Chapter 17

CYCLICAL FLUCTUATIONS IN THE LABOR MARKET

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1. Introduction and scope

Every few years the U.S. economy, and similar economies around the world, enters recessions. Though the macroeconomic event triggering the recession will differ from one episode to the next, the responses of the labor market are generally quite similar. As total output declines, a characteristic set of changes occurs. During the expansion, these changes are reversed, though the cycle in the labor market often lags behind the cycle in output and some other indicators.

In this chapter we examine facts and theories related to cyclic fluctuations in the labor market. In the process, we review and summarize, selectively, a good deal of research by macroeconomists and labor economists.

We organize our examination of the facts about cyclical fluctuations by starting with annual variations in total hours of work. In an economy unperturbed by sudden new developments, or one where a smoothly functioning price system could absorb all shocks, annual hours would grow smoothly along with the population. But in the U.S. economy, hours fluctuate around their growth path; they tend to track the business cycle. People work harder in booms than in slumps. We decompose fluctuations of annual hours into a number of components. When total hours of work are higher, people tend to spend fewer hours looking for work and fewer hours in non-work activities. The two together account for the bulk of cyclical changes. But there are important changes in the hours of workers within the framework of their continuing jobs. Weekly hours fall during a recession. A larger fraction of workers are cut involuntarily to part-time schedules as well.

We look behind these fluctuations in hours of work with a view to appraising the quantitative importance of phenomena identified in recent research. One

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important issue is the distribution of employment adjustments. When annual hours fall by 3 percent, is it because an added 3 percent of workers do not work at all that year, or because everybody works a week or two less during the year? The answer is that extended periods of unemployment and non-work for individuals are an important part of the process. It is true that employment adjustments are distributed widely across the labor force, but most of them generate relatively little unemployment. The quantitatively important source of unemployment is long spells.

We also take a special look at the difference between unemployment and joblessness. Some of the unemployed have not lost their jobs; they are temporarily laid off and expect to return to their jobs in a few weeks. It is true that a reasonably large fraction of workers who are laid off return, eventually, to their original jobs. However, the contribution of temporary layoffs to total unemployment is quite small. The biggest jump in unemployment in a recession comes from workers who have unambiguously lost their jobs and are seeking new ones.

The bulk of the chapter looks at theories that try to explain cyclical fluctuations in the labor market. Generally, the theories do not tackle the explanation of the finer grain of the process – most treat annual hours as the variable of interest.

At the outset, we introduce a distinction between the two major ingredients of a successful theory of cyclical fluctuations: an *economic mechanism* and a *driving force*. The three mechanisms that have been prominent in recent thinking are, first, the Keynesian hypothesis of unilateral employment determination by the firm; second, the intertemporal substitution mechanism; and, third, the job search mechanism. The driving forces we consider are real shocks and misperceptions about the state of the economy.

Thinking about cyclical fluctuations in the labor market has been as strongly influenced as almost any area of macroeconomics by the hypothesis of rational expectations. However, the hypothesis is not divisive. On the contrary, as the implications of rational expectations have been clarified over the past decade, the surviving theories of fluctuations have embodied the hypothesis. One of the most important consequences has been a diminution of the role of misperceptions as a driving force and an upsurge of interest in real driving forces.

Important models of labor market fluctuations have emerged that combine one or another mechanism and the moving force of misperceptions. The oldest of these, the Phillips curve, rests on the premise that wages are predetermined and employers determine employment unilaterally by equating the marginal revenue product of labor to the wage. Misperceptions in setting the wage in advance create departures of employment from equilibrium. Though the Phillips curve view has not answered some important criticisms from other schools, it remains the dominant mode of thinking among practical macroeconomists. The upsurge of interest in labor market contracts has helped support some of the ideas about the Phillips curve, most notably the hypothesis that employers set employment unilaterally.

The search model explains fluctuations in unemployment in terms of misperceptions by the unemployed or by employers about the prevailing level of the wage in the market. Because the most important dimension of fluctuations seems to be between work and non-market activities, rather than between work and intensive job search, the search model never achieved much importance in practical thinking. More generally, research on job search has developed into a major field of its own, but has not focused on explaining aggregate fluctuations.

Intertemporal substitution models hypothesize that employment fluctuates according to a mechanism in which temporarily high real interest rates or temporarily high real wages are mistakenly perceived by workers. Again, this type of model has not achieved much practical importance. There seems to be little basis for well-informed workers to make the mistake of thinking that real wages are temporarily high, because the stochastic process of real wages has only a small transitory component. Though perceived real interest rates probably fluctuate quite a bit, empirical work based on their influence on labor supply has reached negative conclusions.

Real shocks have been married to intertemporal substitution and job search to yield cyclical models as well. As we mentioned earlier, professional interest has shifted in this direction as the rational expectations hypothesis has circumscribed the theoretical role of perception errors. Shifts in productivity or in product demand have been proposed as real driving forces in connection with the intertemporal substitution mechanism. As with the intertemporal substitution model with perception errors, the empirical evidence has not so far been favorable.

Real shocks have been combined with ideas about job search in recent work. If the nature of the shock is a change in the composition of product demand, the response in the job market may involve shifting workers from one sector to another, which involves temporarily lower levels of employment and higher unemployment. Empirical research suggests that this consideration may have been important in the fluctuations of the 1970s, though it cannot explain all of the labor market movements of the postwar era.

2. The nature of employment fluctuations

2.1. Fluctuations in total annual hours of work

A basic question about cyclical fluctuations in the labor market is the following: How large are fluctuations in total hours of work and how are they distributed between changes on the job and movements into and out of the labor market?

Over the postwar period, several long-term trends, including increasing labor force participation of women, decreasing participation of men, earlier retirement,

Table 17.1
Means and standard deviations of detrended measures of hours of work, 1956–1983.

Detrended series	Mean	S.D.
Annual hours per capita (16 +)	1168.2	33.2
Annual hours (all workers)	2053.6	14.8
Annual hours (full-time workers and workers on part-time schedules for noneconomic reasons)	2066.1	11.9
Unemployment rate (percent of labor force)	6.1	1.5
Per capita hours lost to unemployment time	75.5	18.2
Labor force participation rate	60.6	0.4
Percent of labor force on part-time schedules for economic reasons	3.2	0.7
Per capita hours lost to part-time schedules for economic reasons	7.1	3.6

Source: See Table 17.2.

and the changing age composition of the population, were occurring at the same time as the shorter-term fluctuations in labor market aggregates that we are interested in. For that reason we have detrended the aggregates to isolate short-run fluctuations. We regressed all variables on two trend variables and the unemployment rate of males aged 25–54. The first trend variable is a simple time trend running over the entire period from 1956 through 1983. The second is set at zero before 1968 and follows a simple time trend from 1968 to 1983. The detrended series were then calculated by subtracting the estimated trend from the actual series after normalizing the two trend variables to zero in 1972. Thus, the resulting hours series can be interpreted as reflecting fluctuations in normalized 1972 hours.

Tables 17.1 and 17.2 examine variations in hours of work per capita over the business cycle. Because we are concerned about cyclical shifts in the size of the labor force, we define per capita relative to the potential working population (those 16 and older) rather just those who are classified as being in the labor force. A significant fraction of hours variation stems from changes in the size of the labor force. Our calculations also sidestep the question as to how successful the BLS measure of labor force participation is in distinguishing between unemployment and non-participation [see Clark and Summers (1979)]. These tables give no indication of the distribution of hours fluctuations among individuals.

A line in Table 17.2 should be read in the following way. Take the total deviation in annual hours from trend; say, 24.6 hours in 1956. Of this, 15.7 hours

Table 17.2
Dimensions of variation in hours per capita.

Year	Detrended annual hours per capita		Deviation in annual hours per capita attributable to deviations of:					
			Employment			Hours/employed worker		
	Total	Deviation from average	Total employment	Unemployment	Labor force participation	Total hours	Full time	Involuntary part time
1956	1192.8	24.6	15.7	11.1	4.8	8.8	4.9	3.8
1957	1176.0	7.7	9.5	10.0	−0.1	−1.8	−3.5	1.6
1958	1135.8	−32.4	−20.8	−20.7	−0.3	−11.4	−9.6	−1.5
1959	1160.0	−8.2	−5.0	−2.2	−2.7	−3.1	−1.9	−1.1
1960	1165.1	−3.1	−0.2	−2.3	2.1	−2.6	0.1	−2.6
1961	1150.1	−18.1	−13.0	−15.6	2.2	−4.6	−0.2	−4.1
1962	1163.3	−4.9	−6.9	−0.5	−6.5	2.3	5.5	−3.1
1963	1166.0	−2.2	−6.8	−0.4	−6.6	5.0	3.3	1.6
1964	1174.6	6.4	2.9	6.8	−3.8	3.7	1.5	2.1
1965	1199.9	31.7	16.4	16.0	0.6	15.3	12.4	2.7
1966	1217.6	49.4	34.8	26.0	8.9	14.3	11.3	2.7
1967	1227.8	59.6	45.2	26.4	18.6	14.0	10.3	3.5
1968	1223.9	55.7	42.9	30.3	12.4	12.6	9.0	3.3
1969	1221.3	53.1	45.5	31.5	13.7	7.7	4.1	3.3
1970	1190.5	22.3	25.9	13.2	12.2	−2.8	−6.3	3.4
1971	1164.1	−4.1	2.2	1.4	0.2	−5.5	−8.7	3.1
1972	1168.6	0.4	2.9	6.1	−3.7	−1.8	−5.0	3.1
1973	1181.2	13.0	13.0	15.7	−3.3	1.0	−1.3	2.2
1974	1166.9	−1.3	5.2	6.3	−1.7	−5.6	−6.8	1.1
1975	1116.7	−51.5	−38.5	−28.8	−9.8	−13.5	−12.7	−0.6
1976	1130.1	−38.1	−29.7	−18.8	−11.0	−8.5	−8.3	−0.1
1977	1147.9	−20.3	−15.8	−10.3	−5.7	−4.2	−4.7	0.5
1978	1180.0	11.8	6.9	2.3	4.1	5.7	4.5	1.2
1979	1186.1	17.9	12.6	5.3	6.6	6.2	5.5	0.7
1980	1153.7	−14.5	−10.0	−10.8	1.0	−4.6	−2.3	−2.2
1981	1141.7	−26.5	−21.3	−16.0	−4.7	−5.8	−0.5	−5.1
1982	1100.9	−67.3	−54.2	−42.0	−10.1	−16.3	−6.3	−9.6
1983	1107.2	−61.0	−59.4	−40.0	−17.3	−4.5	5.7	−9.7

Source: Raw data are from U.S. Bureau of Labor Statistics, *Employment and Earnings*. All series are detrended by the authors.
Notes: Components do not sum to total due to interaction terms. The column labeled "Full time" includes workers on full-time and part-time schedules for noneconomic reasons.

occurs in connection with fewer people being at work – there were 11.1 extra hours per year per person of unemployment and 4.8 extra hours spent out of the labor market. The rest of the reduction, 8.8 hours, is reduced time during weeks of work. Of the 8.8, 4.9 takes the form of lower hours for people still considered full time (that is, reduced overtime and the like) and 3.8 is lower hours for people involuntarily on part time.

Between 1956 and 1983, hours of work per capita (normalized as described at the 1972 age composition and trend participation rates) averaged 1168 hours per

year. In a typical week 60.5 percent of the population was in the labor force, of which 93.9 percent were employed. The employed worked an average of 39.5 hours. Of these 3.2 percent were constrained to part-time schedules for economic reasons; the average hours of full-time and voluntary part-time workers were 39.7 hours.

Annual fluctuations in hours of work are not terribly big. The standard deviation in annual hours is only 2.9 percent of the normal level of hours. Even in 1975 and 1982–83, the two lowest points for detrended employment since the Great Depression, annual per capita hours were down by only 50.6 hours and 69.1 hours, respectively, or by about 4.3 percent and 5.9 percent of normal labor market hours. Between 1966 and 1969 per capita hours averaged 55.3 hours or 4.7 percent above normal hours.

In a study of the data for any given month, it is apparent that hours fluctuations associated with the business cycle are not spread relatively evenly among the working population through the use of work sharing and shorter work weeks for most workers but instead are concentrated as unemployment for a few workers. Because private compensation for workers on layoff is relatively rare in the United States, reductions in hours of work through unemployment introduce considerable variation in weekly and monthly earnings. Whether annual earnings are more variable than they would be with complete work sharing depends on the distribution of unemployment within the labor force. If unemployment is distributed evenly among all workers, then it amounts to no more than a slightly different pattern of work sharing. We will return to this issue in the next section. In the typical recession no more than a fourth of aggregate hour reductions stem from changes in weekly hours on full-time jobs. In 1975, employed full-time workers and workers on voluntary part-time schedules worked 26 minutes a week less than their normal (trend) hours including normal overtime. This amounts to a 1.1 percent deviation from trend and approximately a fourth of the total deviation in per capita hours from trend.

The biggest component of the variation in hours is fluctuations in the level of employment. In 1975, for example, per capita hours were 4.3 percent below trend. The detrended employment rate (the ratio of employed persons to the adult aged population) was 54.9 percent compared to the trend of 56.8 percent. That is to say, employment per capita was roughly 1.8 percentage points or 3.2 percent below trend; this accounted for roughly 74 percent of the total decline in per capita hours. Similar patterns occurred in other years. Fluctuations of the employment rate account for between 75 and 80 percent of the below trend hours in 1982–83 and the above trend hours in 1967–69.

There are several reasons why the bulk of hours reductions take the form of periodic nonemployment rather than shorter full time schedules.

(1) Imperfect experience rating of unemployment insurance subsidizes hour reductions that take the form of unemployment [see Feldstein (1976)].

(2) Fixed costs of work in the form of commuting and setup costs make it more economical for workers to stay home rather than working short hours.

(3) Production technologies may make it infeasible or expensive to shorten the work week. High startup and shutdown costs in manufacturing industries encourage less frequent plant shut downs lasting several weeks rather than the frequent ones associated with shorter shifts. Feldstein and others have modeled this by allowing number of employees and hours per employee to enter the production function separately.

(4) Shifts of demand between sectors of the economy necessitate labor reallocation. Employees must depart firms with contracting demand and be hired by firms with expanding demand. Efficiency calls for separations rather than hour reductions in these situations. Informational problems may yield separation rates in excess of what is efficient [Hall and Lazear (1984)]. Lilien (1982a, 1982b) argues that part of what we label cyclical fluctuations is in fact slow adjustment to intersectoral shifts of demand.

So far, we have stressed the cyclical fluctuations in hours of work per capita. Although data on work hours are not entirely free of problems, there is no important conceptual ambiguity about defining and measuring hours. Table 17.2 also makes the distinction between unemployment and not in the labor force, with respect to hours not spent at work. That distinction is a notoriously difficult and ambiguous one, although it is obviously important. In the U.S. data, the distinction is made almost purely on the basis of job-seeking activity. Of those people not working during the survey week, those who have taken any specific step to look for work within four weeks of the survey count as unemployed. Those who have not looked in the past four weeks are out of the labor force.

Table 17.2 shows that hours fluctuations associated with changes in labor force participation were unimportant in the contractions of 1957–58 and 1961, but became a significant part of the story of labor market fluctuations starting with the expansion of the 1960s. In 1967, when total hours of work per capita were almost 60 hours per year above trend, about 19 of those hours were associated with a bulge in the fraction of the population who were in the labor force. Similarly, the strong contractions of 1975 and 1982 saw important declines in labor force participation.

Table 17.2 does not try to describe the process of temporary layoffs, which some authors have stressed as a mechanism for cyclical fluctuations in hours of work. Part of the reduction in employment that occurs in a recession is not a consequence of job loss. When demand slackens, workers in manufacturing are sometimes put on temporary layoff. They retain their jobs and can usually expect to return to work in a few weeks or months. In the automobile industry, reduced hours per year are frequently brought about by cycling a large fraction of workers through periodic one-week layoffs. We will have more to say about this process later in this section.

2.2. *Concentration of unemployment*

The fact that the majority of hours fluctuations stem from fluctuations of employment, not hours per week, in itself tells us little about how evenly hours reductions are distributed among workers or whether they bear most severely on a particular group of workers.

Until recent decades, the economist's image of unemployment was largely an outgrowth of the Great Depression. The view was of a relatively stagnant stock of job-seekers. Unemployment was viewed as an extreme hardship for the few who would not find jobs until the economy recovered from recession. In the 1960s and 1970s the view of unemployment changed radically. Better unemployment data, including spell duration data and labor turnover data, along with relatively low unemployment rates, changed the perception of unemployment to that of a short-term state occupied by workers at various times during their working careers. As a general matter, thinking about unemployment began to focus on the role of turnover.

Labor turnover data indicate that flows into unemployment are quite high. In manufacturing industries almost 4.5 percent of workers depart their jobs each month. Similarly, duration data show that most unemployment spells are quite short. BLS data on the duration of incomplete unemployment spells indicate a mean spell duration of 12.5 weeks on the average from 1956 to 1983. Kaitz (1970) and others have shown that these BLS duration figures grossly overstate the duration of completed unemployment spells because the CPS samples workers rather than spells.

The new view of the labor market was one where workers frequently left jobs, either voluntarily or involuntarily, suffered short duration spells of unemployment and quickly became reemployed. To the extent that most workers were viewed as suffering some but not much unemployment, the burden of aggregate fluctuations was spread among a large base, not concentrated on a few individuals.

More recently, a new middle ground between these two extreme characterizations is being argued. While it is recognized that (a) most unemployment spells are very short and (b) most jobs do not last long, it also recognizes two other important facts.

(1) Most unemployment time is spent in spells of long durations or sequences of repeated spells of unemployment. A small fraction of individuals suffer the majority of unemployment time.

(2) Most workers are in jobs that will last for quite a number of years.

The pioneering work that showed that the stochastic process governing the labor market had all of these characteristics was Clark and Summers (1979). Their most important point was that a minority of workers have low job-finding

rates when they are looking, even though most job-seekers have about a 50 percent chance of departing unemployment each month. The unsuccessful minority contribute the bulk of unemployment. In 1974, only 2.4 percent of the labor force had more than 6 months of unemployment, but that group accounted for over 40 percent of all unemployment. By contrast, in a simple Markoff model that generated the same unemployment rate, that group would account for only 8 percent of total unemployment. In the Markoff model, all job-seekers would face the same monthly probability of success. It is the unequal distribution of job-finding probabilities that makes unemployment so concentrated.

Clark and Summers also examine the concentration of unemployment and non-work over longer time spans. They show that over a four-year period, 40 percent of all unemployment is experienced by people who are out of work for a full year or more. Again, if everybody had the same probabilities of finding work when looking and losing work when working, the concentration of unemployment and non-work would be vastly lower.

Closely related to their central conclusion is Clark and Summers' finding that successful job search is a relatively unimportant contributor to unemployment. In 1974, only 28 percent of unemployment was associated with spells of 2 months or less ending in re-employment. Almost half of all unemployment – 47 percent – came from spells ending in withdrawal from the labor force rather than success in finding work.

We can summarize the current state of thinking about turnover in the following way. The unemployed are neither a stagnant mass of people who will not work until the economy improves nor are they exclusively a group of job-seekers on the verge of finding new work. Disproportionately, they are people who have trouble finding and holding jobs. They cycle from brief jobs to extended periods of job search and equally extended periods out of the labor force. Mixed in are people who are making normal job changes and have high probabilities each month of finding new work. In terms of flows through unemployment, the latter group is dominant. But in terms of the stock of the unemployed at any one time, those with poor experience are dominant.

2.3. Layoffs and rehires

Feldstein (1972) called attention to the importance of layoffs and rehires in the response to fluctuations in demand. The process has two aspects. First, in contractions, layoffs rise relative to rehires, so that the number of workers on layoff rises. The reverse happens in expansions. Second, and less intuitive, is that a continual process of recurrent layoffs is one of the ways that work sharing operates during a period of sustained slack. In the auto industry, as we men-

Table 17.3
Unemployment by reason.

Year	Total unemployment	Involuntary	On layoff	Lost job	Quit or entered
1967	3.8	1.6			2.2
1968	3.6	1.4			2.2
1969	3.5	1.2			2.3
1970	4.9	2.2			2.7
1971	5.9	2.8			2.9
1972	5.6	2.4			3.2
1973	4.9	1.9			3.0
1974	5.6	2.4			3.2
1975	8.5	4.7			3.8
1976	7.7	3.8	1.1	2.7	3.9
1977	7.1	3.2	1.0	2.2	3.9
1978	6.1	2.5	0.7	1.8	3.4
1979	5.8	2.5	1.2	1.3	3.4
1980	7.1	3.7	1.4	2.3	3.4
1981	7.6	3.9	1.3	2.6	3.7
1982	9.7	5.7	2.1	3.6	4.0

tioned earlier, one-week layoffs occurring every few weeks or months are a common adaptation to low demand. Because of the second influence, both layoffs and rehires continue at high rates after the economy has reached its trough.

Table 17.3 presents data from the U.S. household survey on reasons for unemployment. Until 1976, the survey did not distinguish between layoffs and other reasons for involuntary departure from work. The column labeled "involuntary" includes workers who had unambiguously lost their jobs, together with those on layoff, who retain some claim on their jobs. Most, but not all, workers on layoff are rehired eventually. Note that the bulk of cyclical fluctuations occur in the involuntary category. For example, between 1974 and 1975 total unemployment rose by 2.9 percentage points. Of this, 2.3 points were in the involuntary category and only 0.6 in the category of unemployment due to earlier quit, entry, or re-entry to the labor force. The involuntary category remains high well into the expansion (in 1976 and 1977, for example), thanks to the relation between the level of unemployment and the amount of layoff–rehire turnover.

The data in Table 17.3 make it clear that layoffs are not the major contributor to unemployment, even in a deep recession. In 1982, when total unemployment rose 2.1 percentage points, the layoff contribution rose by only 0.8 points. And even this included a fraction who in fact had lost their jobs permanently.

Clark and Summers (1979) examined the role of temporary layoffs in total unemployment. From unpublished data from the household survey, they found that temporary layoffs (those where the individual expected to return to work within 30 days) accounted for only 13 percent of the unemployment of males

Table 17.4
Layoffs and rehires.

Year	Layoff rate	% ending in rehire[a]	Unemployment ending in rehire[a]	Manufacturing total	Unemployment job losers
1965	1.4	0.70	1.7	4.0	N/A
1966	1.2	0.68	1.3	3.2	N/A
1967	1.4	0.65	1.4	3.6	2.1
1968	1.2	0.68	1.3	3.3	1.9
1969	1.2	0.63	1.1	4.4	1.8
1970	1.8	0.60	1.6	5.6	3.7
1971	1.6	0.70	1.8	6.8	4.7
1972	1.1	0.75	1.5	5.6	3.5
1973	0.9	0.71	1.1	4.3	2.4
1974	1.5	0.64	1.6	5.7	3.6
1975	2.1	0.78	3.3	10.9	8.4
1976	1.3	0.74	1.8	7.8	5.4

[a]Estimated by Lilien (1979) from labor turnover data and are not strictly comparable to CPS unemployment data

aged 25–39. Even that number is probably an overstatement for the labor force as a whole. Adult men are more likely to be employed in the manufacturing industries where temporary layoffs are most important. Furthermore, not all of those expecting to return actually returned.

Table 17.4 summarizes results from Lilien's (1979) study of the layoff–rehire process. It shows that about three-quarters of layoffs end in rehire. Moreover, the percentage of layoffs that end in rehire increases in recessions – in the slack market of 1975, 78 percent of layoffs resulted in rehire rather than job change. But layoffs ending in rehire contribute only a small fraction of total unemployment, either in terms of averages or marginal changes occurring in recessions.

3. Theories of employment and unemployment fluctuations

A theory of cyclical movements of employment and unemployment combines an *economic mechanism* with a *driving force*. The economic mechanism may be as simple as standard supply and demand, or it may involve more elaborate considerations. There are three mechanisms that stand out in the literature on employment fluctuations.

(1) *Employment is chosen unilaterally by the firm, given a predetermined wage.* This is a central concept of Keynesian thinking: recently work on labor contracts has provided a sound economic rationale for what earlier seemed to be an arbitrary but realistic assumption.

(2) *Intertemporal substitution.* Workers are fairly flexible about the timing of their work from one year to the next. When they perceive that the rewards to

greater effort are strong, they will work more. Employment is higher and unemployment is less.

(3) *Search*. Unemployment is more than simple joblessness. The unemployed are making use of their time searching for the best available jobs. They balance the cost of forgone wages against the benefits of better job matches. Fluctuations in unemployment occur as changes take place in the perceived benefits of search.

The two driving forces that have figured in thinking about fluctuations are as follows.

(1) *Real shocks* – shifts in the real level and composition of demand. Examples are changes in government purchases, in investment demand, and in productivity.

(2) *Misperceptions* about the state of the economy. The wage in an employment arrangement with a predetermined wage may be set too high and bring excess unemployment. Workers may underestimate the current reward to work and so choose to work too little. Or, they may overestimate wages and adopt a search strategy that leaves them unemployed too long.

3.1. Economic mechanisms

Before describing the economic mechanisms that have prominent roles in the literature on employment fluctuations, it will be useful to indicate why the simplest model of supply and demand does not seem attractive as a mechanism capable of explaining the observed movements of employment. In the simple competitive labor market model, wages and employment are determined at the intersection of labor demand and labor supply curves. At the equilibrium level of employment, the marginal value of labor services in production is just equal to the value workers place on alternative uses of their time. Competitive markets yield an equilibrium that is efficient. Equilibrium in the competitive model can be perturbed by shifts in the demand for products and in labor productivity, and by changes in the value of workers' time. The resulting perturbations to employment are efficient.

The problem with the simple competitive model is that it interprets the observed employment-wage combinations as points on a simple, static labor supply curve. A glance at the data for the United States and many other economies shows large movements of employment occurring at the same time that the real wage remains unchanged. There are two possible explanations within the simple model. First, the labor supply schedule may be highly wage elastic. But a large literature on labor supply contradicts that view. Static labor supply is only slightly wage elastic, and then only for workers with major non-work alternatives. The second potential explanation is that shifts of the labor supply schedule may be a principal driving force in the economy, so that the

observed wage–employment combinations are on an elastic labor demand schedule. In the second view, the typical recession occurs because people have decided not to work as hard as usual. That view has no important support in the literature, to our knowledge.

Because the simple supply and demand model cannot plausibly generate the observed pattern of co-movement of wages and employment, students have reached for more exotic economic mechanisms. In the rest of this section, we will comment on the mechanisms briefly. We will not lay out complete models until we have discussed the driving forces in the next section.

3.1.1. Predetermined wages and unilateral employment determination

In the simple Keynesian model the assumption of wage determination in markets is replaced with the assumption of a predetermined wage. Given the wage, firms choose the level of employment unilaterally. Excess supplies and demands may exist. In the case of excess supply of labor, the value of workers' time in production exceeds the value workers place on their own time. Workers are constrained in that at the market wage rate they wish to sell more of their services than they are able to.

The predetermined wage–unilateral employment mechanism is plainly capable of explaining the facts of employment fluctuations. It is not embarrassed by the observed pattern of employment and wages. The notion that employment decisions are made by management alone rings true in an economy where the great bulk of increases in unemployment occur because of job losses that generally appear to be regretted by the workers involved. Its continuing popularity among practical macroeconomists is understandable.

Recent thinking about employment contracts has helped clarify the circumstances when the predetermined wage–unilateral employment mechanism works well. The issue was first investigated in Calvo and Phelps (1977); they looked at what they called an "employment-contingent" contract. Later work by Hall and Lilien (1979) established the following result. Suppose that the firm faces stochastic demand, but the variable perturbing demand is not public knowledge and cannot serve as the basis of a contract contingency. Suppose further that the opportunity cost of workers' time is predictable and that workers and the firm are risk neutral. Then it is optimal to predetermine the wage to equal the opportunity cost and to let management choose the level of employment through unilateral profit maximization. The predetermined wage–unilateral employment contract is optimal because it brings a level of employment that equates the marginal revenue product of labor to the opportunity cost of labor's time.

More generally, the literature on labor contracts [see, for example, Azariadis (1982) and Grossman and Hart (1981) as well as the two papers just cited] argues that totally efficient employment contracts are impossible. Even in the case just mentioned, if firms are risk averse, fully efficient employment-contingent contracts are not feasible and "next best" incentive-compatible contracts will yield overemployment in periods of high demand and underemployment in low demand. Hall and Lilien show that even when firms and workers are risk neutral, totally efficient incentive-compatible contracts are not feasible when both the marginal revenue product of labor and the opportunity cost of labor time are subject to independent shocks that are not public knowledge. On the grounds that demand fluctuations are more frequent and volatile than fluctuations in the value of workers' time, they argue that approximately efficient employment contingent contracts specifying nominal wage schedules may be written that yield efficient adjustments to demand shocks. However, unforeseen fluctuations in the value of workers' time that are not accounted for by cost of living indexing will yield inefficiencies in employment determination and under- or overemployment. Thus, there will be a need for periodic contract renegotiation to correct for these fluctuations that are not handled by the approximately efficient contract.

To summarize, the large literature on incentive-compatible contracts provides a justification for employment relationships where the wage is predetermined, possibly by an indexing formula. Because of bilateral information asymmetries, employment relations governed in this way may yield less than totally efficient outcomes.

3.1.2. Intertemporal substitution

Lucas and Rapping (1969) first developed the intertemporal substitution model. Its prominence is not so much the result of empirical verification, but because of the important role it plays in equilibrium business cycle models [see, for example, Lucas (1975)]. The basic idea of the intertemporal substitution hypothesis is that current leisure and future leisure are close substitutes. Its proponents argue that while lifetime labor supply may be relatively wage inelastic, short-run labor supply will be highly elastic because workers are close to being indifferent to the timing of leisure. Consequently, workers will allocate lifetime hours so that they work more hours in periods where the return to their labor is higher and fewer hours when the return is lower.

Maximization of a simple two-period utility function,

$$U = U(c, c^*, h, h^*), \tag{1}$$

subject to the intertemporal budget constraint,

$$c + \frac{1}{1+r}c^* = wh + \frac{1}{1+r}w^*h^* + A, \tag{2}$$

yields the labor supply function:

$$h = F(w, w^*, r, A), \tag{3}$$

with

c, c^* = current and future consumption,
h, h^* = current and future work,
w, w^* = current and future real wages,
r = real interest rate,
A = assets.

The assumption of a high degree of substitutability between current and future leisure implies that labor supply responds strongly positively to an increase in either the current real wage or the real interest rate, everything else held constant.

If we now give this simple two period model a multi-period interpretation by calling starred variables the normal values for the future, the supply function can be given by the following interpretation. Temporarily lower than normal real wage rates, or low real interest rates (which imply low purchasing power of today's wages in terms of future consumption) induce workers to shift consumption of leisure from future periods to the current period when it is relatively cheap. A recession will be a time when hours of work are low because workers perceive low real wages or a low real interest rate. Similarly, in periods of temporarily high wages or high interest rates, workers delay their consumption of leisure because it is unusually expensive; then a boom occurs.

Employment fluctuations due to intertemporal substitution result from movement in perceived real variables. The same mechanism is at work whether the perceptions are correct or not. In the Lucas–Rapping model errors in perceiving real wages and real interest rates were the driving force. In more recent models of the real business cycle, there are genuine movements of the variables as well.

Despite the widespread adoption of the intertemporal substitution model by equilibrium business cycle theorists, relatively little empirical work has gone into testing its implications. Lucas and Rapping provide some support for the theory by estimating an annual model with data from 1930 to 1965 under the assumption of adaptive expectations of unknown future variables. Their estimates, however, ignore the effects of interest rates and because of the time period of estimation and the assumption of adaptive expectations are of somewhat limited value in explaining recent labor market fluctuations.

In order to know whether the sensitivity of labor supply to intertemporal considerations is large enough to explain the observed fluctuations of unemployment, it is necessary to know the driving forces in the economy. If fluctuations in product demand are the main driving force, then all the burden of intertemporal substitution effects must operate through real interest rates, not real wages. This point, due originally to Stanley Fischer, is elaborated in Hall (1980). If an increase in product demand (say, because the government is buying more in wartime) stimulates output, and the capital stock is fixed, it is necessarily the case that the real wage *falls*. Real wages can play a role in the explanation of employment fluctuations if temporary changes in productivity are an important driving force, but not if product demand is the force.

Macro evidence provides little support for intertemporal substitution. Altonji (1982) provides two tests of the model. In the first he attempts to duplicate the basic Lucas–Rapping model using essentially the same data updated to 1976 but with far greater attention to econometric issues and the modeling of expectations for future wages and real interset rates. His estimates of the effect of current and future wages on labor supply are either significantly estimated with the wrong sign or are insignificantly different from zero. The same is generally true of expected real interest rates.

One of the weaknesses of Altonji's initial estimates is that they are conditional on assumptions about the way expectations of future wages and real interest rates are formed. Arguing that the life cycle model underlying the intertemporal substitution model also has implications about consumption, Altonji notes that consumption embodies agents' expectations of the determinants of well-being. He reformulates his model using consumption to proxy for expectations. The results sustain his general rejection of intertemporal substitution.

Recently Mankiw, Rotemberg and Summers (1982) (MRS) have carried out an investigation of intertemporal substitution in the framework of modern finance theory. Their results are unambiguously unfavorable, especially for labor supply. First, they find that employment responds *negatively* to a variable that combines intertemporal incentives from real wages and real interest rates; the intertemporal substitution model absolutely requires this response to be positive. Second, they find that consumption and employment move together, whereas the intertemporal substitution model requires that they move in opposite directions – when people are better off, they should consume more and work less.

MRS note that their results are biased if shifts in consumer behavior are an important driving force in the economy. Hall (1984) shows that these shifts are probably quite important, though not of the same magnitude as shocks from investment. However, when he corrects for the bias caused by consumer shifts, the results still do not show a strong enough negative relation between employment and consumption to fit the intertemporal substitution model. Further, Hall (1980) used a method for estimating the response of labor supply to intertem-

poral incentives that avoids the bias in MRS. His results have the right sign, but it is not clear that the magnitude of the response is large enough to make intertemporal substitution an important part of the explanation of employment fluctuations.

3.1.3. Search theory

The first significant effort to create a microeconomic foundation for unemployment theory occurred in the late 1960s. High levels of labor turnover and generally short duration of unemployment over the 1960s led to models characterizing unemployment as a job-search process. The unemployed were not viewed as a stagnant stock of displaced workers, but rather as in a state virtually all workers pass through in their transitions between jobs.

Phelps' (1970) model emphasized the role of firms' recruitment policies in labor markets characterized by high labor turnover. Imperfect information on the part of workers leads to an upward sloping supply curve of labor to the firm in the short run giving what Phelps calls "dynamic monopsony power". Firms set wages for some period in the pursuit of an optimal recruitment policy which considers not only the effect the wage rate will have in recruiting new workers but also the incentives it gives existing workers to quit their jobs. Given the demand for their products, firms attempt to set their wage rates optimally relative to expectations of other wages.

Search models of the type proposed by Mortensen (1970a, 1970b) emphasize the behavior of job seekers. Workers who become unemployed are viewed as facing a distribution of wages of potential job prospects. It would not generally be optimal for them to accept the first job offer they receive; a better job might be offered if they continue searching. Workers have perceptions of the wage distribution. They are modeled as choosing an optimal reservation wage and accepting the first job paying the reservation wage or more. In determining the optimal reservation wage, workers face the obvious tradeoff: the higher the reservation wage the longer it is likely to take to find a job and the longer the worker can expect to remain unemployed. The lower the reservation wage, the lower is the expected wage the worker will receive once employed.

When workers correctly perceive the distribution of wages, their unemployment is efficient in the sense that workers are following optimal strategies, and are voluntarily choosing to remain unemployed by turning down wage offers less than their reservation wage. The unemployment that exists in search equilibrium when agents correctly perceive the distribution of wages is simply the natural rate. If the unemployed as a group misperceive the distribution, they will set reservation wages above or below the efficient level, and unemployment will be above or below the natural rate.

3.2. *The driving forces of the economy*

3.2.1. *Real forces*

The driving forces that are real, as against misperceptions with nominal origins, can be divided into aggregate and sectoral. The aggregate real shift that figures most prominently in the literature about the real business cycle is in productivity. In a year of abnormally high productivity, people will work harder than usual. They will schedule their vacations in times of low productivity. This is straightforward theory, but there is little evidence that important, temporary fluctuations in productivity take place in the United States or any other economy.

Shifts in product demand are also potentially important driving forces. Temporary increases in government purchases in wartime should set off a characteristic response which will include an increase in total employment, in almost any theory. A similar response should occur if investment or net exports rise exogeneously.

Shifts in world relative prices are another important real driving force that has received much attention since the two oil price shocks of the 1970s. Unless labor supply is more responsive to a permanent decline in real wages than is indicated by the evidence, higher oil prices or other import prices should not have a major impact on the level of employment or physical output. Instead, when the price of a commodity rises where the United States is a net importer, consumption should fall and net exports and investment rise by about the same amount.

The most likely avenue for a shift in world relative prices to influence U.S. employment levels is by mistake, through a wage-setting mechanism that is not designed to deal with such shifts.

At the level of individual sectors, shifts in the composition of demand can be an important driving force. If the movement of workers among sectors takes time, as search ideas suggest, then periods of rapid change in composition will be periods of diminished employment and higher unemployment as well.

3.2.2. *Errors and misperceptions*

Few economists hold that all of the ups and downs of employment are the smooth accommodation of the economy to real driving forces. Such a view would leave no room for the possibility that bad monetary policy was a cause of recessions, for example. Rather, most accounts of the driving forces behind employment fluctuations stress the roles of mistakes and misperceptions.

In a situation where the wage is predetermined and management chooses employment unilaterally, employment is vulnerable to errors in setting the wage. The failure of wages to respond to current conditions is at the heart of the Keynesian analysis of economic fluctuations and leads directly to its policy prescriptions. Recent contract theory has revealed the critical issues in this line of

thought. Mistakes in setting the wage are costly to the two parties to the employment bargain – the total cost of a major recession in terms of forgone output may be hundreds of billions of dollars. Consequently, we might expect a great deal of care in the design of wage-setting formulas to try to minimize errors by using every available piece of reliable information. In practice, wages seem to be linked only to the cost of living; otherwise they do not respond to current information at all. Gigantic mistakes seem to occur without any corresponding effort to avoid them.

In models where intertemporal substitution is the economic mechanism bringing employment fluctuations, errors in perceiving the real wage and real interest rates give rise to movements in employment. In Lucas and Rapping (1969), workers overestimate the real wage in booms and underestimate it in recessions. In Lucas (1972), a monetary expansion creates the mistaken impression of high real interest rates so people work harder than they should or they would if they knew what was really happening.

In search theories, misperceptions about the prevailing wage level cause firms or workers to adopt strategies that bring employment or unemployment levels different from the optima. A worker who is unaware that a recent monetary expansion has raised the average level of wages will set a reservation wage that is too low and will find a job sooner than expected and sooner than is optimal. If the same thing is happening to most job-seekers, unemployment will fall below its normal level.

3.2.3. Rational expectations and perception errors

As we stressed in the introduction, rational expectations has had a strong influence on recent thinking about labor market fluctuations, but it is not a divisive issue. On the contrary, virtually all current thinking incorporates the hypothesis of rational expectations fully. Because rational expectations strongly circumscribes the magnitude and duration of perception errors, its ascendancy has made economists concerned with issues of employment fluctuations redouble their efforts to identify plausible economic mechanisms and driving forces.

According to rational expectations, economic agents should use all available information in forming their perceptions about current economic conditions and expectations about the future. Because perception errors are costly to both sides of the employment bargain, the two sides have substantial incentives to undertake information gathering and processing to avoid those costs. A model that involves avoidable perception errors, especially those that are persistent over months and years, seems unattractive in the light of the rational expectations hypothesis.

When the mechanism of employment fluctuations is the predetermined wage and unilateral employment determination, perception errors enter the picture

through the wage-setting process. The formula that sets wages ought to use all available reliable public information about the opportunity cost of workers' time. A theory is manifestly implausible if it rests on the hypothesis that wages are held stubbornly at a given level without consideration for observed conditions, and that this process has repeated itself for recession after recession even though it is obvious that indexing wages to unemployment, nominal GNP, and other public variables would drastically reduce deadweight loss.

Rational expectations strongly limits the role of perception errors in models based on intertemporal substitution. In Lucas's (1972) classic paper, only very strong assumptions about the unavailability of information gives a rational expectations equilibrium where misperceptions create employment fluctuations. The economy in that paper would have no aggregate fluctuations at all if somebody just published a financial section in a newspaper. *Any* additional piece of information about contemporaneous monetary developments would eliminate the fluctuations Lucas describes.

Similarly, unemployment fluctuations in search models occur only as long as misperceptions exist. In an economy where job-seekers talk to their employed friends in bars and at cocktail parties, mistakes about the current level of wages should not last too long. Learning the level of prevailing wages is of paramount importance to the searcher. A theory is unappealing if it invokes a casual theory of information acquisition and builds from it a model of fluctuations that cost the people involved hundreds of billions of dollars.

3.3. Specific models of employment fluctuations

In this section we examine the major recent models of employment fluctuations, with a view to describing the economic mechanisms that bring the fluctuations and the driving forces behind them.

3.3.1. The Phillips curve

Modern thinking about employment fluctuations began with the Phillips curve. Phillips curve doctrine has two important elements.

(1) From Keynes, it takes the assumption that the observed wage–employment combination is a point on the labor demand curve but not necessarily a point on the labor supply curve. Unemployment can occur when the wage is too high; the level of unemployment is the difference between supply and demand.

(2) The Phillips curve itself describes a gradual process of equilibration. If unemployment is high, the wage falls. If too low, the wage rises. Ultimately, supply and demand are brought to equality and excess unemployment disappears.

Phillips (1958) documented an inverse relationship between British inflation and unemployment. Well before Phillips' paper appeared, economists recognized the existence of some kind of inflation–unemployment tradeoff. Fisher (1926) is an early example. Phillips and others [for example, Lipsey (1960)] provided a theoretical underpinning in terms of relatively simple disequilibrium paradigms where excess demand for labor leads firms to compete with each other in attracting workers, thus bidding up wages, and excess supply of labor leading to reduced pressure on employers to raise wage levels. Though the empirical generalization of the Phillips curve became popular soon after the publication of Phillips' original paper, little formal micro theoretical foundation was provided for the curve until the late 1960s.

3.3.2. Shifts in the Phillips curve under sustained inflation

Friedman (1968) and Phelps (1967) launched the line of thought that more clearly identified employment and unemployment fluctuations with perception errors. Their arguments were based on simple implications of labor market equilibrium. In their view, there exists a natural rate of unemployment in the economy necessary to accomplish the continuous process of labor allocation within the economy. Variations of factors such as the demand for their products or the cost of inputs to production lead to labor turnover as firms continually adjust the sizes of their labor forces. In good times or bad there will always be some firms trying to expand their employment while other firms are contracting. Moreover, the process of workers seeking better jobs or moving up career ladders leads to further labor turnover. Together these factors cause about 3 percent of employed workers to leave jobs (either voluntarily as quits or involuntarily as layoffs) for new ones every month within the U.S. economy. Because it takes time for separated workers to locate new jobs, some unemployment is unavoidable. See Lucas and Prescott (1974) and Hall (1979) for examples of models of the natural rate.

The natural rate is the normal unemployment rate that results from this process of labor allocation when workers and firms correctly perceive the levels and rates of change of price and wages. In the long run, as people adjust to changing inflation patterns, unemployment will tend to this natural rate, but in the short run agents may suffer from misperceptions. Unemployment can be driven below the natural rate by an increase in demand, which will cause prices to rise faster than people anticipate. Similarly, a recession occurs when demand is less than expected; unemployment rises above the natural rate and inflation drops below its expected level.

Friedman and Phelps' modification of the Phillips curve led a number of investigators, including Gordon (1971), to add expected inflation to the right-hand variables in the Phillips curve. The foundation for this specification was still a

loosely based disequilibrium adjustment theory. Most researchers thought of expected inflation as just another explanatory variable in the Phillips curve. But moving expected inflation to the left-hand side, so that the Phillips curve became a relation between unexpected inflation and the departure of unemployment from the natural rate, called attention to the importance of misperceptions in explaining unemployment fluctuations.

The emergence of the concept of the natural rate of unemployment also clarified a possible role for real driving forces in unemployment fluctuations. Any influence that raised the fraction of the labor force that was looking for work in any given month, either through layoffs or quits, would raise unemployment through the natural rate.

In earlier thinking, the unemployment rate was something chosen by macro policy and by other determinants of aggregate demand, more or less without restriction. The natural rate hypothesis strongly circumscribed fluctuations in unemployment relative to earlier theories. Unemployment could rise or fall only through negative or positive surprises or through changes in the natural rate. In particular, macro policy could keep the unemployment rate below the natural rate only by creating a continuing sequence of inflationary surprises.

3.3.3. Misperceptions and search

The Friedman–Phelps modification of the Phillips curve was a plausible assertion about wage adjustment, but it lacked a detailed theoretical foundation. A particularly awkward question was the following: When are the expectations formed that shift the Phillips curve? Why do not people read the newspaper and update their beliefs about inflation as soon as the cost of living index is announced? Without more theoretical structure, questions like these could not be answered.

The search theory, as propounded in the Phelps volume (1970) and elsewhere by Phelps, Mortensen, and others, argued that misperceptions on the part of job-seekers could explain the relation between unemployment fluctuations and inflationary surprises.

In the version of the model developed by Phelps, when employers face excess demand for labor, they try to raise their relative wage so as to attract more workers. Each tries to raise his own wage by more than the amount he expects average wages to rise. If most firms in the economy face excess demand for labor, then most firms will be setting their own wages above expected inflation, and average wages will rise by more than expected.

Other versions of search theory, including Mortensen's (1970), stress the role of job-seekers. When searchers misperceive the distribution of wages, they incorrectly set reservation wages and unemployment deviates from the natural rate. If job-seekers underestimate the level of wages in the economy, they set their reservation wages below the optimal reservation wage and find jobs quickly.

Unemployment falls below the natural rate. When workers overestimate the level of wages they set their reservation wage too high and remain unemployed longer than is optimal. Unemployment exceeds the natural rate. Nevertheless, unemployment is optimal subject to the imperfect information workers have. It is inefficient only relative to the unattainable standard of perfect information.

Search models have greatly enhanced our understanding of labor market dynamics and the determinants of the natural rate of unemployment in particular. However, they face serious limitations in explaining the actual pattern of fluctuations over the cycle. Neither can explain why firms would choose to lay off workers rather than lower wages. The failure to explain layoffs is particularly troublesome when trying to explain unemployment fluctuations. As we showed in Table 17.1, virtually all of the increase in unemployment during recessions comes from involuntary job-losers and labor force reentrants. Unemployment of voluntary job-leavers is relatively small and non-cyclical. To explain unemployment fluctuations, we must explain layoffs. It is hard to argue that the long-term unemployment (see Section 2.3) that makes up the majority of cyclical increases in unemployment has much to do with optimal search behavior. There is little to indicate that job search is considerably more efficient when workers are unemployed – Mattila (1974) finds that over 60 percent of workers who quit jobs find employment while still on their old jobs. And it is unconvincing to argue that job-seekers choose to remain unemployed for such long intervals because of mistakes in evaluating the distribution of wages in the economy.

Search models were the first attempts to explain more deeply why the observed combination of employment and wage is a point on the demand function and not on the supply function. Research in the Phillips curve line has never come to grips with this issue and even today many writers seem unaware of its importance. In search theory, firms set their offered wages so as to maximize profit. In this sense, they are on their labor demand schedules. Job-seekers set their reservation wages so as to maximize expected earnings over working and nonworking hours. In so doing, they anticipate spending a certain amount of their time searching and the rest working. They are on their supply functions for both activities. Unemployment is an outcome of a considered choice about the allocation of time. Unemployment is the difference between the total amount of time committed by workers to the labor market and the amount of time spent working. By making unemployment the result of a decision about the use of time, the search theory avoids the arbitrary assumption of earlier models that the supply of hours of work exceeds the demand.

3.3.4. Misperceptions and intertemporal substitution

Lucas and Rapping (1969) and later Lucas (1972) developed a different line of argument to provide the needed theoretical background for the natural rate proposition. Again, their models are driven by misperceptions of price and wages.

However, instead of the work-search margin that is distorted in the search theory, it is the margin between work now and work later that provides the economic mechanism of these models.

The second paper presents the full development of rational expectations and is embedded in a general equilibrium framework. In it, workers mistakenly work too hard when a monetary expansion occurs because they are unable to distinguish the jump in prices from the one that would occur if there were a local disturbance. In the case of a local disturbance, the incentive for current work is genuinely high. The only hint that workers have about a local disturbance comes from the price level, which is also influenced by purely monetary expansion. They have to hedge their bets. When prices rise, they work somewhat harder. If they were sure it was a local shock, they would work even harder. If they knew it was a monetary shock, they would work only a normal amount.

In Lucas's model, and in other models based on the intertemporal substitution mechanism, it is perception errors in the real interest rate that drive employment fluctuations. Although perception errors in the real wage seemed to be important in Lucas and Rapping, they do not seem a likely candidate for driving aggregate fluctuations, for the reason mentioned in Section 3.1.2: it seems unlikely that disturbances would push the real wage in the right direction to explain observed fluctuations.

As we noted earlier in Section 3.1.2, research has not so far documented the influence of expected real interest rates on labor supply. As a result the intertemporal substitution mechanism driven by errors in expected real interest rates suffers from defects in both its elements. First, it is no more than a theoretical possibility that expected real rates (correctly or incorrectly forecast) influence labor supply; it depends on the intertemporal elasticity of substitution. Second, it is not clear that the public makes significant errors in forecasting real rates that are in the direction needed to explain the observed fluctuations in employment.

3.3.5. Contracts and errors in setting wages

Where search theory emphasizes labor market turnover and job changing, contract models of wage and employment determination start from the presumption that workers and firms maintain long-term relationships. Search theory claims to say something about unemployment among the jobless; contract theory deals with fluctuations of hours of work and with the type of unemployment brought by temporary layoffs. Since workers stay with firms through periods of fluctuating demand, employment and wage determination need not respond directly and instantaneously to market forces. Rather, firms and workers enter into contracts that specify, in advance, wage rates and hours of employment or rules for determining wages and employment, conditional on the level of demand. Contract theory has made at least one solid contribution – it explains why the unilateral determination of employment by firms may be desirable.

The pioneering contract models of Azariadis (1975), Baily (1974), and D. Gordon (1974) explained long-term employment contracts as optimal risk-sharing relationships between risk-neutral firms and risk-averse workers. They demonstrated that in a world of stochastic product demand a firm could offer workers a fixed wage–variable employment contract that allowed for the possibility of periodic spells of temporary layoff unemployment. Such a contract could dominate the spot market. Workers and firms enter into contracts bilaterally, but individual unemployment spells are involuntary for the worker ex post; they are chosen unilaterally by the employer under the rules of the contract. It should be noted that these results depend heavily on the assumption that firms do not compensate workers while unemployed [see Akerlof and Miyazaki (1980)].

Other models invoke different reasons for long-term employment relationships such as the development of firm specific skills and heavy turnover cost, but still yield unilateral layoffs as an efficient response to demand fluctuations. Feldstein (1976) showed that even with the assumption of risk-neutral workers, the incentives given by imperfect experience rating in the unemployment compensation system encourages the use of temporary layoffs. Weiss (1980) shows that when workers within the firm receive the same wage despite differences in productivity, wage reductions may encourage high productivity workers to quit. Because of selection problems layoffs can in some circumstances be more desirable than wage reductions.

When contract theory was first introduced, much hope was held out that it would provide a microeconomic foundation for the predetermined wage–unilateral employment view of the business cycle. Unlike search models, it explained unilateral employment determination by employers and explained why firms might not reduce wages in the face of falling demand. Furthermore, most workers do maintain long-term relationships with firms. Hall (1982) estimates that the typical worker is holding a job which has lasted or will last about 8 years. Over a quarter of workers are holding jobs which will last 20 years or more.

Contract theory offered hope of providing a justification for the basic Phillips curve setup discussed at the beginning of this section. Suppose a contract had the form that the firm could choose the level of employment subject to a wage dictated by the contract. Suppose, further, that the contract can make the wage respond only imperfectly and with a lag to the relevant variables. Then employment fluctuations will occur very much as described by the predetermined wage–unilateral employment model which is still the foundation of the bulk of practical macroeconomics.

Despite initial optimism Barro (1977) pointed out that these early microeconomic contract models were not capable of explaining the effects of purely monetary disturbances on real output. ABG models can explain why optimal risk-sharing contracts might specify rigid real wages, but they cannot explain the failure of money wages (and prices) to fall in response to a drop of aggregate demand nor can they justify a contract that specifies money wages several periods

in advance as in Fischer (1977) or Phelps and Taylor (1977). Such a contract ignores public information about the price level that all agents know. While the rigid money wage models can explain aggregate fluctuations, they have obvious problems. Presetting nominal wages has imposed huge costs on firms and workers. Why do they not make wages respond to national and local variables like unemployment, nominal GNP, sensitive prices, and other relevant indicators?

An efficient contract between a firm and a group of workers will set employment at the point where the marginal revenue product of labor equals the marginal opportunity cost of time. Contract models can explain aggregate fluctuations of employment in response to shifts in terms of trade or shifts of labor productivity (both of which affect the aggregate real MRP of labor). No contract model to date, however, provides a foundation for money wage rigidity.

The large literature on incentive compatible contracts provides a justification for employment relationships that yield less than totally efficient outcomes [see Hart (1983) and his references]. When one or both parties to an employment contract is risk averse, the optimal second-best contract compromises between employment efficiency and insurance. In some conditions, employment will exceed the efficient level, and in others, it will fall short. So far, these theoretical considerations have not been incorporated in any convincing account of the occasional episodes of severe unemployment in the U.S. economy.

3.3.6. Intertemporal substitution and real shocks

A number of recent papers, including Kydland and Prescott (1982) and King and Plosser (1982), have developed the theoretical proposition that real driving forces are capable of creating fluctuations in employment through intertemporal substitution. The force whose effect most obviously operates in this way is a shift in demand. Suppose that investment demand rises, or government purchases rise. Then the real interest rate will rise to clear the output market. Not only does a higher real interest rate make consumers and investors defer purchases, but it also makes workers offer more current labor services. In the new equilibrium, employment and output are above normal if intertemporal substitution in labor supply occurs. The accommodation of higher product demand takes the form partly of higher product supply and partly deferral of other components of demand.

The theoretical models of employment fluctuations as the response through intertemporal substitution to real driving forces are airtight as theory. It is very much an open question whether the response of labor supply to real interest rates is strong enough, and the changes in real interest rates big enough, to make this explanation of employment fluctuations an important part of the story empirically. As we noted earlier, work by Altonji (1982) and Mankiw, Rotemberg

and Summers (1982) has generally reached negative conclusions about the empirical success of the intertemporal substitution mechanism.

3.3.7. Sectoral shifts as real driving forces

There is a tendency in macroeconomics to view aggregate fluctuations as resulting from aggregate shocks. Recently, Lilien (1982a, 1982b) has argued that this view ignores a major source of aggregate fluctuations: the slow adjustment to intersectoral shifts of labor demand. In this view the natural or frictional rate of unemployment is not constant as in most macroeconomic models but varies with the degree of required labor reallocation in the economy. Periods of rapid technological change in production or dramatic shifts of domestic product demand require unusually large movements of labor between labor market segments. If for whatever reasons labor is slow to adjust to these shifts of labor demand unemployment increases.

A long tradition explains unemployment in terms of structural or market imbalance. The basic hypothesis is that mismatching of jobs and workers raises both vacancies and unemployment. The Beveridge Curve, the locus of unemployment–vacancy combinations at various levels of demand, shifts outward when mismatching is high [see, for example, Holt (1970)]. Some have viewed these structural imbalances primarily in the dimension of skills. The primary motivation for the manpower programs of the 1960s and 1970s was to bring skill levels in the labor force into line with the composition of labor demand, thereby reducing the rate of unemployment.

Lilien's work suggests a slightly different view. Structural imbalances are the transitory result of slow labor market adjustment to rapid shifts in the composition of employment demand. He argues more specifically that during the 1970s the decline in military purchases, shifts in relative prices, particularly oil prices, increased foreign competition in manufactured goods, and movements toward more automated manufacturing production led to dramatic shifts of the demand for labor out of manufacturing industries and into the service, retail trade, finance, insurance and real estate industries. Between 1970 and 1981 manufacturing's share of total employment fell from 29 percent to 22 percent, a 24 percent decline in share. Over the same period the shares of service, retail trade and finance–insurance–real estate grew by 31 percent, 11 percent and 19 percent, respectively. Service industry employment grew in every year of the 1970s despite three major recessions and record declines in manufacturing employment. In contrast to the 1970s, employment grew relatively uniformly throughout the 1960s; manufacturing's share of employment declined by only 6.1 percent between 1958 and 1969.

Lilien argues that much of the increased unemployment of the 1970s as well as the cyclical pattern of unemployment was the result of the slow movement of

labor out of declining and into expanding sectors of the economy. He labels fluctuations due to intersectoral demand fluctuations as shifts of the natural rate of unemployment because they are not associated with the level of aggregate labor demand but rather the composition of demand.

Lilien presents two somewhat different theoretical models of the role of sectoral demand shifts. His 1982 paper emphasizes the role of turnover and is not dissimilar in structure to the equilibrium search model of Lucas and Prescott (1974). Shifts of product demand or labor productivity lead some firms to expand employment while other firms lay workers off. Unemployment results because it takes time for workers displaced from shrinking firms to find jobs in expanding firms. Holding aggregate demand constant, the level of unemployment is positively related to the magnitude of intersectoral demand shifts.

Lilien (1982b) examines the consequences of slow labor mobility in a model where that employment is set efficiently within labor market sectors, that is, employment is set at the point of equality of the marginal revenue product of labor and the opportunity cost of labor. However, labor flows are too slow to equate the marginal revenue product of labor among sectors. Shifts of sector specific product demand or labor productivity (through the introduction of new technology) temporarily widen the gap between sectors in the MRPL until labor flows from low to high MRPL sectors, but until equality is restored aggregate employment is depressed. Basic convexity properties (decreasing marginal productivity of labor in production and decreasing marginal utility of leisure) imply that employment hours fall by more in firms with declining product demand than hours rise in firms with growing product demand. As time passes, labor flows out of low MRPL sectors to high MRPL sectors and normal employment is restored.

These two approaches are consistent. The first emphasizes flow equilibrium conditions while the latter emphasizes the determinants of stock employment equilibrium. They have identical implications for aggregate fluctuations, so we will briefly examine the simpler turnover model.

At the level of the firm, hiring consists of two components: an aggregate component and a firm specific component. Ignoring quit behavior and letting h be firm net hiring or the rate of change of employment at the firm, we decompose h into two factors:

$$h = H + e,$$

where H is the aggregate rate of change in employment and represents the component of hiring that is common to all firms and e is a firm-specific component distributed among firms with variance $\sigma(t)$. The innovation here over equilibrium unemployment models like Lucas and Prescott's is that $\sigma(t)$ is not assumed to be constant in all periods.

Assuming that when $h < 0$ firms lay workers off and when $h > 0$ firms hire new workers, we derive the aggregate relations:

$$H = A - L,$$
$$L = g(H, \sigma(t)),$$
$$A = H + g(H, \sigma(t)),$$

where L is aggregate layoffs, A is aggregate accessions, and $0 > g_1 > -1$ and $g_2 > 0$. Increases in the dispersion of hiring conditions as measured by σ lead to both greater L and A holding H constant.

Assuming that the duration of unemployment is influenced by aggregate demand or money illusion, $X(t)$, as in equilibrium search models and that the aggregate labor force is constant, so that H is equal to negative the change in unemployment, Lilien derives a dynamic unemployment equation of the form:

$$U(t) = f(U(t-1), \sigma(t), X(t)).$$

This equation has the form of an equilibrium Phillips curve where the natural rate of unemployment is a function of σ, and $X(t)$ represents expectation errors in wages or prices.

Lilien estimates several versions of the layoff and unemployment equations above using the observed dispersion of industry employment growth rates as a proxy for σ and a measure of unanticipated money growth as a measure of $X(t)$. During the 1960s intersectoral demand shifts account for relatively little unemployment fluctuations, while aggregate demand as measured by unanticipated monetary growth explains the bulk of unemployment. In marked contrast, σ explains a major fraction of unemployment fluctuations in the 1970s and relatively less is explained by money growth.

Lilien interprets these results as indicating that the sources of aggregate fluctuations in the 1970s were fundamentally different from the 1960s. In the 1960s most fluctuations were deviations from the natural or equilibrium unemployment rate induced by fluctuations of aggregate demand. In the 1970s most fluctuations were movements of the natural rate induced by exogenous shifts in the composition of employment demand.

Several criticisms have been made of this interpretation of the data. Abraham and Katz (1984) and Lilien (1982b) point out the inappropriateness of using dispersion in employment growth rates as a measure of exogenous sectoral shifts that are not influenced by the level of aggregate demand. If some sectors are more cyclically sensitive than others we might expect dispersion in growth rates to result from movements of aggregate demand. Shifts of demand always affect manufacturing employment more than service employment, so that movements of aggregate demand (increases or decreases) will tend to be associated with increased dispersion in employment growth rates.

Lilien (1982b) attempts to create a proxy for σ that does not suffer from this bias. Industry employment growth rates are decomposed into a component that measures the industries' normal response to aggregate conditions and a component that measures industry specific factors. He finds that aggregate labor market conditions and industry specific conditions are of roughly equal importance in explaining the typical industry's employment growth over time. He also finds that the dispersion of industry specific effects accounts for virtually none of the variance of unemployment of prime age males during the 1960s, but between 50 and 60 percent of the variance of unemployment through the 1970s.

Abraham and Katz (1984) point out another criticism of Lilien's interpretation of the data. If the sectoral shift–structural unemployment model of unemployment is correct, vacancies as well as unemployment should be increasing functions of σ when the level of aggregate demand is controlled for. However, when a proxy for vacancies, help-wanted advertising, is regressed on σ and unanticipated money, vacancies appear to be negatively related to σ. They interpret this as indicating that Lilien's σ variable is simply measuring shifts of aggregate demand. It may be, however, that different industries have different tendencies to use help wanted advertising and that the help wanted index cannot be used as a consistent measure of vacancies during periods of structural change. Also, if wages rise quickly in expanding demand sectors, there is no reason to believe that increases in σ will lead to increased vacancies. Within an equilibrium framework we might expect short-run increases in unemployment in declining sectors and higher wages in expanding sectors.

While Abraham and Katz's analysis casts some doubt on Lilien's σ as a proper empirical measure of the short-run dispersion of demand shocks, vacancy data generally support the hypothesis of increased labor market imbalance during the 1970s. Medoff (1983) presents both cross-section and time-series evidence that both unemployment and vacancies increased significantly during the 1970s.

Medoff also points out other dimensions of intersectoral shifts. While Lilien emphasizes shifting industrial patterns of labor demand, Medoff emphasizes geographic shifts. The 1970s were characterized by dramatic shifts of employment out of the Northeast and Middle Atlantic regions towards the Southwest and Pacific regions. Of course these are the same shifts described by Lilien. The states experiencing declining employment had heavy manufacturing industrial bases.

Evidence that these geographical shifts were at least partially demand driven comes from the fact that help-wanted advertising measures of vacancies grew at an annual rate of 6.2 and 4.9 percent per year in the Southwest and Pacific, respectively, and declined by 3.4 and 1.3 percent per year in the Northeast and Middle Atlantic states.

Research on sectoral shifts raises an important question: Why does it take so long for labor to adjust to intersectoral demand shifts? Lilien finds that the

intensity of intersectoral shifts as measured by σ influence unemployment for up to two years in quarterly equations and somewhat longer in annual equations.

One possibility is that workers cannot tell instantaneously whether reduced demand at the level of the firm represents a temporary cyclical phenomenon or a permanent shift in the firm's permanent level of demand. It may pay workers to incur heavy mobility costs as well as loss of firm specific skills if they know demand reductions are permanent, but not if they are temporary cyclical fluctuations. Thus, workers continue to search within their industry and region until convinced that demand will not recover.

Hall (1975) provides another explanation that may be particularly relevant to explaining the effect of declining manufacturing employment. He presents a two-sector model with one high-wage and one low-wage sector. The high-wage sector has administered wages that adjust only slowly to demand. Even when wages adjust quickly to clear the competitive (low)-wage sector unemployment exists as workers prefer to remain unemployed with a chance of getting a job in the high-wage sector. In terms of our recent experience declining employment has been primarily in high-wage manufacturing jobs, while employment has been expanding in low-wage service jobs. Given the low wages on alternative jobs, an unemployed auto or steel worker may have a strong incentive to wait for re-employment within the industry, even if the probability of recall is quite low.

4. Conclusions

Employment in the United States shows important cyclical fluctuations, both in the amount of work performed by workers on their jobs and in the fraction of the population holding jobs. Macro and labor economists have been interested in explaining these fluctuations for many years. Microeconomic criticism of the standard Keynesian view of employment determination has sharpened and improved that view. In addition, new theories have captured attention. In our view, however, no single theory has been completely successful in explaining the facts of cyclical fluctuations on the basis of a fully articulated microeconomic analysis and a satisfactory econometric model. We look forward to much additional progress in this field of research.

The Keynesian analysis posits that firms choose employment unilaterally subject to a predetermined wage. Because the choice does not take account of the marginal value of workers' time, the employment level may be inefficient. It is precisely the monumental inefficiency of widespread unemployment during cyclical contractions that makes Keynesians call for corrective government action. Although most practical economists take as given the unilateral determination of employment by firms, it was not until the flowering of contract theories of employment that a good justification was offered for that hypothesis. Contract

theories have demonstrated that it makes sense for the firm to choose employment unilaterally when the level of product demand is private information to the firm. But theoretical work has not made the other steps that would be necessary to provide a complete foundation for standard macroeconomic models of cyclical employment fluctuations. In particular, the theory seems to predict that employment contracts would be indexed to a number of observable indicators that convey information about the current marginal value of labor's time, such as the unemployment rate.

Equilibrium models of employment fluctuations provide the most serious intellectual competition to the standard macro model today. Two versions are under active development. One invokes cyclical changes in product demand (say, from investment or the government) which bring changes in real interest rates to clear the output market. When the real interest rate is high, people work harder and employment rises, because there is an incentive to work now and consume later. Or, along the same lines, a temporary increase in productivity again creates an incentive to work harder. However, empirical testing of this type of model has reached negative conclusions.

A second version of the equilibrium model notes that the movement of workers from one sector to another takes time and resources. Periods of rapid structural change will be periods of lower employment and output, and higher unemployment, because a larger fraction of the labor force will be in transit from one sector to another. Empirical work on this idea has been successful in linking measures of structural change to the unemployment rate. The result is not a complete, unitary model of cyclical fluctuations, however. The model still attributes part of the fluctuations of employment to purely nominal influences, and does not have a theory to explain why those influences have real effects.

Two other hypotheses enjoyed an earlier vogue in the literature on employment fluctuations. Search theory dealt specifically with unemployment, treating it as one of the uses of time chosen by rational economic agents. Changes in relative prices will change the amount of unemployment, according to this line of thought. Though search theory is still an active area of research, as this Handbook shows, few economists still look to its mechanisms for much of the explanation of observed fluctuations. First, it has nothing to say about the shift of labor resources from employment to non-market activities that is an important part of the cycle. Second, the concentration of unemployment among a fairly small group of people with low levels of average employment casts doubt on the relevance of the theory in the first place.

Theoretical work of the 1970s put a great deal of emphasis on the role of perception errors as a driving force for cyclical fluctuations in employment. Here, too, recent thinking has moved in other directions. Rational expectations makes it clear that perception errors are tightly circumscribed. If cyclical fluctuations involving millions of jobs and hundreds of billions of dollars in output are just

the result of misunderstandings that could be cleared up by better financial reporting, then there is a monumental and inexplicable failure for markets in information to operate. Certainly Lucas's fully worked out model along this line rests explicitly on an assumption about lack of information that does not transplant in any obvious way to the U.S. economy. The economy has a flourishing industry providing just the sort of information ruled out in the model.

We see likely progress in two areas. There is much more work to be done in following up the theory of labor contracts with empirical work. Further work on the equilibrium cycle based on sectoral shifts or related influences seems promising.

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