generate larger short-run movements in the vacancy-unemployment relationship than reallocation or changes in labor supply.[12] The impact of aggregate demand does not persist in the long run, while the effects of changes in the labor force composition and increases in the intensity of reallocation do.

A number of authors have found that the Beveridge curve shifted out in the 1970s and 1980s. Changes in the composition of the labor force appear to have played at least a small part in this shift.[13] Reallocation of jobs across industries has played a role, but these are not entirely of a consistent timing and magnitude to explain the remainder of the shifts between the 1970s and 1990s. One study provides evidence that increased geographic dispersion of job creation and destruction are more consistent with the shifts; all the researchers cite additional factors that also were likely to have affected matching and shifted the Beveridge curve.[14]

JOLTS will be the first data series in which macroeconomic analyses can be performed without constructing at least one, if not more, of the main components of these models from proxies based on manufacturing data. The studies from the 1980s had to rely on relationships between employment changes, job openings, quits and layoffs constructed from turnover, and vacancy data collected in 1981 and earlier, all of which were limited to the manufacturing industry. In addition, these relationships were used in conjunction with household data to approximate the number of persons moving from one employer to another to generate measures of job separations and hires that did not come from nonemployment. These constructed series on vacancies, quits, and hires seemed to fit labor market data well through the 1980s.[15] However, several changes in the labor market over the past 30 years, including the shift in the concentration of jobs from manufacturing to services and changes in the way workers match with job openings, limit the extent to which one can hope to "update" these earlier series. Moreover, it is always preferable to have direct measures of a model's components rather than having to construct some components. The hires series from JOLTS will provide data on the number of workers who match with jobs during each month. The separations series and breakouts of quits, layoffs and discharges, and other separations will provide the necessary turnover data and job openings will provide a direct measure of vacancies for these models.

The JOLTS data also will enhance economists' understanding of matching models—the process by which employed and unemployed jobseekers match with available jobs. The hires series provides a monthly estimate of the number of such matches, and the job openings series provides a measure of the number of unfilled jobs. In analyses to date, economists have had to rely on less than ideal measures of these two critical elements. Often, exits from nonemployment were used to proxy for job matches even though recent evidence indicates that a substantial number of workers go from one job to the next without a spell of nonemployment. Also, these models have had to rely on proxies for a vacancy series or gross employment changes to control for labor demand. The proxies for vacancies and job matches have been sufficient for certain analyses, but their being imperfect measures of the true values can confound testing of other hypotheses.

An example of how measurement error interferes with analyzing matching models can be seen in economists' examination of the effect that increasing the number of jobseekers has on the rate at which vacancies are filled. Some models imply that at the aggregate level, the matching function should exhibit constant returns to scale—that is, the overall match rate will equal the sum of the probabilities that any given jobseeker and firm will match. In regression models that estimate the elasticity of job matches or new hires with respect to vacancies and unemployment, constant returns to scale implies that the elasticity of matches with respect to vacancies and the elasticity of matches with respect to unemployment should sum to one. Other models suggest that there might be increasing returns to scale in the matching function—that is, the total number of matches will increase by more than the amount

that the number of jobseekers and job openings has increased. Increasing returns to scale would imply that the estimated sum of the unemployment and vacancy elasticities is greater than one. Measurement error in either unemployment or vacancies can result in the estimated elasticities being biased towards zero. Therefore, imperfect measures of job vacancies might suggest constant returns to scale simply because the estimated effect of job vacancies is biased downward.

Matching models have been used to examine the extent to which employers prefer employed jobseekers to unemployed jobseekers. Such ranking of types of workers has implications for jobless durations and unemployment durations. Recent evidence indicates that a substantial proportion of new employees come from other jobs rather than unemployment.[16] Although JOLTS does not collect data on whether hires come from another job, unemployment, or out of the labor force, its information on matches (hires) and job openings will provide better information than existing proxies created from other surveys.

With data from a single consistent source, there is less concern that measurement error in the key components will interfere with estimating the true relationship between vacancies, unemployment, and other economic indicators.

These series will improve the ability to test how well current models describe the evolution of labor demand and labor market dynamics in the United States. Also, the time series on hires and quits, in combination with data on gross employment flows, may enable researchers to back out other turnover series, such as employment-to-employment transitions, and further enhance such research.

These topics are part of economists' research agendas and extend beyond JOLTS use as an indicator of labor demand in the United States. The full scope of the data's usefulness cannot be anticipated; however, as the data series accumulates and models of labor dynamics are further developed, they may substantially deepen economists' understanding of labor markets and the economy.

AS A SINGLE SOURCE for directly measured data on job openings, hires, and separations, JOLTS statistics can be used as indicators of general economic conditions, and are important tools for considering the implications of economic policies on unemployment and the labor market. These data series, in conjunction with other micro- and macroeconomic data, are also likely to enhance researchers' understanding of labor market dynamics and their relation to the economy as a whole.

Notes

[1] For a brief introduction to the Job Openings and Labor Turnover Survey see, "New survey measures demand for labor," *Monthly Labor Review*, September 2000, pp. 37–39.

[2] See James A. Walker and John B. Murphy, "Implementing the North American Industry Classification System at BLS," also in this issue.

[3] See Hoyt Bleakley and Jeffrey C. Fuhrer, "Shifts in the Beveridge Curve, Job Matching, and Labor Market Dynamics," *New England Economic Review*, September/October 1997, pp. 3–19. Also a derivation of the Beveridge curve can be found in Bent Hansen, "Excess Demand, Unemployment, Vacancies and Wages," *Quarterly Journal of Economics*, 1970, vol. 84, no. 1, pp. 1–23.

[4] See Katharine G. Abraham, "Structural/Frictional vs. Deficient Demand Unemployment: Some New Evidence," *American Economic Review*, 1983 vol. 73, no. 4, pp. 708–24; and Katharine G. Abraham, "Help-Wanted Advertising, Job Vacancies, and Unemployment," *Brookings Papers on Economic Activity*, no. 1, June 1987, pp. 207–48; Olivier Blanchard and Peter Diamond, "The Beveridge Curve," *Brookings Papers on Economic Activity*, no. 1, 1989, pp. 1–76; and Bleakley and Fuhrer, "Shifts in the Beveridge Curve" 1997, pp. 3–19.

[5] Bleakley and Fuhrer, "Shifts in the Beveridge Curve," 1997, pp. 3–19.

[6] Katharine G. Abraham and Lawrence F. Katz, "Cyclical Unemployment: Sectoral Shifts or Aggregate Disturbances?" *Journal of Political Economy*, 1986, vol. 94, no. 3, pp. 507–22; and Blanchard and Diamond, "The Beveridge Curve," 1989, pp. 1–76.

[7] Barbara Petrongolo and Christopher A. Pissarides, "Looking into the Black Box: A Survey of the Matching Function," *Journal of Economic Literature*, June 2001, pp. 390–431.

[8] Patricia M. Anderson and Bruce D. Meyer, "The Extent and Consequences of Job Turnover," *Brookings Papers: Microeconomics,* 1994, pp. 177–248.

[9] Hoyt Bleakley, Ann E. Ferris, and Jeffrey C. Fuhrer, "New Data on Worker Flows During Business Cycles," *New England Economic Review*, July/August 1999, pp. 49–76.

[10] Bruce C. Fallick and Charles A. Fleischman, "The Importance of Employer-to-Employer Flows in the U.S. Labor Market," Finance and Economics Discussion Paper Series, no. 2001-18 (The Federal Reserve Board, April 2001).

[11] For more details, see Abraham, "Help-Wanted Advertising," 1987, pp. 207–48; Bleakley and Fuhrer, "Shifts in the Beveridge Curve," 1997, pp. 3–19; and Petrongolo and Pissarides, "Looking into the Black Box," 2001, pp. 390–431.

[12] Abraham and Katz, "Cyclical Unemployment," 1986, pp. 507–22; and Blanchard and Diamond, "The Beveridge Curve," 1989, pp. 1–76.

[13] For more details, see Abraham, "Help-Wanted Advertising," 1987, pp. 207–48; Blanchard and Diamond "The Beveridge Curve," 1989, pp. 1–76; and Bleakley and Fuhrer, "Shifts in the Beveridge Curve," 1997, pp. 3–19.

[14] Abraham, "Help-Wanted Advertising," 1987, pp. 207–48.

[15] Abraham, "Help-Wanted Advertising," 1987; and Blanchard and Diamond, "The Cyclical Behavior of Gross Flows of Workers in the U.S.," *Brookings Papers on Economic Activity*, no. 2, 1990, pp. 85–155.

[16] Fallick and Fleischman, "The Importance of Employer-to-Employer Flows," 2001.