

ROBERT E. HALL

*Stanford University*

## *How Much Do We Understand about the Modern Recession?*

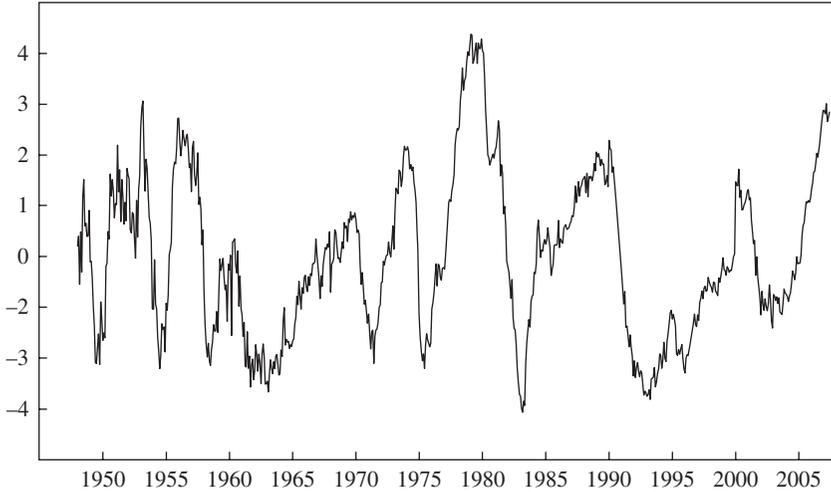
MODERN RECESSIONS HIT THE U.S. economy in 1990–91 and in 2001. A modern recession is one occurring in an economy with well-executed monetary policy and a small fraction of the labor force on the factory floor. I review the facts about modern recessions and compare them with earlier recessions, with primary emphasis on the labor market. The facts are perplexing: employment falls in modern recessions at least as far as in past recessions, without identifiable driving forces. Economists' understanding of the modern causeless recession is at an early stage, but progress has occurred and the future of this area of research seems promising.

### **Facts about Modern and Earlier Recessions**

The first important fact about modern recessions is that they are about as severe when measured in employment losses as earlier ones, leaving aside the Great Depression. Figure 1 shows deviations of total employment from its trend since 1948, and table 1 shows the percentage decline in employment associated with each of the ten recessions of the past sixty years. (The identification of recessions follows the standard chronology as determined by the National Bureau of Economic Research Business Cycle Dating Committee, but the dates are for the peaks and troughs in detrended employment, not the National Bureau's dates for peaks and troughs in economic activity.) The two modern recessions rank second and sixth in employment decline. Plainly the "Great Moderation"—the broad reduction in economic volatility of the last couple of decades—is a feature not of employment,

**Figure 1. Deviation of Employment from Trend, 1948–2007<sup>a</sup>**

Log points



Source: Author's calculations using Bureau of Labor Statistics data.

a. Data are monthly. Deviations are the residuals from a regression of log employment on a cubic polynomial in time.

**Table 1. Employment Declines Associated with Post-World War II Recessions<sup>a</sup>**

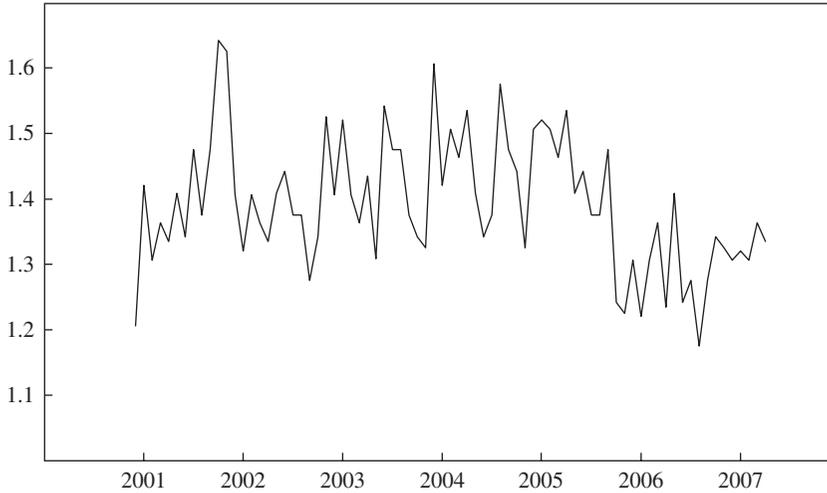
<i>Previous peak in detrended employment</i>	<i>Trough in detrended employment</i>	<i>Decline in employment (percent)</i>
1981:4	1983:1	5.74
1990:1	1993:1	5.04
1973:11	1975:6	4.38
1960:6	1963:2	3.02
1969:8	1971:6	2.99
2001:1	2003:9	2.61
1979:2	1980:8	2.58
1953:3	1954:7	2.21
1957:7	1958:7	2.15
1948:6	1949:10	2.13

Source: Author's calculations from data in figure 1.

a. Recessions are those identified by the National Bureau of Economic Research's Business Cycle Dating Committee. Number following colon indicates month. Shading indicates modern recessions. See figure 1 for an explanation of the detrending method.

**Figure 2. Monthly Layoffs, 2000–07**

Percent of workforce



Source: Bureau of Labor Statistics, Job Opportunities and Labor Turnover Survey.

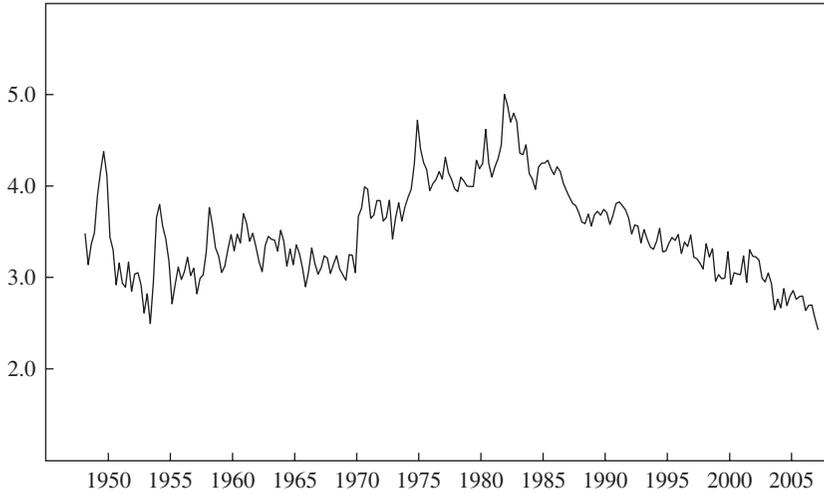
but rather of output. One of the important features of the modern recession is that productivity does not decline as it did in earlier ones.

The Great Moderation definitely applies to GDP, whose volatility has fallen by half in the past two decades compared with the two preceding decades. By some measures, such as the standard deviation of year-to-year changes in employment, the volatility of employment also has declined, but not as much. But the key fact is that modern recessions have involved lengthy periods of below-trend employment growth, and so a metric that captures these lengthy periods, such as that in table 1, reveals that employment volatility has not declined at all. Of course, this statement is based on a sample size of two. The next recession could easily have a small and brief decline in employment.

The second important fact is that the decline in employment and rise in unemployment associated with a modern recession occur without any important increase in job loss. Figure 2 shows the layoff rate reported by employers in the Job Openings and Labor Turnover Survey (JOLTS), which began in December 2000, just in time to catch the 2001 recession. Apart from a spike at 9/11, layoffs remained quite constant until they began

**Figure 3. Average Monthly Exits from Employment, 1948Q1–2007Q1<sup>a</sup>**

Percent of workforce



Source: Robert Shimer, University of Chicago. For additional details see Shimer (2007) and his webpage [robert.shimer.googlepages.com/flows](http://robert.shimer.googlepages.com/flows).

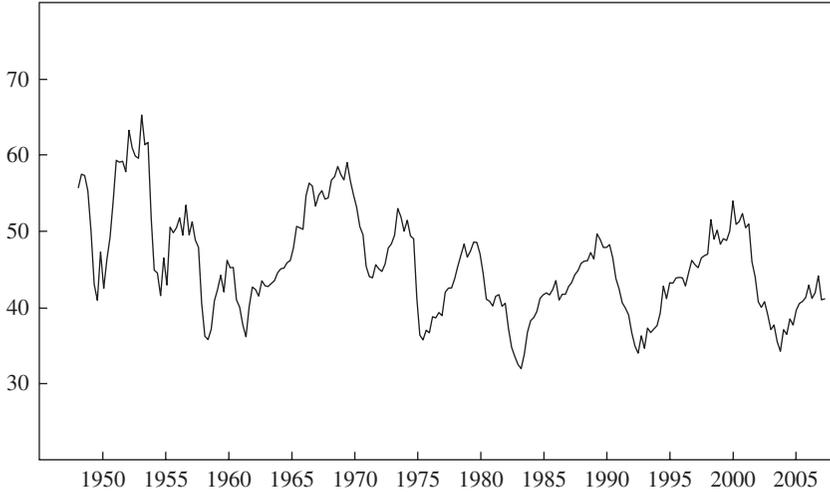
a. Data are quarterly averages of monthly rates of exit from employment.

to decline moderately in late 2005. This picture of the 2001 recession is confirmed by a long time series constructed by Robert Shimer for the exit rate from employment, that is, the rate of departure from employment into unemployment or out of the labor force (figure 3). Shimer's series actually declines fairly steadily over the entire period since the early 1980s, with no visible reversal during the 2001 recession. This illustrates the third important fact: unemployment rises in a modern recession because new jobs are hard to find, not because workers have lost jobs. In a recession, the flow of workers out of jobs remains about the same, and so does the flow of workers back into jobs. But a much larger pool of unemployed develops because jobs are hard to find. The rate at which the unemployed find jobs falls in the same proportion that the stock of unemployed rises, resulting in a constant flow from unemployment into new jobs.

Figure 3 shows that earlier recessions did generate spikes of job loss. In those recessions, unemployment rose both because workers lost jobs more frequently and because the unemployed found it harder to land new jobs. The spikes of job loss were brief, so that unemployment rebounded more

**Figure 4. Average Monthly Hires from Unemployment, 1948Q1–2007Q1<sup>a</sup>**

Percent of unemployed workers



Source: Robert Shimer, University of Chicago. For additional details see Shimer (2007) and his webpage [robert.shimer.googlepages.com/flows](http://robert.shimer.googlepages.com/flows).

a. Data are quarterly averages of monthly rates of hiring from unemployment.

rapidly in the earlier recessions than in the modern ones. Layoffs in durables manufacturing were an important factor in these spikes.

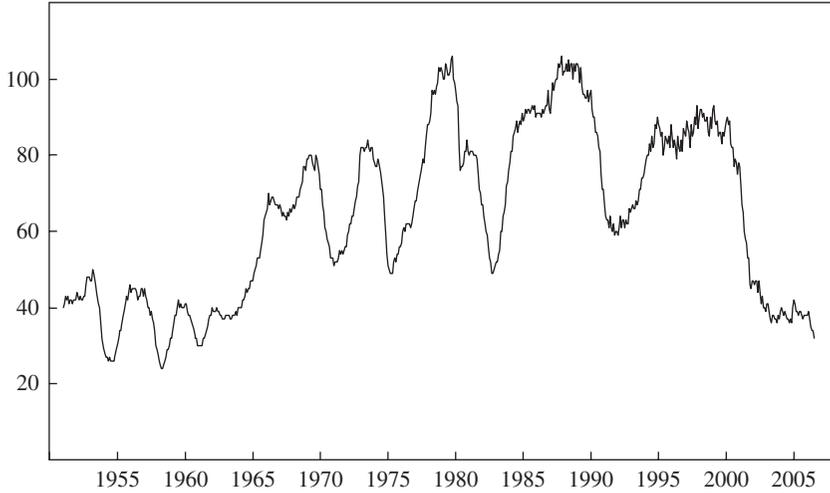
Figure 4 shows the job-finding rate for the unemployed, also calculated by Shimer. In the 1990–91 and 2001 recessions, the same dramatic fall in the monthly likelihood of finding new work occurred as in the recessions of earlier decades.

Another dimension of the softening of the labor market in recessions is in the recruiting efforts of employers, as measured by help-wanted advertising. Figure 5 shows that help-wanted ads collapse in every recession, but did so especially sharply in the two modern recessions. The 2001 recession, although not severe by the standard of employment decline, saw the largest fall ever in help-wanted ads. The decline may have been exaggerated by a shift toward Internet recruiting, as the further decline during the recovery suggests. The Conference Board, which collects these data, has recently begun to gather data on online job listings but has not yet produced a combined index.

In the modern recession, as in earlier ones, *all sectors* of the labor market slacken at the same time. Figure 6 illustrates this fact in terms of job openings

**Figure 5. Monthly Index of Help-Wanted Advertising, 1951–2006**

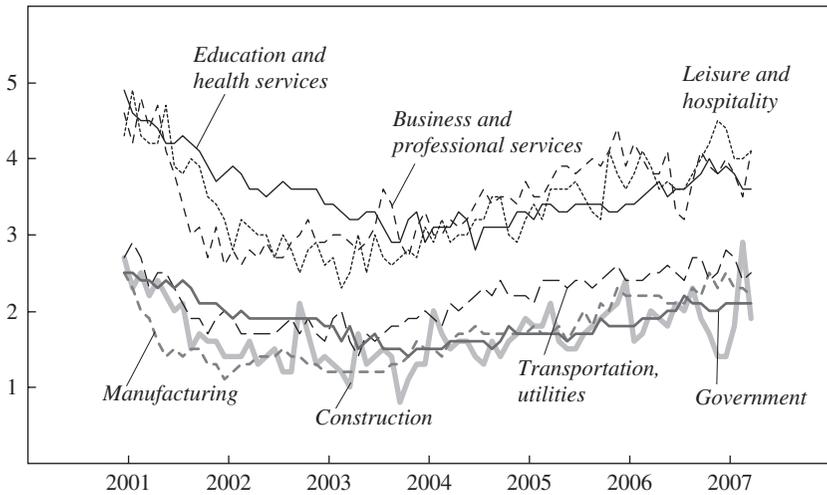
1987 = 100



Source: The Conference Board.

**Figure 6. Monthly Vacancy Rates by Sector, 2000–07**

Percent of sector workforce



Source: Bureau of Labor Statistics, Job Opportunities and Labor Turnover Survey.

recorded in JOLTS for the 2001 recession. Each of the seven major sectors—even including government—was recruiting to fill far fewer positions at the trough of the recession than at the previous peak. The softening of the labor market was economy-wide, not restricted to recession-prone sectors such as durables. Katharine Abraham and Lawrence Katz were the first to recognize the significance of this feature of the economy,<sup>1</sup> which rules out theories of recession that rest on reallocation from shrinking to expanding sectors.

If unemployment in a recession were the natural, efficient result of reallocation of workers from shrinking to growing sectors, the growing sectors would be seen opening their doors wide to absorb the flow of workers leaving the shrinking sectors. Vacancies would be high in the growing sectors and low in the shrinking ones. Figure 6 refutes that view for the most recent recession. Some common force was making all sectors cut back their recruiting. Later I will discuss the idea that sticky prices and wages could explain these facts. I find that they could, but that the traditional way of thinking about stickiness is theoretically unsatisfying and is in the process of being replaced by a new line of thought.

## Driving Forces

What exogenous forces cause recessions? Three forces are prominent in the accounts of the various schools of macroeconomic thought: productivity, government purchases, and monetary shocks.

I have shown elsewhere that the appropriate measure of productivity from the perspective of the labor market is the average product of labor, which moves in proportion to the marginal product of labor under constant returns to scale.<sup>2</sup> Figure 7 plots detrended productivity since 1948. It shows that although productivity did decline in earlier recessions, the two modern recessions occurred without any contribution from that source. Given that finding, it is unnecessary to enter the debate over whether the earlier productivity declines were the cause or the effect of the recessions that accompanied them.

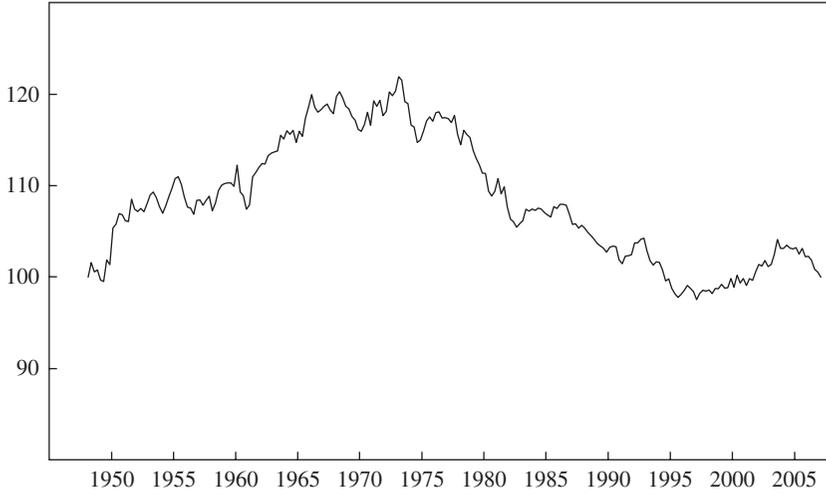
Figure 8 shows detrended government purchases. The 1990–91 recession occurred during a period of unusually rapid decline in these purchases—

1. Abraham and Katz (1986).

2. Hall (2007).

**Figure 7. Detrended Output per Worker, 1948–2007<sup>a</sup>**

Index, 1948 = 2007 = 100

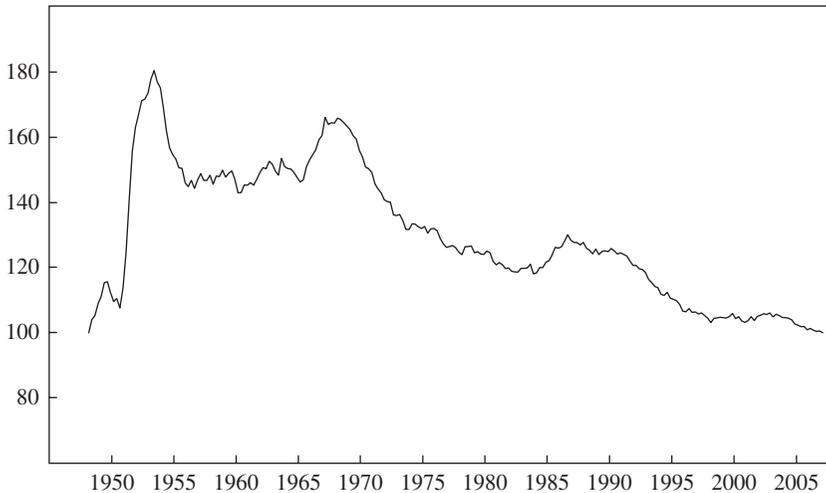


Source: Bureau of Labor Statistics, Major Sector Productivity and Cost data.

a. Series is detrended by dividing by a constant growth factor that equalizes the beginning and ending values at 100.

**Figure 8. Detrended Real Government Purchases, 1948–2007<sup>a</sup>**

Index, 1948 = 2007 = 100

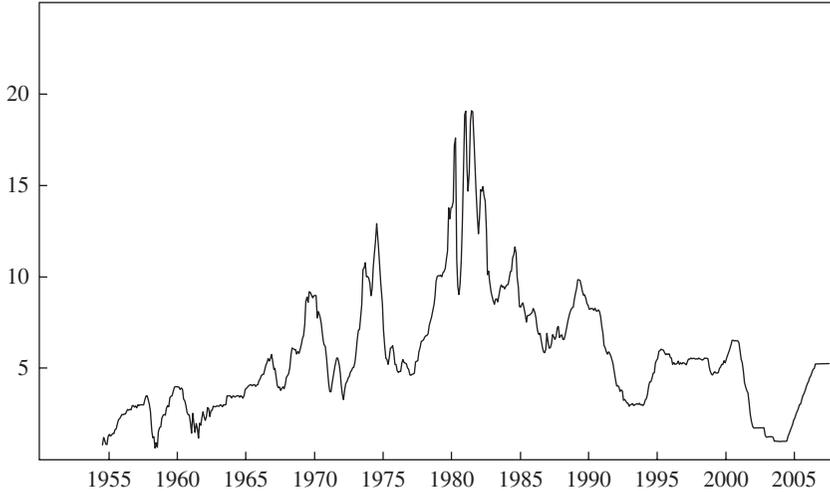


Source: Bureau of Economic Analysis, National Income and Product Accounts, table 1.1.6.

a. Data are quarterly. Series is detrended by dividing by a constant growth factor that equalizes the beginning and ending values at 100.

**Figure 9. Federal Funds Interest Rate, 1954–2007<sup>a</sup>**

Percent a year



Source: Federal Reserve Board.  
a. Data are monthly.

as did the 1970–71 recession. But purchases rose slightly more than normal in 2001. Fluctuations in government purchases do not seem to play much of a role in the story of recessions.

The two modern recessions occurred in the setting of fully modern monetary policymaking. In that setting the central bank responds to outside influences, with the objective of keeping inflation low in the longer run and offsetting booms and recessions in the shorter run—monetary policy is not a source of disturbances to the economy. Figure 9, which plots the interest rate on federal funds since 1954, illustrates the change in monetary policymaking that separated the last of the earlier recessions, in 1981–82, from the two modern recessions. Here the most noticeable change is the huge reduction in the volatility of the funds rate. But timing differences are important as well. Under modern policy the Federal Reserve cuts the rate aggressively as soon as a recession is apparent. Under the old policy the Federal Reserve not only caused the recession by raising the rate to extreme levels, but held it high during the recession. This behavior was most prominent in the 1973–75 and 1981–82 recessions. Although monetary policy can be a causal factor in recessions, and apparently was in the

1980s and before, it is hard to see how monetary policy could have caused either of the modern recessions.

John Cochrane argued similarly long before the second modern recession. He assigned virtually all responsibility for recessions to what one might call “mystery shocks,” after reviewing the standard candidates.<sup>3</sup> Sometimes the mystery shocks have names. For example, many observers blame the 1990–91 recession on the savings and loan crisis, and the 2001 recession on the collapse of technology spending when the technology bubble broke in 2000.

The primary defect with this class of explanations is their failure to explain the Abraham-Katz phenomenon. If housing fell in 1990–91 because of financial constraints stemming from the savings and loan failures, but all other sectors were unaffected, it is hard to see why all the other sectors’ labor markets turned so slack. The focus of the technology sector collapse was even narrower. Why didn’t the winning sectors expand to absorb the workers released by the single losing sector in each of the two modern recessions?

A traditional answer to this question is that the wage-price system fails to send the right signals to consumers, workers, and firms to expand the unaffected sectors. One view is that real wages are sticky and thus remain too high to yield firms in the other sectors high enough profits to expand. Another is that prices are sticky and remain too high to result in full employment because the central bank keeps the interest rate too high for any expansion to occur. Recent models combine both views. The recent paper by Lawrence Christiano, Martin Eichenbaum, and Charles Evans is a leading example of modern research in this vein.<sup>4</sup>

Sticky wages and prices are not a full explanation, however, because they lack a deep rationalization. A sticky wage that keeps employment below a mutually desirable level creates an opportunity for a worker and an employer to make a Pareto improvement for themselves by adjusting employment upward. What happens to the wage is immaterial here—what matters is the increase in employment. The same holds when a sticky price keeps the quantity of goods traded below its efficient level. The traditional sticky-price literature has not come to grips with the obvious tools that employers, workers, sellers, and customers possess to overcome inefficiently low

3. Cochrane (1994).

4. Christiano, Eichenbaum, and Evans (2005).

employment or sales. The literature lacks a coherent theory of disequilibrium. Departures from equilibrium are an assertion, not a derived conclusion from fundamentals. Traditional sticky-wage and sticky-price theory has a strong descriptive claim but not a strong theoretical underpinning.

### **The Modern Economics of Job Creation**

The 1994 paper by Dale Mortensen and Christopher Pissarides is the canon of the modern theory of job creation in a frictional labor market.<sup>5</sup> Pissarides later provided a more complete book-length treatment of the subject, before the recent explosion of new thinking.<sup>6</sup> The Mortensen-Pissarides paper brought unemployment back into formal macroeconomics. The labor market in their model describes unemployment in a way that rings true. People grope around trying to find jobs that fit, and the process takes time and information flows are limited. The model improves on traditional sticky-wage treatments of the labor market by invoking a full equilibrium, devoid of any opportunities for bilateral Pareto improvements by a worker-employer pair.

The Mortensen-Pissarides model also fits the facts about modern fluctuations, in the sense that it focuses mainly on job creation rather than job loss. The incentive for job creation is the margin between the productivity of a new worker and the wage to be paid to that worker, both as present values over the duration of the worker's employment with the firm. Employers expend recruiting resources—running ads, paying posting fees at Monster.com, interviewing applicants, and the like—up to the point that the resources needed to add one worker to the payroll absorb the entire present value of the productivity-wage margin. The model describes an equilibrium in the market for new hires.

The model also describes an equilibrium with respect to the termination of employment. Workers do not lose jobs because their wages are too high. They lose or leave jobs only if their opportunity cost in the market at large exceeds their productivity in their current job. This equilibrium property is probably the most important difference between the modern macroeconomic view of unemployment, as embodied in the Mortensen-Pissarides

5. Mortensen and Pissarides (1994).

6. Pissarides (2000).

model, and traditional thinking. The older view had workers resisting wage cuts that would have saved their jobs. Jobs are automatically saved in the Mortensen-Pissarides model exactly when they are worth saving—job separations are efficient.

In October 1969—the month, it so happens, that I was recruited as a member of the Brookings Panel—the paper by Robert Lucas and Leonard Rapping appeared that launched the equilibrium school of employment fluctuations.<sup>7</sup> Although the proposition that markets achieve equilibrium—in the sense that pairs of actual or potential transactors cannot alter the terms of their transaction to their mutual advantage—is virtually the defining concept of economic science, the Lucas-Rapping story, that movements in employment are along a labor supply curve and that unemployment can be lumped with leisure, was at best at the borderline of plausibility. The enhancement of the story in the real business cycle model and its progeny never persuaded even the more sympathetic of its critics (such as me). The essential problem was that every version of the equilibrium story invoked a far higher elasticity of labor supply than could ever be found in the micro data.

The Mortensen-Pissarides model, in contrast, holds out the tantalizing possibility of an equilibrium theory without excessively elastic labor supply. The question that we have been wrestling with since 2002, when Shimer first circulated his paper that would later appear in the *American Economic Review*,<sup>8</sup> is whether some variant of the model can generate cyclical fluctuations of the magnitude found in the U.S. economy. Shimer showed that the original Mortensen-Pissarides model could not come close. Dozens of subsequent papers have introduced alterations in the model to boost its response to the driving forces so as to generate realistic unemployment volatility.

Mortensen and Pissarides followed John Nash in taking the division of the surplus as a fixed parameter. That assumption turned out to doom their model to failure as far as unemployment volatility is concerned. If one abandons this assumption, their model has the potential to generate lots of volatility. With realistic choices of its parameters, it turns out that a relatively small decline in productivity relative to the wage causes a substantial reduction in recruiting effort, making it much harder for workers

7. Lucas and Rapping (1969).

8. Shimer (2005).

to find jobs. The constant flow of workers into the pool of unemployed—unchanging over the cycle—requires a much larger stock of unemployed to generate an equal flow from unemployment to work. The reluctance of employers to hire any given job seeker is offset by the greater number of job seekers.

Not surprisingly, a lot of the new research has focused on wage determination. In a sense, the wage is indeterminate within a specified range in the Mortensen-Pissarides model. The indeterminacy arises in any model where potential transactors meet each other at random, in pairs, rather than gathering in a central market where they can participate in an auction. An employer and a worker, having met at random, face the situation described by an Edgeworth box. If a bargain is available that benefits both sides, there is a contract curve showing the possible levels of compensation that split the joint surplus. But no fundamental theory exists to show how the parties make their bargain along the contract curve.

John Nash tackled this problem in his second-most-famous paper.<sup>9</sup> Under plausible but not compelling assumptions, the parties pick a division of the surplus controlled by a parameter reflecting their relative bargaining powers. Researchers in the Mortensen-Pissarides line tend, with one interesting exception that I will take up momentarily, to think of bargaining power as roughly equally divided between worker and employer.

The choice of the Nash bargain prevents the original Mortensen-Pissarides model from harnessing this source of unemployment volatility. It makes the wage so flexible that there is essentially no movement in the key productivity-wage margin. If productivity falls, so does the wage, the margin remains the same, and employers recruit with their usual enthusiasm.

Marcus Hagedorn and Iourii Manovskii spotted a way to overcome the low unemployment volatility implied by the Mortensen-Pissarides model with a Nash wage bargain.<sup>10</sup> They assigned low bargaining power to the worker and at the same time assigned a low desire to work—in other words, a high opportunity cost of participating in the labor market. The wage is essentially a weighted average of the opportunity cost and productivity, with the weight on the latter equal to the worker's bargaining power, measured as the worker's share of the total surplus from the employment relationship.

9. Nash (1953).

10. Hagedorn and Manovskii (forthcoming).

Thus, Hagedorn and Manovskii's two assumptions imply that the wage is controlled more by the opportunity cost and less by productivity. So if productivity falls, the wage does not fall by as much, the incentive to recruit falls, the labor market softens, and unemployment rises. Hagedorn and Manovskii's model can match the observed volatility of unemployment—it delivers a true equilibrium account of cyclical fluctuations. But attributing a high opportunity cost to participation in the labor market is just another way of saying that labor supply is quite elastic. The elasticity of labor supply implicit in their model is two or three times higher than is found in micro studies.

I have been involved in elaborating a couple of alternative solutions that avoid excessive labor supply elasticity. My 2005 paper drops the Nash wage bargain, replacing it with a wage rule that stabilizes the wage within the bargaining set, that is, along the part of the contract curve in the Edgeworth box that is within the lens formed by the indifference curves that pass through the points the parties could achieve if they did not make a bargain.<sup>11</sup> If the normal wage is in the middle of the bargaining set, corresponding to equal sharing of the employment surplus, the model avoids the Hagedorn-Manovskii implication of a high labor supply elasticity. The cost is that the wage rule is ad hoc. Although the rule satisfies the basic property of equilibrium—the solution lies on the contract curve, inside the Edgeworth lens—the model provides no guidance about where wage stabilization comes from.

My recent paper with Paul Milgrom offers a less arbitrary theory of equilibrium sticky wages.<sup>12</sup> We again drop the Nash bargain, this time in favor of alternating-offer bargaining. We see this as a move toward realism in how bargaining actually occurs: whereas the Nash bargain just appears as if by magic, in alternating-offer bargaining one party—we believe usually the employer—makes an offer and the worker accepts or makes a counter-offer. The resulting wage bargain is much less sensitive to the worker's opportunity cost. Although the bargain is still fairly flexible, it is sufficiently stickier than the Nash bargain to make the model capable of matching the observed increase in unemployment in a recession.

Taming the excess flexibility of the wage bargain in the original Mortensen-Pissarides model strikes me as the most promising way to

11. Hall (2005).

12. Hall and Milgrom (forthcoming).

generate realistic unemployment volatility. However, some researchers are exploring modifications of the model in other directions, especially adding on-the-job search to the story. The project of enhancing the Mortensen-Pissarides model to account for realistic movements in unemployment faces a huge unmet challenge, however. We have no idea how to generate a modern recession from the model. Almost all the recent work has taken productivity fluctuations as the most promising driving force. If the wage is sticky but productivity rises and falls, the key margin will fluctuate properly, and the Mortensen-Pissarides setup gives a totally convincing account of the results in the labor market and the economy as a whole. But productivity has not fallen in the two modern recessions. The recession of 2001 in fact occurred during a burst of productivity growth so rapid that essentially no decline in output occurred even as employment fell dramatically. So the next step in this promising line of work is to figure out how the subtle changes that occurred in the economy in 1990–91 and 2001 translated into diminished incentives all across the economy to create jobs.

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## *General Discussion*

Benjamin Friedman wondered how economists should judge the role of monetary policy in causing recessions. When monetary policy responds to a shock to the economy, that response may trigger another problem to which monetary policy must then respond. Inflation may ultimately end up outside the central bank's comfort zone, and monetary policy tightens in response. Was the resulting recession then "caused" by monetary policy, or by the original shock, or by one of the intermediate steps in the chain of events? Friedman gave the example of the recession of the early 1980s: Paul Volcker did not deliberately set out to create a recession but was responding to various events, many of them (like the 1979 increase in oil prices) originating outside the United States, and this chain of events and responses ended in recession. Thus, monetary policy is an important but somewhat ambiguous part of the cyclical story.

William Brainard discussed the complexity of the relationships between firms and employees. He argued that the models of employer-employee wage bargaining in the paper, which assume a single employer and a representative employee engaging in bargaining, ignore the differences between the marginal and the average worker in a firm. This simplification is less of a problem if all workers are represented by a completely centralized union, but this is usually not the case. Brainard suggested that the model's assumption was artificial and ignored the constraints imposed by within-firm labor markets.

William Nordhaus said that he would have liked rigid wages and prices to be addressed more in the paper, particularly to explain the moderate decline in the layoff rate since 2005. Another possible explanation for this decline may be the "Europeanization" of some American institutions: it is becoming increasingly difficult to lay off workers. Nordhaus also won-

dered why employment has not become less volatile given the striking decline in output volatility. Arithmetically, these phenomena are reconciled by a decline in the cyclical productivity, but that decline suggests a reduction in labor market rigidities that appears inconsistent with the declining layoff rate in recent years.

Lawrence Summers noted that the recessions preceding World War II were “modern recessions” by Robert Hall’s definition, because they were not caused by inflation prompting the Federal Reserve to tighten monetary policy. “Modern” recessions seem to be caused by a more widespread and unquantifiable loss of confidence, which Robert Shiller has written about elsewhere. Summers suggested that modern and traditional recessions may have different implications for productivity, which might be a useful way of categorizing them.