The Theory of Employment and Unemployment

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The Theory of Employment and Unemployment

by

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Chapter 4 of Monetary Theory (tentative title)

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Classical and Keynesian theories of employment and unemployment start from a common framework. There is a single composite good, output, produced under conditions of diminishing returns to each scarce factor of production and constant returns to scale. The conditions governing production are described by a production function, and the demand for labor is derived from this function. The supply of labor is based on individual decisions to give up other activities - loosely described as leisure - and allocate time to labor. These relations yield a negatively sloped aggregate demand curve for labor relating offers of employment and the relative price of labor, or real wage, and a positively sloped supply curve of labor. The intersection of the two curves determines the market clearing real wage and the equilibrium level of employment. Unemployment can be defined as the difference between the amount of employment demanded and supplied at each real wage or as the difference between actual and equilibrium employment. Both definitions are in use currently.

Very early in the development of systematic, economic theory, there were attempts to "explain" unemployment as the result of slow adjustment of money wages - wage rigidity. Thornton's clear statement (1965, pp. 118-19) is reproduced above.\footnote{Marshall appears to have been unaware of Thornton's explanation and cites Bowley's statistical studies as the source of the proposition that real wages rise in...}
recessions and fall in expansions. Keynes's (1939, pp. 35-6) reference to
Marshall's testimony makes clear that he did not regard his use of wage rigidity
to "explain" unemployment as novel. Keynes believed, correctly, that previous
writers failed to provide a theory uniting wage rigidity and unemployment with the
theory of aggregate output and prices. Although much progress has been made, the
charge remains true.

Few economists ever denied that output and employment fluctuate, and
few would deny that in the presence of rigid wages and fluctuating prices and
output, there are periods of excess demand and excess supply for labor. The
problem is to explain why wages do not adjust rapidly, why the excess demand or supply
of labor persists for months or years, and what governs the eventual adjustment
of wages and employment.

Unemployment of any good or service can be "explained" by asserting that
prices adjust slowly or that anticipated prices adjust slowly, or that buyers and
sellers have different anticipations, or by introducing costs of adjustment. Each of
these, and many similar explanations, invoke relative price changes (in the
broadest sense) to "explain" disequilibrium. Recurrent disequilibrium can occur
only if buyers or sellers do not find a way to profit from the disequilibrium by
reallocating demand to periods with excess supply from periods with excess
demand. The theory of expectations that has developed from the work of
Muth (1961) and Lucas (1972) implies that any systematic association between real wages and unemployment, resulting from slow adjustment of money wages, should not persist. Unemployed workers can offer to supply labor at a lower money wage; firms can offer to hire labor at a lower wage and offer lower wages to existing employees. Why do we not observe greater variability in wages and less variability in employment?

This chapter develops a theory relating employment, unemployment and wages as part of a theory of aggregate output and prices. The behavior of firms and workers is not autonomous or independent of behavior in other markets as in Nordhaus (1972), but is part of the process by which relative prices adjust to real and nominal shocks. By taking the responses on other markets as given, we assume what has not been shown, chiefly that there is a rational explanation for the persistence and duration of fluctuations (or business cycles) in an economy that produces a single composite good—aggregate output. The justification for this procedure is that we depend on the results in this chapter when we analyze the fluctuations in output. Our approach follows the long line from Thornton through Marshall to Keynes by relying on rigid money wages as a necessary condition for excess supply and demand on the markets for labor and output and follows the more recent tradition of Phelps et al. (1970), Lucas (1972, 1975) and others in providing a rational explanation for the observed market conditions.
The following section discusses some of the patterns that we attempt to explain — the stylized facts about labor markets and their interpretation. Many of these "facts" have been developed by looking at data for recent years and may give undue weight to developments during the period of the dollar standard in the United States. A broader set of "facts" for the years of the gold standard might give a different picture.

After presenting the facts that a theory of labor markets must reconcile, we present a theory of the supply and demand for labor and our explanation of the main patterns. Our explanation differs from the most common explanation of recent years known as the Phillips curve. A final section compares the two.

Stylized Facts and Interpretations

Keynes's explanation of cyclical wage changes starts from a stylized fact (1936, p. 10). "It would be interesting to see the results of a statistical inquiry into the actual relationship between changes in money wages and changes in real wages. . . . In the case of changes in the general level of wages, it will be found, I think, that the change in real wages associated with a change in money-wages . . . is almost always in the opposite direction. When money-wages are rising, that is to say, it will be found that real wages are falling; and when money-wages are falling, real wages are rising. This is because, in the short period, falling money-wages and rising real wages are each, for independent reasons, likely to
accompany decreasing employment; labour being readier to accept wage-cuts when employment is falling off, yet real wages inevitably rising in the same circumstances on account of the increasing marginal return. . ."

Keynes, following Marshall, assumed that cyclical changes in real and money wages result from shifts in the demand for labor. Fisher (1973) attributed the shift in demand to unanticipated price changes. This is the classical assumption found in Thornton, and if it is combined with slower adjustment of money wages than of prices, we, like Keynes, reach the classical conclusion – real wages rise in recession and fall in expansion.

Investigation has not yielded unqualified support. Dunlop (1938) showed that Bowley's evidence, as reported by Marshall (1926), is contradicted by data for subsequent periods. Modigliani (1977, p. 7) cites Dunlop's evidence, which he interprets as showing that real wages rise in expansion, to argue against competitive wage determination and the interpretation of wage rigidity due to Keynes and the classical economists. Studies by Kessel and Alchian (1960) cast doubt on previous findings of a lag of wages behind prices. A spectral study by Cargill (1969), uses U.S. data for 140 years and British data for 200 years. For cyclical frequencies, there is very little evidence of a uniform pattern of leads or lags, and the measured lags are much too short on average to be consistent with observed unemployment.

The data suggest that a theory of the labor market must be capable of explaining unemployment without relying on any consistent timing relation between cyclical changes in wages and prices. Real wages may rise, fall or remain unchanged
during periods of expansion and contraction. A theory in which there are only nominal shocks to demand would be consistent with the stylized facts relating wages and prices only if there is a complex pattern of leads and lags. A pattern of this kind cannot be ruled out a priori, but it does not appear likely that an economic hypothesis can be developed along these lines.

An extensive search for a relation between aggregate excess demand and the rate of change of wages has produced mixed results. Laidler and Parkin (1975, p. 754) report that the relation is "weak". Gordon (1977) shows that the rate of wage change in the United States during the postwar period is affected very little by aggregate excess demand but is affected somewhat more by changes in excess demand.

A second stylized fact is the weak relation between excess demand and wage changes. This fact becomes more puzzling in the light of recent showing a strong association between excess demand and unemployment. Barro's (1977) study of postwar unemployment in the United States shows that nearly 80% of the variance of unemployment can be explained mainly by "unanticipated money growth" and the minimum wage. Unanticipated money growth is a measure of shifts in aggregate demand, so Barro's equation suggests strongly, that changes in aggregate demand and unemployment are related. His study implies that most of the positive and negative changes in unemployment are the result of monetary shocks. But his evidence is limited to the postwar years and has a puzzling implication: unanticipated money growth affects unemployment without much effect on real wages. This implication
follows from the fact that wages and unemployment are not closely associated and from Barro's finding that the errors in his equation are serially uncorrelated. Serial correlation of the errors would suggest that some measure of excess supply affecting wages and unemployment has been omitted. Barro shows, however, that a most obvious measure of labor market conditions – the lagged unemployment rate – is not significantly related to current unemployment once the effects of unanticipated money growth and the minimum wage rate are included (1977, p. 108).

Real wages and the equilibrium rate of employment are determined simultaneously. Barro's equation implies that with constant unanticipated money growth, unemployment changes only if there is some effect of past money growth on the real value of the minimum wage. Barro's interesting finding leaves much of the behavior of employment and real wages to be explained.

Most research on wages and unemployment uses data only for the postwar period. Two well-known studies by Lucas and Rapping (1969) and by Phillips (1958) examine the long-term data for the United States and the United Kingdom. Both studies show that in periods of relatively high unemployment, during the thirties in the United States and during the inter-war years in the United Kingdom, the relation between measures of aggregate demand or excess demand and the rate of wage change are weak or non-existent. This "fact" requires much more attention than it has received since the failure to account for relatively high unemployment calls into question any explanation of smaller fluctuations. A valid explanation of unemployment and wage changes must account for differences between earlier and more recent periods.
Kejnes (1936, p. 15) defined unemployment as "involuntary" if a rise in the price level that reduces real wages increases employment. The finding that unemployment is not closely linked to changes in real or money wages suggests that most cyclical unemployment is not involuntary in Keynes's sense. Unemployment rises and falls cyclically in response to unanticipated changes in aggregate demand without much change in wage rates. Any hypothesis seeking to explain unemployment and wage rates must recognize the failure of Keynes's theory to reconcile observed changes in wages and unemployment in Western Europe and the United States during the postwar years.

A third stylized fact about labor markets is the persistence of unemployment during recoveries. Adjustment from recession to full employment is a process that continues for several years. Usually this process is described as a gradual adjustment from disequilibrium to a unique equilibrium at full employment. The time required for adjustment of wages and employment is longer than can be explained by the adjustment of demand to a one-time shock.

Hall (1977a) analyzes the response of unemployment to shocks to demand and finds that, for the years 1956-75, more than 90% of the variation in unemployment is predicted by the unemployment rate in the previous eight quarters. Greatest weight is given by the data to the most recent past. Hall concludes that the observed pattern cannot be explained by sluggish adjustment of unemployment or by a failure to use available information about conditions in the labor market. He, then, compares the adjustment of money wages implied by the rapid response of unemployment to the...
actual response and finds a large, unexplained difference. If money wage and
unemployment adjust to shifts in demand, most of the adjustment in money wages
should be completed within two years. The actual speed of adjustment is
considerably slower. Hall concludes that a model in which expectations are
rational in the sense of Muth (1961) cannot explain observed wage changes solely as to
the result of process in which the demand for labor and the money wages adjust to
shocks. Hall (1977a, 1977b) suggests that an equilibrium model in which the
equilibrium (or natural) rate of unemployment changes is more likely to explain
observed patterns.

A problem with many theories of unemployment is that all unemployment is
treated alike. Workers are unemployed by reductions in demand and search for
new jobs. Sustained unemployment results from lack of information, inefficient
search, the gradual adjustment of wages under fixed contractual arrangements and the
like. Most work in the United States is not subject to contractual arrangements with
unions, and nothing prevents employers or employment agencies from exploiting
the opportunity provided by slow adjustment.

A study of Marston (1976) shows that the average duration of unemployment in a
1974 sample is 8.5 weeks for adult men and 18 weeks for adult women. Brinner
(1977) analyzed sample data on reported reasons for unemployment and found that
changes in the unemployment rate are not mainly the result of a rise in the "quit rate,"
as suggested by theories of search, but results from a more than proportional increase
in the unemployed classified as job losers. Some of the job losers are separated
temporarily —layed off—as Feldstein (1975) shows. But Hall (1977b) argues that allowance for layoffs can exclude no more than 15% of the unemployed. At least 70% of the unemployed are job losers who cannot expect to return to their previous employment. The rest are recent entrants or reentrants.

Some of the unemployed are seeking part-time employment. This affects the number of hours workers desire to supply per week or per year; but does not affect the analysis if the quantity of employment demanded and supplied is expressed in actual or standardized manhours.

The fourth stylized fact, or set of facts, is that cyclical variations in unemployment are dominated by job losers, not voluntary "quits." During recessions bankruptcies rise, firms go out of business, jobs are eliminated both permanently and temporarily. Most of the unemployed cannot expect to return to their previous employment. The number of unemployed and the duration of unemployment rise in recession much more than can be explained solely as a result of errors in forming expectations and by a desire to search. Some evidence suggests that reported quit rates move opposite to the unemployment rate. 5\textsuperscript{/}

A theory of unemployment, or employment and wages cannot rely solely on demand shocks, voluntary search and changes in the quit rate to explain unemployment during recessions and expansions. Theoretical work on labor contracts by Azariadis (1975), Baily (1974) and others introduces risk sharing arrangements and implicit contracts into the theory of labor markets. Firms absorb risk from workers by offering contracts that show the adjustment of money
wages to changes in product demand. Risk averse workers prefer to absorb fluctuations in product demand by reducing hours rather than by reducing money wages. Neither Baily nor Azariadis claims to have produced a theory of aggregate unemployment, and Barro (1977a) shows that risk sharing arrangements cannot explain unemployment if the labor market is competitive and expectations are rational in the sense of Muth (1961) and Lucas (1972).

As an empirical proposition, risk sharing is falsified by the diversity of labor contracts that appear in labor markets. Tenure ranges from the life-time employment offered to school teachers, professors and civil servants, after a minimum period of employment, to the daily or hourly employment offered to casual labor. The unemployment statistics for layoffs, entrants and other unemployed suggest that contract theory applies to a limited range of jobs. Many workers, and most of the unemployed, do not have implicit or explicit contracts with specific employers and do not return to their previous place of employment, as noted above.

A fifth stylized fact about labor markets is the very wide range of wage agreements that are found in different countries and time periods. Cyclical unemployment has been observed under too many different sets of institutional and contractual arrangements to be explained by a specific contractual arrangement. This, of course, does not deny that risk aversion or types of contractual arrangements alter the magnitude of the response to shocks in particular periods. Nor does it deny that certain provisions of contracts—seniority provisions are an example—appear ubiquitously. A theory of labor markets should be capable of explaining the frequent
use of seniority provisions without requiring that all, or most, workers have contracts.

The five stylized facts summarize much of what is known or accepted about the cyclical response of wages and employment. A theory of the labor market should be consistent with the observed facts and capable of explaining principal features of labor markets as the rational responses of workers and employers.

A Theory of the Labor Market

Fluctuations in aggregate economic activity and employment result from changes in the aggregate demand for and supply of output. The timing of the changes is uncertain. The changes may be positive or negative, and may be temporary or persistent. Workers and employers in individual firms do not know whether shocks or changes are temporary or long-lasting, real or nominal.

The uncertainty that affects employment is summarized by the four way classification of shocks as real and nominal, temporary and persistent. Uncertainty arises because of the inability of workers and employers to distinguish promptly, between the four categories. Here we assume that there is no way to extract from available data fully reliable information about the type of shock that has occurred. We examine the way in which the labor market absorbs uncertainty and the implications for wages and employment. We start with a discussion of shocks, then analyze the demand and supply curves and draw their implications.
The distinction between real and nominal shocks is familiar. Our earlier discussion of the classical theory showed that spending depends on $B$ and $B^*$, the domestic and rest of the world stocks of base money. Unanticipated changes in $B$ and $B^*$ change aggregate spending and the demand for labor. The qualitative effects of $B$ and $B^*$ on spending are the same, but the quantitative effects differ.

Real shocks were introduced in the aggregate supply functions of classical and Keynesian theory to represent the effects of changes in weather, degree of monopoly, technological change and the like. In an open economy, real shocks to supply at home and abroad affect output and employment under fixed and floating exchange rates. Floating exchange rates permit countries to offset the effects of foreign shocks on domestic output, as shown earlier, but to do so policy authorities require information about the magnitude of effects and the duration of the shock. Policy changes introduced to offset shocks can increase uncertainty as Friedman noted years ago. Friedman (1953)

Real shocks to spending have been neglected in previous chapters. Velocity was assumed constant in our discussion of the classical theory and equal everywhere.

In our discussion of Keynesian theory, the demand for money was treated as certain. Here and in later chapters changes in government spending and in tax rates induce changes in the demand for money and in aggregate spending which in turn change the demand for labor. We continue to treat output as a composite good, so the composition of spending in each country does not change, but changes in the composition of world demand affect relative prices in an open economy and also change the demand for labor, employment and real wages.
Temporary and Persistent

Shocks may be temporary or persistent. A major problem faced by individuals or firms when choosing a course of action is to distinguish the two - to decide on the duration of shocks. To a farmer deciding to expand or contract acreage knowledge of weather patterns is not certain knowledge. Rainfall or sunshine shift within distributions that can be described by fixed means and constant variances, but there are, also, shifts in distributions. Climate in various parts of the world has changed; formerly productive regions become arid, and arid regions become more productive.

The problem of duration requires a choice of whether the pattern observed in weather, sales, births, deaths, rates of return or any other variable is best regarded as a drawing from a distribution with given mean and variance or as a change in the mean and variance. Feller ( ) shows that long runs of observations above and below the mean may occur before it is proper to reject the hypothesis that the mean is unchanged.

Nominal shocks present a similar problem. Although it has become conventional to describe all changes in price level as "inflation," the expected duration of price changes is relevant for asset choice and for decisions about the allocation of purchases over current and future periods. Between the extremes of one-time changes in money stock, government spending, or any other policy variable and permanent changes in the rate of change lies a term structure of expected rates of change. For the individual or firm deciding on a rational course of action, some answer must be given to the question: Are current observations on the growth of money or government spending best regarded as a
change in the mean of the distribution or as drawings from a distribution with unchanged mean?

The answer to this question and decision about duration or expected duration are not the same for everyone. The duration relevant for decisions by the day trader in financial markets is shorter than the duration relevant on average, so day traders will respond to changes that others regard as transitory and likely to be reversed in the near term. Changes in expected duration are most important when costs of adjustment are high. The importance of expected duration in choosing when and how workers and employers respond makes it useful to look at the decision problem faced by workers and firms.

The Supply of Labor

Friedman's (1957) theory of consumer behavior emphasizes the distinction between permanent and transitory income— or between income defined as an expected stream and current receipts. Workers prefer smooth to variable streams of consumption. If receipts are variable, consumption can be smoothed by accumulating assets or lending when current receipts exceed desired or planned consumption and by reducing asset stocks when current receipts are less than consumption.

Consistency requires that workers allocate sufficient time to earn the expected income required to satisfy their consumption plans. The concept of expected income implies that, up to the horizon relevant for his consumption plan, a worker plans to supply hours of labor at an expected wage rate that, in sum, equals the value of his expected labor income. Income from property is assumed to be constant. Expected income for each worker is $y_e$.
where \((\frac{w}{P})^e\) is the worker's expected real wage, \(L^e\) is the expected supply of manhours of labor standardized to allow for differences in productivity, and \(r\) is the rate of discount. If \(0 \ldots T\) describes the worker's remaining lifetime and planned lifetime consumption is equal expected income, as is often assumed, \(y^e_i\) equals the value of current and future consumption.\(^9\) Formally, we can follow Friedman (1957) and describe the individual's decision as the maximization of the utility of consumption:

\[
U = U(C_0, \ldots, C_T)
\]

subject to

\[
y^e_i = \sum_{t=0}^{T} C_t \left( \frac{1}{1+r} \right)^t
\]

The individual allocates labor and capital to earn \(y^e_i\). The timing of consumption and the timing with which labor services are supplied are related, but distinct, problems. The latter, not the former, governs individual's labor supply.

Smooth streams of consumption do not imply or even require smooth streams of receipts or smooth rates of purchase. Consumption is a measure of the rate of use and in Friedman's permanent income hypothesis is related to expected income. Purchases measure the rate of acquisition. Workers with the same expected income and different streams of receipts may purchase at different rates, hold inventories and consume at the same rate. Workers with highly variable streams may anticipate...
that over their lifetimes, they will supply fewer hours of work at a higher real wage per hour. This is accomplished, for example, by receiving a premium (overtime) for hours in excess of some maximum number of hours per week. Workers with variable streams of receipts receive higher wages per hour if additional compensation is required to induce workers to accept variability of receipts. Papers by Azariadis (1975) and Baily (1974) develop the analysis of risk sharing in labor markets but do not distinguish between smooth consumption and variable receipts. Whether workers with smooth consumption receive compensation for variability of receipts depends on the relation between the number of workers who prefer smooth to variable receipts and opportunities for employment at relatively variable or constant employment.

When choosing his occupation, a worker is aware that seasonal and cyclical fluctuations occur. Construction workers and farmers anticipate that weather causes substantial fluctuations in receipts. Workers entering durable goods industries are aware that employment is more variable cyclically in the durable goods industries than in industries producing non-durables or in the civil service. The variability of receipts that characterizes each occupation is known to workers choosing the occupation and governs their anticipation of the time path of receipts. As long as receipts are interpreted as a drawing from a distribution with unchanged mean, a workers long-term anticipation is unaffected by the variability of actual receipts. It is only when the observed stream of receipts causes the worker to change his estimate of the true mean that his behavior changes.
Differences between observed and anticipated variability of receipts affect consumption by changing the cost of smoothing consumption and by changing the anticipated mean. A run of positive or negative deviations from the mean changes the anticipated mean income, the consumption associated with that income and the supply of labor. Changes in variability and in anticipated mean induce workers, including new entrants to the labor force, to supply labor so as to adjust the return from occupations with different variability and to adjust real wages and labor supply to market conditions.

Workers in different age groups may have the same anticipation about the stream of future earnings yet have different responses to fluctuations in current and future earnings. A prolonged recession lowers the wealth of young and old. Both spread the loss over current and future consumption and leisure. Because they are poorer, workers consume fewer goods and less leisure and work more in the future than they would have worked if the recession had been avoided. For the older worker, time to retirement is shorter, so there is a shorter span within which the current loss can be distributed. Seniority provisions are a means by which younger workers reduce the cost of variability for the current generation of old workers. In exchange, they get a reduction in the cost of variability when they are old.

In eq. (4.1) a worker maintains constant lifetime income by supplying more labor when wages are high and less labor when wages are low. A rise in current w/p relative to the average anticipated \((w/p)^c\) is matched by a rise in current L relative to average hours worked. A worker, therefore, does not smooth receipts to smooth consumption but, instead, increases the variability of receipts by supplying more labor when current real
wages are high and less labor when real wages are low. Smoothing real receipts to smooth consumption requires the opposite pattern: a workers would supply more labor when wages are low and less when wages are high.

The labor supply function for an individual worker, consistent with eq. (4.1) is

\[ L^s = \tau_i \left[ \frac{w}{p_t} \right] \left( \frac{w^e}{p^e} \right) \tau_1 > 0 \quad \tau_2 < 0. \]

Expected real wages depend on expected income. Labor supply increases as current real wages rises relative to expected wages. Increases in \( \frac{w^e}{p^e} \) increase the future earnings anticipated by the worker, so he supplies more labor in the future and less labor now. Recreation and other non-labor activities have lower current and higher future prices when \( \frac{w^e}{p^e} \) rises relative to \( \frac{w}{p} \), so more current hours are directed to non-labor (leisure) activities. Current and future real wages rise in the same proportion, labor supply in each period is assumed to increase.

Consistency imposes an additional constraint for the aggregate. The sum of the expected incomes of all workers and owners of capital cannot exceed the aggregate income of the community for the same period. To obtain the income expected by suppliers of labor and capital, we sum the individual expectations; \( y^e \) is the present value of income expected to be produced in the community in each of the next \( T \) years. We assume a constant population, a given, unchanging age composition, and let \( T \to \infty \) to obtain the community's expected income.

\[ y^e = \sum_{i=1}^{T} y^e_i. \]

Given \( y^e \), there is a unique \( \frac{w^e}{p^e} \) that workers expect to receive on average for an hour of work.
The aggregate supply function is obtained by summing \( L_i^s \) for the population. The current supply, \( L^s \), depends on current and anticipated future wages and in anticipated near-term output.

\[
(4.2) \quad L^s = L \left( \frac{w}{p}, \frac{w^e}{p^e} \right) \quad L_1 > 0; \quad L_2 < 0.
\]

A rise in the current real wage, given \( y^e \), induces workers to supply additional manhours now and fewer manhours in the future. A rise in anticipated future wages, given \( y^e \), encourages workers to reallocate hours of work from present to future. For the aggregate, leisure and other non-labor activities are assumed to be normal goods that increase with expected income, so increases in \( y^e \) increase the current and future supply of labor by changing \( \frac{w}{p} \) and \( \frac{w^e}{p^e} \).

An increase in expected inflation \( w^e \) and \( y^e \) constant, raises \( p^e \) relative to \( p \). Current labor supply increases and expected future supply falls as workers reallocate labor to equate the return to work in different periods. An equiproporionate increase in \( w^e \) and \( p^e \), however, leaves expected real wages unchanged and has no effect on supply.

Workers distinguish types of technical change in eq. (4.2). Technical change affects \( y^e \) and therefore \( \frac{w^e}{p^e} \), but labor-saving and labor-augmenting technical change have different effects on current and future wages. To the extent that the effects are anticipated, they affect the current and future supply of labor by changing anticipated wages.
Technical change is a type of real shock. All permanent or persistent real
shocks affect the labor supply by changing \( \frac{w^e}{p^e} \), but temporary or transitory shocks do
not. Temporary real shocks affect labor supply only if they change \( \frac{w}{p} \) or are
erroneously interpreted as permanent. Temporary nominal shocks affect \( L^s \) only
to the extent that workers in the aggregate fail to distinguish real and nominal
changes correctly.

The Demand for Labor

Each firm's demand for labor is derived from the solution for current output
that equates current expenditure to current supply. As in our discussion of
classical theory, eq. (2.6) above, aggregation of individual production functions yields
the long-run expected output of the community. Expected long-run supply depends
on capital and labor and on permanent shocks to supply denoted \( \varphi \).

\[
(4.3) \quad y^e = F(K, L; \varphi)
\]

Equation (4.3) is not a technological relation between inputs and maximal
output. That interpretation of (4.3) leads to Keynes's problem of explaining why
long-run unemployment is not removed by wage and price adjustment. Our long-run
normal output, or full employment output, is the optimal output for given social
institutions and conventions, represented by \( \varphi \). As long as social institutions for
distributing risk and allocating returns do not produce optimal investment and
consumption, output and employment can be increased in principle by removing
distortions and changing social institutions. $^{10/}$ $F(K, L; \phi)$ is the output expected to be produced with efficient use of resources under current and expected institutions and conventions. Maximal employment differs from full employment output and is reached only if all private and public institutions and arrangements are chosen to minimize waste. $^{11/}$

All positions of long-run equilibrium are at $y^*$, but short-run positions are not. Temporary and permanent, real and nominal shocks are not easily distinguished. Suppose in a non-growing economy, with fixed productive capital, the short-run supply function is

$$y = y^* (\frac{w}{p}, \phi) \epsilon.$$ (4.4)

The supply of output changes directly with the price level and inversely with the real wage. Permanent shocks, $\phi$, shifts the short- and long-run supply curves. Temporary supply shocks cause actual supply to fluctuate around the level anticipated by producers. Temporary shocks are, as before, denoted by $\epsilon$, a random variable with unit mean and constant (log) variance.

In the long-run equilibrium of a stationary economy, the rate of purchase and the rate of consumption coincide. Real and nominal shocks to expenditure cause spending to differ from current consumption by the net accumulation of durable assets. Households spend and accumulate assets when current real receipts, $y$, exceed expected income, $y^*$, and reduce spending when current receipts are less than expected income.
Friedman (1957), Darby (1978) Firms increase inventories when costs of production are lower than average anticipated costs. For the present, let real spending depend on the domestic price level, $p$, and a vector of policy variables and other shocks, denoted $q$.

\begin{equation}
(4.5) \quad y = d(p, z)
\end{equation}

Short-run equilibrium output is at the intersection of the spending and short-run supply curve. The equilibrium position depends on all real and nominal shocks, and all shocks that have been observed are reflected in the prices of assets and output. The short-run equilibrium position depends, also, on current beliefs about the duration of shocks.

Producers hire labor to produce short-run equilibrium output. The current demand for labor depends on current output and on costs of producing in current and future periods. Firms increase finished goods inventories when costs of production are lower than average anticipated costs. Real and nominal shocks shift the demand for labor by changing current spending and the aggregate supply curve of output. The demand for labor is

\begin{equation}
(4.6) \quad L^d = f\left(\frac{w}{p}, y, \frac{w^e}{p^e}\right) f_1 < 0; f_2, f_3 > 0
\end{equation}
The labor market reaches long-run, steady state equilibrium if three conditions are met. There are no real shocks; \( \phi \) is constant, and \( e = 0 \). Producers' expected output equals the income expected by suppliers of labor and capital services; expectations about streams of real income are consistent as to amount and timing.

There is a common expectation of equilibrium prices (or rates of change) equal to the actual price level (or rate of change). When the three conditions are met, and maintained, employers pay and workers accept \( w^e = w \) per standard hour of labor; workers supply and firms demand the number of manhours of labor, \( L_n^e \), that produce long-run normal output equal to \( y^e \) per period.

Long-run equilibrium on the labor market is shown in the lower panel of Figure 4.1 at the intersection of \( L_0^d \) and \( L_s^e(y^e) \). The number of manhours is \( L_n^e \) and the real wage is \( \frac{w^e}{p^e} \). The output market is shown in the upper panel. Equilibrium output \( y^e \) is at the intersection of \( d_0^e \) and \( y_0^e \). This output is produced using \( L_n^e \) manhours of labor and yields a stream of consumption services equal to expenditure \( y^e \).

[INSERT FIGURE 4.1 HERE]
The Short-Run Position

Suppose that a shock to spending lowers real expenditure to \( d_1 \) so that output falls to the short-run equilibrium, denoted \( y^s \) in Figure 4.1. Employers reduce the demand for labor in response to the reduction in output. The reduced demand for labor is shown as \( L^d_1 \).

Alternatively, assume that, with spending unchanged at \( d_0 \), a real shock to supply shifts the short-run supply curve from \( y_0 \) to \( y_1 \). Again, short-run equilibrium output is at \( y^s \). Fewer workers are required to produce \( y^s \), so the demand for labor falls to \( L^d_1 \) as before.

The reduction in the demand for labor following the negative shock to spending or to supply lowers the real wage at which the labor market reaches short-run equilibrium. To find the equilibrium real wage associated with \( L^d_1 \), workers and employers must distinguish spending and supply shocks. The reason is that the unambiguous effect on money and real wages resulting from the reduction in output is mixed with the effect of the change in prices. Prices rise in response to the reduction in supply and fall in response to the reduction in spending, so the price change reinforces the reduction in money wages induced by the decline in spending and offsets, to some degree, the effect of the supply shock.

Although workers and employers can expect to make errors when predicting the equilibrium price level, we do not expect the errors to be systematic. To simplify the complex inference problem and recognize the empirical evidence cited in our discussion of the first stylized fact, we limit our discussion to the choice of real wages and employment.
Employers offer a real wage equal to the marginal product of labor. Workers choose a real wage and the associated employment that maximizes the utility of consumption. Their decision depends on the expected duration of the shock.

If the shock is perceived as permanent, workers and employers accept \( y^s \) as a position of long-run equilibrium and reduce real wages and expected income to the new conditions. The reduction in expected or permanent income is distributed between current and future periods and between the consumption of goods and leisure. Employment falls to \( L_1 \) and real wages are reduced correspondingly. If the shock is perceived as temporary, there is a loss of real wealth to be spread between current and future periods, so some reduction of real wages occurs. For convenience of exposition, we neglect this adjustment.

The workers response to a temporary shock is defined by two polar positions. They can maintain real wages and reduce hours of work to \( L_0 \). This choice is described by the disequilibrium \( L \cdot L_0 \cdot \frac{w^e}{p^e} \) in Figure 4.1. Or workers can distribute the loss of current earnings between real wages and hours of work by choosing to work \( L_1 \) hours at the associated short-run equilibrium wage. This choice involves a movement along the labor supply curve \( L^s (y^e) \).

The choice of \( L_1 \) rather than \( L_0 \) implies that workers respond to all shocks, whatever the expected duration, by reducing real wages. They smooth consumption by reducing real wages and employment when output is low and by increasing real wages and
employment when output is high. Observations by economists from Thornton to Keynes and beyond suggest that workers in the aggregate do not behave in this way.

Workers are aware that real and nominal shocks introduce fluctuations into the demand for products of individual firms, into aggregate spending and output. They recognize that fluctuations affect the demand for their services and the market clearing price. A reduction in currently anticipated receipts has very little effect on \( y^e \) or wealth. Workers spread the loss over current and future consumption by supplying more labor over their lifetimes. Because long-term expectations change very little, labor is reallocated from periods of low real wages to periods of high real wages. Similarly, shocks to supply or to spending that temporarily raise short-run output above the long-run expectation, \( y^e \), induce workers to offer more labor than is consistent with the labor supply function \( L^s(y^e) \). A sustained or permanent increase spending and output induces workers to move along \( L^s(y^e) \); a temporary change does not.

Workers do not ignore information about the current position of the economy and the expected duration of shocks. The timing of a recession or an expansion may be unknown; the duration of a particular shock is uncertain and difficult to anticipate precisely. Workers in our analysis, however, estimate the real wage at which they can obtain employment and use the information when deciding whether to seek work at the lower real wages expected to prevail in recessions and at the higher real wages expected to prevail during expansions.
A worker's current and anticipated near-term output asks: Is this a drawing from the anticipated stream of receipts that this occupation generates, or has the mean of the distribution shifted? If he believes the mean has changed, he moves along $L^s(y^e)$ and $\frac{w^e}{p^e}$ changes. Otherwise, he estimates the real wage he could expect to receive if he acts as a price taker. This wage, $\frac{w^a}{p^a}$, depends on his estimate of the current and near-term position of the economy. His rational expectation of current real output is $y^a = E_i(y^s)$ where $y^s$ is the short-run equilibrium output shown in Figure 4.1; the anticipated short-run equilibrium real wage, $\frac{w^a}{p^a}$, depends on current and near-term conditions summarized by $y^a$ and the vector of policy variables denoted $z$.

Equation (4.7) shows the worker's supply of current and anticipated future hours of labor, the individual's labor supply function, $L^s_i$:

\[
L^s_i = g_i \left[ \frac{w}{p}, \frac{w^a}{p^a} (y^s_i, z), \frac{w^e}{p^e} \right] g_1, g_2 > 0; g_3 < 0
\]

Equations (4.7) imply that increases in the current real wage induce workers to reallocate hours of work from future to current periods. Increases in $\frac{w^a}{p^a}$, given $\frac{w}{p}$, reduces current and increase anticipated future hours of labor supplied. Current labor supply increases, at unchanged real wages, as the anticipated near-term output of the economy rises.
Aggregation of eq. (4.7) yields the aggregate labor supply function.

\[(4.8) \quad L^s = g \left[ \frac{w}{p}, \frac{w^a}{p^a} (y^a, z), \frac{w^e}{p^e} \right] \quad g_1, g_2 > 0; g_3 < 0 \]

Figure (4.2) shows the equilibrium position of the labor market at the intersection of \(L^d\) and \(L^s\) given by eqs. (4.6) and (4.8). The \(L^s(y^e)\) curves are reproduced from Figure 4.1. Eq. (4.8) is shown as the g-curve.

Workers information or beliefs about the duration of the shock induces a shift in labor supply. Instead of accepting the full reduction in real wages implied by a temporary shock, \(w^a/p^a\) an Figure 4.2, workers reduces short-run hours to \(L^d_2\) and raise current real wages to the position shown as \(w/p\). The relation of \(w/p\) to \(w^a/p^a\) and \(w^e/p^e\), and the relation of \(L^d_2\) to \(L^d_0\) and \(L^d_1\) changes as information arrives to clarify the current situation. The longer \(L^d_1\) is expected to remain unchanged, the more the change is regarded as persistent and the closer is the g - curve to \(L^s(y^e)\).

The more transitory the shock, the closer is \(L^d_2\) to \(L^d_0\) and \(w/p\) to \(w^e/p^e\). Construction workers do not reduce expected income (\(y^e\)) very much when it rains. Workers in durable goods industries do not substantially change \(y^e\) in mild recessions.\(^{12}\)

Similarly, when \(L^d_1\) is temporarily to the right of \(L^d_0\), the g - function lies to the right of \(L^s(y^e)\).
Figure 4.2
Whenever we observe the labor market, it is in a position of short-run equilibrium. The real wage and associated equilibrium employment are obtained by solving eqs. (4.6) and (4.8) for \( w \) or \( w/p \) and \( L \). The responses depend on the derivatives of the labor demand \( f \) and supply \( g \) functions. The vector \( z \) is omitted. Actual output, \( y \), varies around anticipated output, \( y^a = y^s \).

\[
y = y^a + \varepsilon
\]

(4.9) \[
w = w(y, y^a, \frac{w^e}{p^e}) p \quad w_1, w_3 > 0; w_2 < 0
\]

(4.10) \[
L = L(y, y^a, \frac{w^e}{p^e}) \quad L_1, L_2 > 0; L_3 \leq 0
\]

Responses to Real and Nominal Shocks

Table 4.1 shows the response of \( w \) and \( L \) to real and nominal shocks. Temporary real shocks change \( y \) and \( y^a \) relative to \( y^e \); permanent or persistent real shocks change \( y^e \) and therefore change \( p^e \) relative to \( w^e \). Temporary and one-time nominal shocks change \( p^e \) relative to \( p^e \); permanent nominal shocks change \( p^e \) and \( w^e \) in the same proposition.

We assume that the \( w \) and \( L \) functions are linear in the logarithms.
Table 4.1

Labor Market Responses to Real and Nominal Shocks

<table>
<thead>
<tr>
<th>effect of:</th>
<th>w</th>
<th>effect on</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\epsilon$</td>
<td>$w_1 = \frac{f_2}{g_1 - f_1} &gt; 0$</td>
<td>$L_1 = \frac{f_2 g_1}{g_1 - f_1} &gt; 0$</td>
<td></td>
</tr>
<tr>
<td>$y_a$</td>
<td>$w_1 + w_2 = \frac{f_2 - g_2}{g_1 - f_1} &lt; 0$</td>
<td>$L_1 + L_2 = \frac{f_2 g_1 - f_1 g_2}{g_1 - f_1} &gt; 0$</td>
<td></td>
</tr>
<tr>
<td>$p$</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>$e$</td>
<td>$-w_3 = \frac{f_3 - g_3}{g_1 - f_1} &lt; 0$</td>
<td>$-L_3 = \frac{f_3 g_1 - f_1 g_3}{g_1 - f_1} &lt; 0$</td>
<td></td>
</tr>
<tr>
<td>$w$</td>
<td>$w_3 &gt; 0$</td>
<td>$L_3 &gt; 0$</td>
<td></td>
</tr>
</tbody>
</table>
A temporary real shock to supply \( e \neq 1 \), shifts the supply of output in the direction of the shock. Positive shocks increase supply and lower the price level; negative shocks reduce supply and raise the price level. The demand for labor and employment change in the same direction as short-run equilibrium output. Money wages may change in either direction or remain unchanged. The direction in which money wages change and the size of the response depends on the slope of the expenditure curve and on \( w_1 \) in Table 4.1. The response of money wages to \( e \), using \( \Delta \) to represent one-time changes, is

\[
\frac{\Delta w}{w} = \frac{\Delta p}{p} + w \frac{\Delta y}{y}.
\]

In classical theory, the slope of the spending curve is -1 and a sufficient condition for rigid wages in response to real shocks is \( w_1 = 1 \). In the more general case, money wages change by less than the price level, so real wages fall in response to temporary reductions in supply and rise following temporary increases.

Temporary shocks result from unforeseen changes in domestic or foreign money, changes in taxes and government or foreign spending. Short-run equilibrium output and prices change in the same direction as the shock. Employment, real and money wages rise and fall together, but real wages rise less than money wages. When the shock reverses, prices, output, wages and employment return to their previous values.

Fluctuations in output, or business cycles, give rise to changes in actual and currently anticipated output. Suppose there is a decline in output or a recession; output is less than full employment output, \( y^e \), but equals the output currently anticipated, on average, by workers; \( y = y^a \). Table 4.1 shows that employment, \( L \), rises and falls
with $y^a$, but money wages may rise, fall or remain unchanged. Our analysis suggests that workers will lower real wages, the size of the reduction depending on the loss of real wealth and the duration of the recession. Real and money wages will appear rigid and unresponsive to changes in employment and real output that characterize a typical expansion or contraction.

Fully anticipated fluctuations and unchanged expectations are an extreme case. In every recovery and recession, expectations change. Some interpret the observed or anticipated change in real spending as evidence that lifetime income has changed. A severe recession or slow recovery encourages the belief that $y^e$ is lower; a mild recession, a fast recovery or a long expansion raise $y^e$. Markets convert the interpretation into current prices for assets, output and labor. In the labor market, changes in long-term expectations affect real wages by changing $w^e$ relative to $p^e$. The belief that recession will be more mild than previously anticipated raises anticipated real wages, increases $w$ but has an uncertain effect on employment. A fully anticipated inflation changes $w^e$ and $p^e$ equiproportionally and has no effect on wages or employment. A rise in current prices with expected prices, and wages unchanged, raises the current money wage but has no effect on employment. The effects of one-time changes in price levels differ from the effects of inflation, though the difference is not recognized in many studies relating unemployment and the rate of price change.
Interpreting Unemployment

The current legal definition of unemployment in the United States treats a worker as unemployed if he is described as having looked for work at least once in a four week period. Other developed countries use similar definitions and treat all cyclical unemployment as a loss of output. In Figure 4.2 the distance $L_n - L_2$ is unemployment as conventionally defined and measured.

Our interpretation of unemployment starts from the distinction between permanent and transitory income - or between income defined as an expected stream and current receipts. A worker who experiences a cyclical "lay off" has no reason to reduce his real wage. As long as his experience is consistent with the anticipations he held when he chose his job or career, as modified by subsequent experience, he regards unemployment as a drawing from the anticipated distribution of time between labor and leisure that he used to determine expected lifetime earnings and consumption. Each day of lay off contains information leading to a revision of anticipated income, but each day of lay off has little effect on workers accustomed to cyclical swings in employment and output.

Every day of lay off is counted as part of measured unemployment, but as long as income anticipations are not revised, expected income changes very little and the worker is not unemployed in an economic sense. A worker becomes unemployed when he revises, downward, his permanent or expected income. Once he believes that current and future earnings are inconsistent with his consumption plan, his income and expected consumption fall, so he reduces his current real wage and his expected future wage. The supply curve of labor in Figure 4.2 shifts from $g$ toward $L^e(y)$. Real wages fall.
The distinction between income and receipts or between expected and actual output carries over to employment and unemployment. Workers are unemployed, in an economic sense, when expected income and consumption fall.

Differences from Classical and Keynesian Theories

Keynes (1936, p. 15) called unemployment "involuntary" if a rise in the price level that reduces real wages increases employment. The definition and its subsequent use by Keynesians and policymakers ignores two distinctions. One is the distinction between anticipated and unanticipated price and wage changes, the other the distinction between anticipated income and current receipts. The first distinction has been clarified in the extended discussion of the Phillips curve, but the degree to which fluctuations in employment are anticipated remains.

The classical interpretation of unemployment differs from the Keynesian interpretation. The quotation from Thornton, (1965, pp. 118-19), reproduced in chapter 2, does not deny the possibility of cyclical unemployment. On the contrary, Thornton describes unemployment as "unusual and temporary distress" arising for reasons that are widely known as Keynesian: Money wages are more rigid downward than prices. For Thornton, however, money wages are rigid upward as well if anticipated inflation remains constant.

Thornton's characterization of unemployment as "unusual and temporary distress" is no less ambiguous than Keynes' term, "involuntary." The mechanism producing employment is clearer, however. For classical theorists, cyclical fluctuations in employment and output are a consequence of real shocks acting on the quantity of commodities currently demanded by shifting supply and of monetary disturbances acting on spending. Shifts in aggregate spending and in aggregate supply induce larger fluctuations in prices than in money wages, so real wages change inversely to the
price level when spending increases and change directly with the price level when supply increases. Unemployment and real wages are positively related following a reduction in spending but are negatively related following a reduction in supply. Thornton (1965, pp. 237-9) is explicit about the relation of prices and output.

Classical writers did not, as far as we know, provide an economic explanation of the slower adjustment of wages than of prices. Keynes, like Thornton, first assumes that wages are slow to adjust then offers an explanation based on a particular set of assumptions about anticipations. (1936, Chap. 19).

The permanent income theory of employment recognizes the difficult inference problem faced by individual workers and employers in an economy subject to real and nominal shocks. Relative prices and the general price level change. A worker who is layed off cannot be certain whether the change is permanent or temporary, the result of a real or nominal shock. He is uncertain whether he will soon return to work at the anticipated real wage, as many do, or must seek a new career. An offer to reduce real wages in recession to maintain employment introduces variability into expected income and consumption for the purpose of smoothing current receipts. Lifetime consumption and utility are reduced. The permanent income theory gives no reason for workers to reduce real wages as long as anticipations are unchanged.

Workers as a group cannot expect to find a set of consistent contract provisions that maintain both employment and real wages when there are unanticipated real and nominal shocks that change prices and output. The best they can do is reduce the cost of fluctuations in receipts to the minimum cost consistent with the risks inherent
in nature, trade and social arrangements. Contractual arrangements distribute the cost of bearing risk among the labor force. Seniority provisions of formal and informal contracts were mentioned earlier as a means of reducing the cost of fluctuations to individuals or particular groups.

Seniority clauses are not the only means by which workers adjust to the risks inherent in nature, trade and monetary or social arrangements. Those with a strong preference for stability of receipts enter occupations or industries where anticipated variability is low, as in the civil service, or predictable, as in teaching, utilities, or most consumer non-durables.

Social policies that reduce measured unemployment during recessions increase measured real income only if workers substitute current labor for current and future leisure. If permanent income is unaffected by employment policies, the long-run supply of labor is unaffected also. Employment today is exchanged for future leisure. Workers gain from the exchange to the extent that they prefer to choose periods of employment and leisure or if they have positive time preference and are permitted to reduce the variability of receipts without sacrificing income.

In contrast, Keynesian theory treats all cyclical changes in receipts as involuntary unemployment. Unemployment compensation is paid to redistribute the private costs of unemployment more evenly. The loss of unemployment becomes mainly a social loss — the output we would have had in a fully employed economy.
Classical theorists described cyclical unemployment as unusual and temporary. The permanent income theory provides a firmer foundation for their interpretation and an explication of the terms "unusual" and "temporary." If anticipated or permanent income remains approximately constant during mild cycles, there is little loss of output. Cyclical fluctuations change receipts relative to income, but have little effect on income. Unemployment compensation smooths receipts but can change income only to the extent that real wages do not fully adjust to the reduced variability of receipts.

Permanent income is not immutable for individuals or for society. During this century, experience in Britain during the twenties and thirties and in many countries during the thirties or the sixties probably changed anticipations of lifetime earnings. A long depression reduces anticipated income and the rate of increase of real wages; a long expansion probably increases anticipated income, thereby encouraging workers to anticipate fewer layoffs. Quitting and increasing "absenteeism" are some of the means workers use to distribute increases in permanent income between goods and leisure. The permanent income theory of employment does not deny that economic unemployment occurs.

The Stylized Facts Again

The permanent income theory of employment has implications for the relation of real and money wages and other features of labor markets. This section considers the implications for the five stylized facts that summarize some principal observations about labor markets.
Real and money wages show no consistent lead or lag pattern during cycles. The cyclical response of real and money wages depends on the nature of the shocks that cause output to fluctuate and on the duration. Unanticipated, positive, temporary real shocks to supply and unanticipated increases in money raise money wages. But the real shocks to supply lower and the nominal shocks to spending raise the price level; real and money wages move in opposite directions following the real shock but not following the monetary shock. Permanent real shocks that increase expected output raise real wages but can do so by raising money wages or by lowering the price level. Permanent nominal shocks raise money wages and prices in proportion and leave real wages unchanged.

Evidence on the historical relation of real and nominal wages contains no information about wage rigidity. The permanent income theory of employment is consistent with the evidence cited by Marshall (1926), Dunlop (1939), Keynes (1939) and others. A lag of real wages behind money wages or of money wages behind real wages has implications for the type of shocks that dominated particular periods, not for the existence of short-run equilibrium in the labor market. The theory is consistent with the first stylized fact.

The second and third facts are the persistence of unemployment and the weak association between measures of excess demand and the rate of wage change. Changes in employment, the level of measured unemployment, or its reciprocal are common measures of excess demand. Table 4.1 shows that changes in employment and money wages move in the same direction when there are temporary shocks to supply. In many other cases, wages and employment (or unemployment) appear
to be unrelated. Cyclical changes in spending change employment but the response of
money wages depends on the relative effects on the supply and demand for labor.

Unemployment persists if real wages remain below expected real wages, $w^e$. Accumulation
of information enables workers to distinguish gradually between the various types of
shock and speeds adjustment. Prolonged recession reduces anticipated income and lowers
wages. Persistent price increases enable workers and employers to distinguish between
price changes and maintained inflation.

Much of the recent literature on labor markets discusses either types of contract
or the role of search. The fourth and fifth stylized facts reflect this literature. There
are many different types of wage agreement. The occurrence of unemployment does
not depend on the type of contract, and the number measured as unemployed is not
readily explained by a desire to search for a better job. The permanent income theory
does not rely on a particular type of contract or require the unemployed to search for work.
On the contrary, the theory implies that one reason for "quits" is to adjust the distribution
of hours between labor and leisure so as to return to the long-run supply curve of
labor implied by workers' expected income.

Comparison with Phillips Curves

Several of the stylized facts were developed in the attempt to find a relation
between the rate of wage change and the level of unemployment. This relation,
known as the Phillips curve, has generated a large literature. Several surveys of
inflation provide a guide to the literature. Frisch (1977), Gordon (1976) and
Laidler and Parkin (1975) are notable examples.

Phillips curve theory and the permanent income theory are alternative theories of wages and employment. A typical Phillips curve relates the relative rate of change of money wages to some measure of excess demand and a measure of expected inflation. No distinction is generally made between changes in the price level and changes in the rate of inflation. All shocks, real and nominal, transient or persistent that affect excess demand are expected to have the same effect per unit on the rate of change of wages. All maintained changes in prices, whether one-time changes or sustained rates of changes, also have the same effect per unit. A commonly used measure of anticipated inflation, the weighted average of past rates of price change, treats all price changes as equivalent. The permanent income theory implies that the responses differ.

A fundamental difference in interpretation arises in the treatment of unemployment or excess supply. The Phillips curve implies that the difference between current and full employment output or measured unemployment affects the current rate of wage or price change but does not alter anticipations.

The permanent income theory of employment implies that measures of excess supply affect the rate of wage change mainly by changing anticipations. Workers and employers recognize that the economy is in a boom or a depression and adjust anticipated output and the anticipated rate of price change to reflect the position of the economy. The labor market response appears as an adjustment of labor supply. The gap between current output and full employment does not appear, however, as a variable explaining wages or prices.
The failure of Phillips curves to predict wage and price changes in the thirties is well-known. Samuelson and Solow (1960) showed, very early, that during the periods of highest unemployment in this century, there is little association between the rate of price or wage change and excess demand. The Phillips curve predicts the relation; the permanent income theory of employment does not.

The permanent income theory implies that a Phillips curve is likely to be found when two conditions are met. Nominal shocks predominate, so output prices and employment rise and fall together. Workers and employers are uncertain about the degree to which price changes are temporary or permanent. Continued or intermittent inflation changes the anticipated duration of price changes. The measured lag of prices or wages changes behind excess demand become shorter. Attempts to trade-off employment and inflation fail.

Conclusion

This chapter presented a theory of employment and unemployment that differs in several respects from Keynesian and classical theories. Unemployment is a measure of the distance between short- and long-run equilibrium positions of the labor market, not a result of the inability of workers to find employment by reducing real wages.
Social policy is based on the Keynesian analysis of unemployment that treats cyclical increases in unemployment as involuntary. Our theory denies that most unemployment is involuntary. Workers in industries subject to fluctuations in production are aware that fluctuations have occurred in the past and they anticipate fluctuations in the future. When a run of negative or positive deviations causes anticipations to change, wages and employment change. In mild cycles, therefore, we expect real wages to change very little. Available evidence for many countries seems consistent with this inference.

The problem of fluctuations in labor markets, and in the economy, arises from the inability of workers or their employers to distinguish real and nominal shocks or to predict accurately the duration of fluctuations. Information is not available in prices of assets or outputs that permit correct inferences to be drawn. Our analysis of asset markets in chapters 5 and 6 attempts to show why current prices of real and nominal assets can reflect available information and anticipations yet be wrong.
Footnotes to ch. 4

1 See Chapter 2, p________

2 Modigliani does not recognize that Keynes rejected Dunlop's evidence as irrelevant. In Keynes (1939, p. 35), Keynes restricted the hypothesis quoted above (1936, p. 10) to the short-run when employment changes in response to changes in spending. In other cases, "[w]age changes which are not in the first instance due to changes in output, have complex reactions on output which may be in either direction according to circumstances and about which it is difficult to generalize" (Ibid, p. 35). A few pages later (p. 37), Keynes showed that Marshall's generalization holds for recoveries and recessions from 1880 to 1886 but not for the period 1886 to 1914.

3 A relation of this kind is not far fetched. Barro's measure of the real minimum wage, denoted MINW, is inversely proportional to nominal average hourly earnings, the denominator of MINW (1977, p. 107). MINW has a positive coefficient in the regression, so a fall in money wages with constant unanticipated money growth raises unemployment. Unanticipated reductions in money growth raise unemployment and, by lowering the actual growth rate of money, lower the rate of (price and) wage change and raise the real value of minimum wages. Barro's equation implies that, when unanticipated money growth is constant, real wages must rise to reduce unemployment.
A related "fact" is the appearance of clockwise and counter-clockwise "loops" in various periods. The loops, measured at a given level of unemployment, show that the rate of wage change may rise or fall as the level of unemployment rises or falls. Laidler and Parkin (1975) has an extended discussion of this issue.

A problem with much of the evidence on which we rely is that it is based on surveys that ask why workers were separated and whether they are looking for work. The definition of "looking" is left to the respondent who need not be the person counted as unemployed. See Feldstein (1975) for a brief description of the question and answer. The reported differences between job losers and job leavers seem too large to be assigned in their entirety to misrepresentation by respondents.

Grossman (1977) draws a similar conclusion in his survey of contract theory.

In chapter _______, we show why this difficulty arises.

Friedman's widely cited contribution to the theory of employment (1968) does not rely on the distinction between permanent and transitory income but emphasizes the distinction between anticipated and unanticipated changes in wages or nominal income. Permanent or expected real income is held fixed to concentrate on the effects of inflation on output.

The constant term in eq. (4.1) also includes all non-pecuniary income from money and other assets. Services like "liquidity" and pride of possession are part of income available for consumption but are not included in income produced. Taxes and government services are ignored until later chapters.
The optimal set of social institutions produces the optimum tax structure size of government, incentives, degree of monopoly and the like. Government removes distortions up to the point at which the marginal cost of removing distortions equals the marginal benefit. See Prescott (1977) for discussion along these lines.

In the terminology of Hick's ( ) *Theory of the Trade Cycle*, the ceiling is maximal output. Actual output remains at the ceiling only if we reach a steady state (no shocks) with unchanging optimal institutions. The appropriate choice of institutions is a central issue in discussions of rules versus authority, but the issue is much broader and involves political-economic interaction over a wide range of institutions.

The problem of explaining why short- and long-run anticipations can differ yet remain rational in the sense of Muth (1961) is taken up in Chapter 5.

Superimposed on the changes in anticipations are the changes in real wealth that occur during expansions and contractions. Reductions in current wealth increase the supply of labor and reduce consumption and spending. Reductions in spending lower the demand for labor. The effect of wealth on real wages is positive, therefore, but the effect on employment is ambiguous. The wealth effect runs counter to the effect of $y^A$ in Table 4.1.

Feldstein (1975) discusses some of the ways in which the definition is applied.