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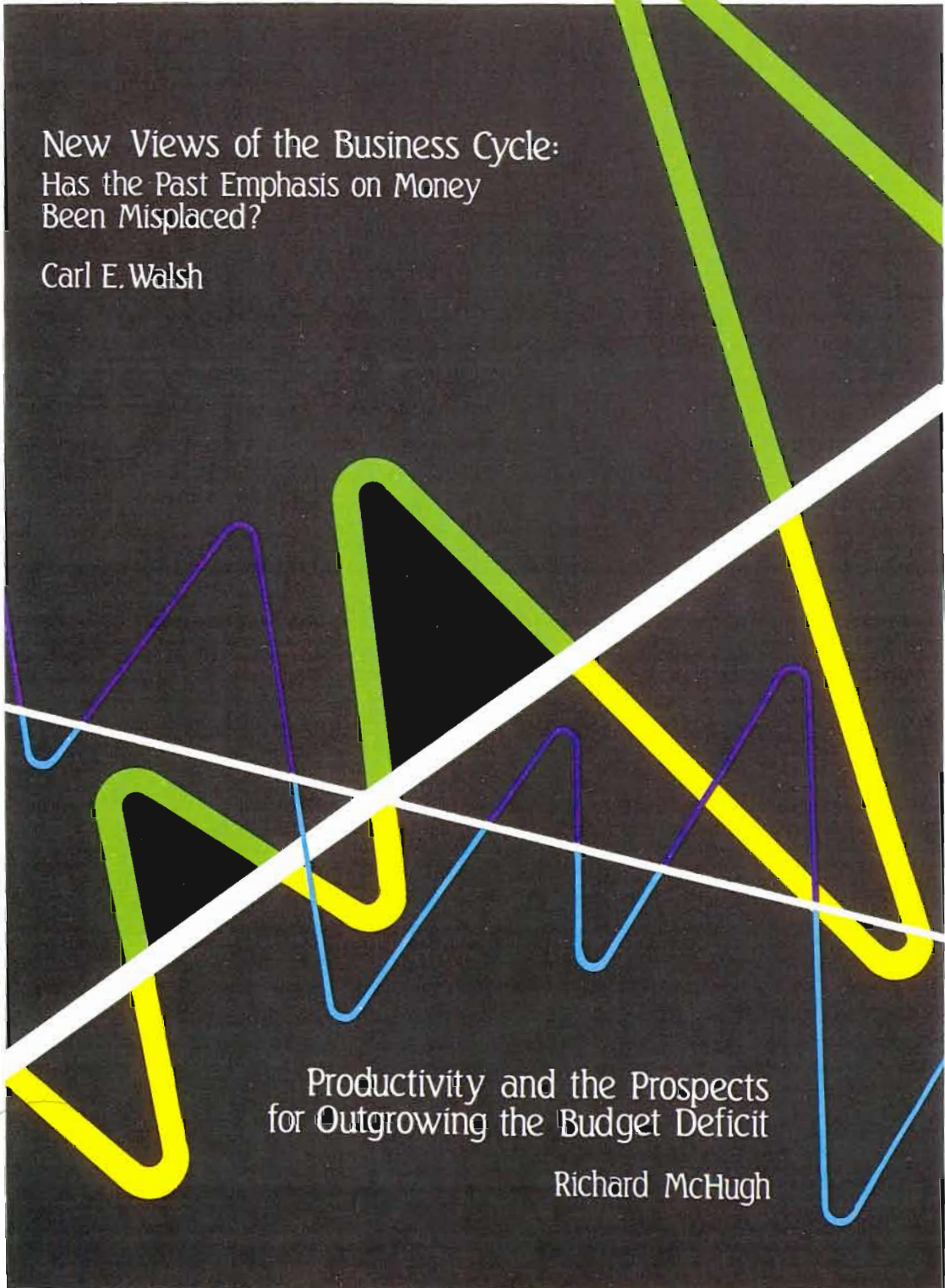
JANUARY • FEBRUARY 1986

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Has the Past Emphasis on Money
Been Misplaced?

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Productivity and the Prospects
for Outgrowing the Budget Deficit

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Ten Independence Mall
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Carl E. Walsh

What causes the national economy to "shift gears" and swing from months or years of expansion to sustained periods of contraction, and vice versa? For some time, the close link between money and GNP has been the cornerstone of the theory that changes in the money stock—monetary shocks—cause business cycles. Recently, however, an alternative theory has been proposed. It argues that "real" economic events, such as oil supply shocks, or changes in productivity trends, cause business cycles, implying that the money-GNP link is not a cause, but an effect. Empirical tests reveal that each theory has some strong points—and some weak points. And, perhaps, the theories may not be exclusive explanations of business cycles, but, rather, complements.

PRODUCTIVITY AND THE PROSPECTS

FOR OUTGROWING THE BUDGET DEFICIT 15

Richard McHugh

Some analysts claim that the U.S. economy is poised for a productivity upsurge, resuming or even surpassing the trend established in the 1960s. The rationale is that the factors that may have driven productivity down in the 1970s, such as the makeup of the labor force, heavy regulation of business, energy price shocks, and so on, are not likely to recur. But is the upsurge going to be strong enough to outgrow the budget deficit? Estimates suggest that even productivity growth as high as in the 1960s is not enough to reach that goal in the next ten years. Moreover, consensus forecasts about productivity for the next few years are well below the 1960s levels.

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New Views of the Business Cycle: Has the Past Emphasis on Money Been Misplaced?

Carl E. Walsh*

Monetary policy has been a central element in virtually all analyses of business cycles during the past twenty years. Many analysts claim that fluctuations in the growth rates of monetary aggregates are the dominant factor causing cycles in real economic activity and in the rate of inflation. Recently, however, economists have seen a

revival of interest in the role played by non-monetary events in causing business cycles. This revival has led to the development of *real business cycle theories*. Real business cycle theories take the view that historical cycles in the U.S. have been caused largely by “real”—rather than monetary—shocks, such as sharp changes in supplies of raw materials, shifts in productivity, or technological changes. These theories show how such “real” shocks, whether striking the economy as a whole or confined initially to one sector, can cause a business cycle.

A major impetus to the development of real business cycle theories was the general agreement that oil and food supply shocks, rather

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than monetary shocks, were the primary causes of the 1974-75 recession. Another is that monetary theories' predictions about some key economic quantities—like real wages—do not mesh with empirical observations. Real business cycle theories, unlike their monetary counterparts, offer a simple explanation of the observed behavior of real wages over the cycle. At the same time they offer a consistent explanation of the cyclical behavior of monetary aggregates and many other key economic quantities. In their current form, real business cycle theories suggest that most of the cyclical movement of U.S. real output can be explained by nonmonetary factors, and that money has played predominantly a passive role in past business cycles.

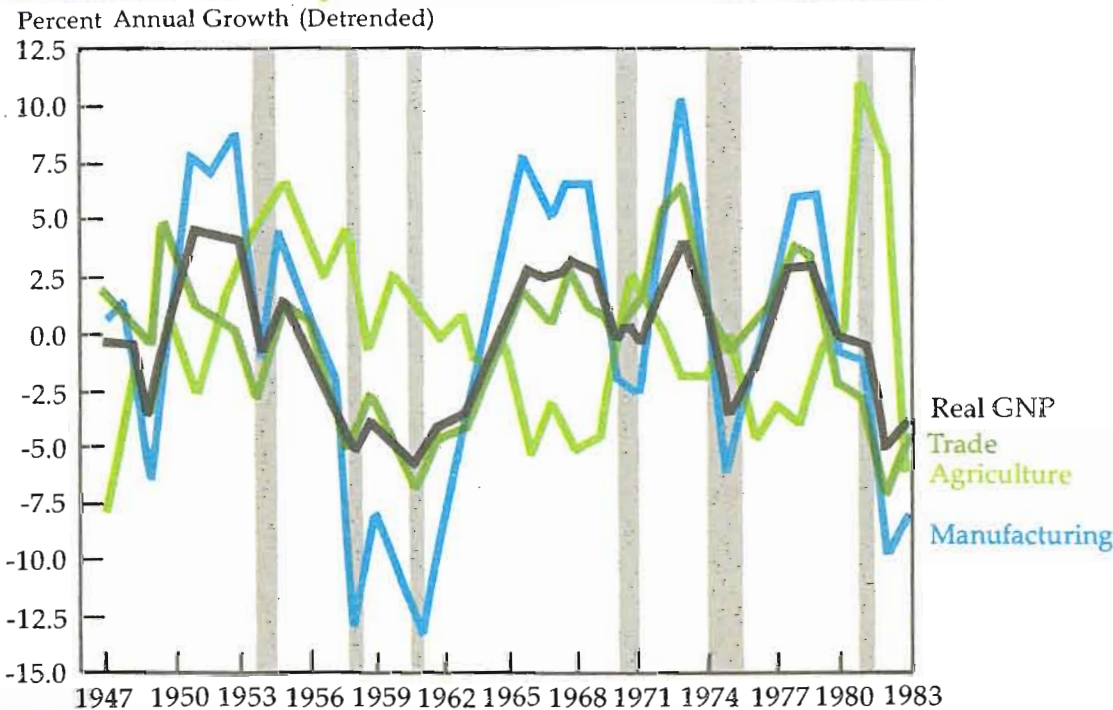
The investigation of modern real business cycle theories is in its infancy. At this stage the formal models that are being developed do not allow any role for monetary shocks. There are, however, good reasons to believe that both "real"

shocks and monetary shocks have a role in business cycles (see A CASE HISTORY OF A REAL BUSINESS CYCLE? p. 13) The hope is that the continuing investigation and the development of these theories will sharpen our understanding of U.S. business cycles, and that this understanding will lead to better economic policies.

WHAT IS A BUSINESS CYCLE?

A simple definition of a business cycle is that it consists of parallel and persistent expansions and contractions in output across most sectors of the economy. The National Bureau of Economic Research, for example, identifies a recession in a business cycle as a *widespread* contraction in the output of goods and services (real GNP) that *persists* for two or more consecutive quarters. Fluctuations in the level of output that occur only in a single sector of the economy do not constitute a business cycle. Figure 1 illustrates this feature of business cycles in the U.S.; it

FIGURE 1
OUTPUT IN MAJOR SECTORS MOVES WITH REAL GNP



NOTE: Shaded regions denote business cycle contractions as dated by the National Bureau of Economic Research. In order to bring out clearly the cyclical behavior of each series, an estimate of trend growth rate has been subtracted from each series. The trend growth is estimated by regressing the log of real GNP on time and time squared.

shows fluctuations of real output in agriculture, manufacturing, and wholesale and retail trade from 1948 to 1983. While the movements are similar, different sectors do not move in exactly the same way. For example, wholesale and retail trade conforms much more closely to the movement in real GNP than does agricultural output.

In addition to being widespread, the rise and the fall of both aggregate and sectoral output persists over time in a business cycle. During an upturn, real output typically expands for several quarters before reaching a peak and reversing direction. For example, the average expansion (trough to peak) during the period from October 1949 to November 1984 was 15 quarters. Similarly, contractions are characterized by several consecutive quarters of very slow or negative growth. Contractions historically tend to be shorter than expansions; contractions averaged 3.6 quarters over this same period. Of course, these averages can hide much of the variation that distinguishes one cycle from another. For example, the shortest complete cycle during this period lasted only 18 months (January 1980 - July 1981), while the longest lasted 116 months (April 1960 - December 1969).

The behavior of real GNP is the criterion by which business cycles are measured, but many other important economic quantities move with the business cycle. For example, the money stock (as measured either by M1 or M2) tends to grow faster than average during expansions and slower than average during recessions—that is, it behaves *procyclically*. Also, employment, inflation, investment, and capacity utilization behave *procyclically*. Real wages (wages expressed in terms of their purchasing power) and the size of the labor force are generally *procyclical*, but their relation to real GNP is not as obvious. Unemployment, on the other hand, rises above its average value during recessions and falls below it during expansions—it behaves *countercyclically*.

Any theory of business cycles is an attempt to explain the essence of how some economic

events—often referred to as shocks—can initiate cycles, and how such shocks can lead to the parallel and persistent movements in real GNP that characterize business cycles. Monetary theories of business cycles, and the more recent real business cycle theories, describe this cyclical behavior according to two different perspectives on how the economy works. These perspectives have different implications not only for the causes of cyclical behavior of real GNP, but also for other important economic quantities, such as the monetary aggregates, real wages, and the labor force.

A MONETARY PERSPECTIVE ON BUSINESS CYCLES

The standard monetary theories of business cycles argue that changes in the money stock are a major cause of fluctuations in real economic activity. A recession, for example, would be explained by a decline in money growth—a monetary shock. Such a fall in money growth could be policy-induced, or it could result from events affecting the banking industry, such as major regulatory changes. The slowdown in money growth results in a temporary shortage of money and credit, which causes interest rates to rise. The rise in interest rates slows real spending, particularly investment spending and purchases of durable goods. Initially firms respond to the slowdown in spending on their products by cutting back production and laying off some workers. The laid-off workers also reduce their spending, which causes further drops in the demand for goods and services and spreads the decline throughout the economy. As demand drops, firms slow the rise in their prices, and they accept lower profit margins in an attempt to maintain their sales; in some sectors prices may even fall.

According to these monetary theories, wage rates do not decline immediately along with prices, however. Rather, wages adjust slowly because of the existence of multi-year contracts which often have built-in raises, and because of the general practice of adjusting noncontract

wages infrequently, usually once a year. Therefore, as inflation slows, real wages rise, and with them the real labor costs to firms. Employment falls further and the recession worsens. Unemployment rises because the laid-off workers cannot find work elsewhere at the going wages, since wages fall only slowly in response to the decline in the demand for labor. This is a key feature of these monetary theories, because it is the sluggish wage adjustment that is responsible for the rise in unemployment. If nominal wages and other prices adjusted readily, then monetary shocks would not cause business cycles in these theories.¹

If no other shocks occur, the higher unemployment and lower inflation associated with the recession eventually will lead to smaller wage increases, or to wage concessions, as new labor contracts are negotiated and noncontract wages and salaries gradually adjust. Firms start hiring more labor as real wage costs moderate. Output, employment, real wages, and the labor force return gradually to their trend growth rates. These trend growth rates are determined by such fundamental factors as the population growth rate, the rate of technological change, and people's attitudes towards work, leisure, and saving.

Different economists have emphasized differ-

ent aspects of this general story, and they often differ over how long a monetary expansion or contraction affects real activity. However, most economists share this general view of how monetary fluctuations would cause business cycles. Most economists also would agree that such money-induced business cycles have been common in the U.S. To assess how well monetary theories account for business cycles it is useful to see how they stand up to the evidence from U.S. business cycles. If they describe business cycles accurately, then two of the fundamental features of their mechanism should be apparent in economic data. First, fluctuations in the rate of growth of the money supply should be related closely to cyclical fluctuations in real GNP. Second, real wages should tend to be counter-cyclical, rising after the onset of the recession—which worsens the recession—and falling during the early part of expansions—which allows the return to trend growth.²

Money and Real GNP Behave As Predicted . . . Over the period from 1960 to 1984 there is, on the whole, a close relation between the growth rate in real GNP and the growth rate of M1 (see Figure 2). Thus, M1's cyclical pattern is roughly consistent with monetary theories of the business cycle.³ While the relation between money and real output is prominent, it is not characterized by any rigid link; rather, as Milton Friedman has claimed frequently, the relation is characterized by "long and variable lags."

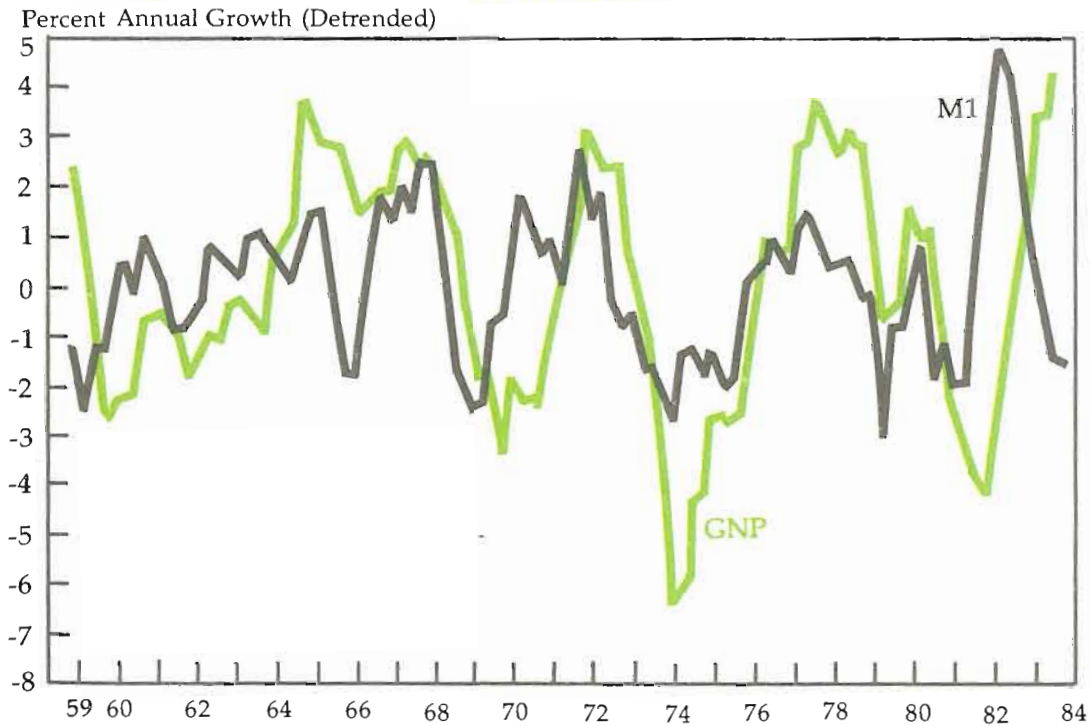
. . . But Real Wages Do Not. Over the period from 1950 to 1982 real wages do not show the

¹The widely accepted version of the "monetary theory" discussed here requires that goods prices and/or wages adjust slowly to economic events. In this sense the monetary theory of business cycles depends on temporary disequilibria in some markets. More recent monetary theories of business cycles do away with the assumption of slow price and wage adjustment, and instead attribute cyclical behavior to incomplete information. In these theories, only unanticipated changes in the money supply matter. The empirical evidence on the success of these new monetary theories is mixed, at best. See R. Barro, "Unanticipated Money, Output and the Price Level in the United States," *Journal of Political Economy*, (August 1978), pp. 549-580; F. Mishkin, *A Rational Expectations Approach to Macroeconomics*, (Chicago: University of Chicago Press, 1983); R. McGee and R. Stasiak, "Does Anticipated Monetary Policy Matter?" *Journal of Money, Credit, and Banking*, (February 1985), pp. 16-27.

²Naturally, monetary theories predict the behavior of most other important economic variables as well, such as real interest rates, investment, and so forth. The discussion here focuses on real wages because real wage behavior is a crucial aspect of the workings of both monetary and real business cycle theories, and because the two theories differ in their predictions of real wage behavior.

³Taking an even longer perspective, Milton Friedman and Anna Schwartz, in *A Monetary History of the U.S. 1867-1960* (Princeton University Press, 1963), document a similar relation between money growth and real GNP for over a century.

FIGURE 2
THE GROWTH RATES OF M1 AND OF REAL
GNP FOLLOW EACH OTHER CLOSELY



NOTE: In order to bring out clearly the cyclical behavior of each series, an estimate of its trend growth rate has been subtracted from each series. The trend growth is estimated by regressing the log of each variable on time and time squared.

countercyclical movement that monetary theories predict. For instance, the real hourly earnings index of the Bureau of Labor Statistics is procyclical (see Figure 3, p. 8). During each recession since 1950 (except the 1981-82 recession), this index fell relative to its trend. Also, many studies find procyclical behavior in sector-by-sector real wage data.⁴ This discrepancy between the mone-

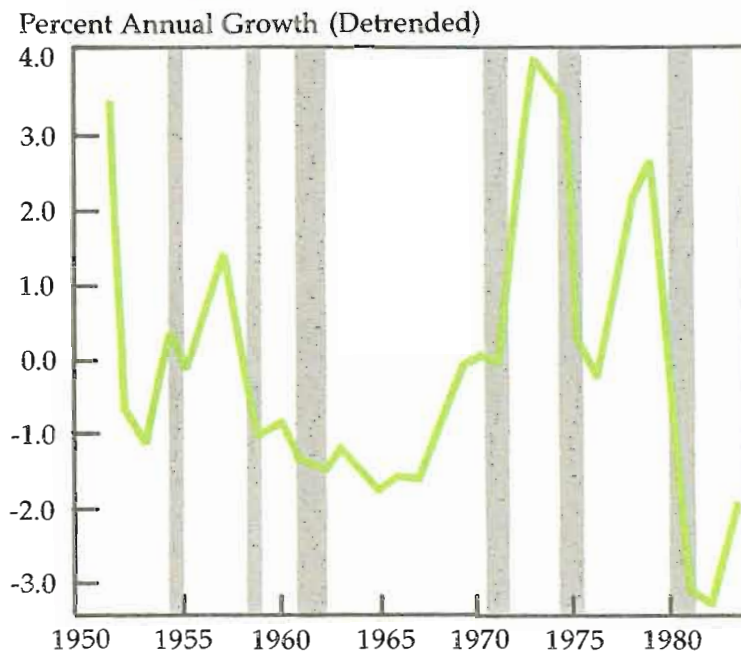
tary theories' predictions and the actual behavior of real wages over cycles represents a serious weak point in monetary models.

Some attempts have been made to modify monetary theories to account for the procyclical behavior of real wages. These attempts show that the cost to employers of laying off and rehiring

⁴R. Bodkin, "Real Wages and Cyclical Variations in Employment: A Re-examination of the Evidence," *Canadian Journal of Economics*, (August 1964), pp. 353-374, finds real wages to be procyclical. J. Altonji and O. Ashenfelter, "Wage Movements and the Labor Market Equilibrium Hypothesis," *Economica*, (August 1980), pp. 217-245, argue that changes in the average manufacturing real wage are not cyclical in nature at all. However, J. Heckman, in "Comment on Ashenfelter and Kydland," in *Essays on Macroeconomic Implications of Financial and Labor Markets and Political Processes*, (Carnegie-

Rochester Conference Series on Public Policy, Volume 21, Autumn 1984) pp. 209-224, points out that industry-by-industry data do reveal procyclical behavior of real wages. Also see M. Mitchell, M. Wallace, and J. Warner, "Real Wages Over the Business Cycle: Some Further Evidence," *Southern Economic Journal* 51,4 (April 1985), pp. 1162-1173. S. Neftci, in "A Time-Series Analysis of the Real Wages-Employment Relationship," *Journal of Political Economy* (April 1978), pp. 281-291, suggests that real wages and employment are negatively related if account is taken of the dynamic aspects of their relationship.

FIGURE 3
THE INDEX OF REAL MONTHLY EARNINGS
IS PROCYCLICAL



NOTE: In order to bring out clearly its cyclical behavior, this series is adjusted by subtracting the estimated trend growth from the growth rate. The trend growth is estimated by regressing the log of the index on time and time squared.

workers, and the ability of employers to offer overtime, may make measured real wages procyclical, while the underlying straight-time hourly rate may be countercyclical. For instance, if a temporary rise in the real hourly wage reduces the firm's demand for labor, it may respond by cutting back overtime employment first. Since firms have to pay a premium for overtime, this reduction in overtime may cause the average wage paid by the firm to fall, while the underlying straight-time hourly rate is rising.⁵ However,

real wage measures—such as the earnings index in Figure 3—which correct for this shift between overtime and straight-time pay, still reveal a procyclical pattern.

A more conspicuous weakness of monetary theories has been their inability to account for the 1974-1975 recession, the most severe since World War II. This shortcoming helped encourage the formulation of real business cycle theories which look for "real" shocks as the source of protracted upturns or downturns in real GNP from trend. Real business cycle theories suggest that business cycles are caused primarily by the ripple effect of "real" shocks as they work their way through the economy. Indeed, the procyclical behavior of real wages is an integral part of real business cycle theories, and, at the same time, these theories offer a possible explanation for the close relation between money growth and real GNP.

⁵See R.E. Lucas, Jr. "Capacity, Overtime, and Empirical Production Functions," *American Economic Review* (May 1970), pp. 23-27, T. J. Sargent and N. Wallace, "The Elasticity of Substitution and Cyclical Behavior of Productivity, Wages, and Labor's Share," *American Economic Review*, (May 1974), pp. 257-263, and T. J. Sargent, "Estimation of Dynamic Labor Demand Schedules under Rational Expectations," *Journal of Political Economy*, (December 1978), pp. 1009-1055.

THE REAL BUSINESS CYCLE PERSPECTIVE

Real business cycle theories, like monetary theories, emphasize that the economy's trend real growth rate is determined by nonmonetary factors (population growth, technological innovation, consumer preferences, and so forth). Prices and wages constantly adjust if shortages or surpluses occur in any of the markets. These adjustments serve to keep the economy close to its trend growth. In the view of real business cycle theorists, any apparent sluggishness of some prices and wages is not of sufficient importance to prevent the economy from remaining close to its trend growth. From this perspective, then, fluctuations in real economic activity are attributed to changes in the real, nonmonetary factors, which determine this trend growth.⁶

Business cycles arise in these theories when "real" shocks change the economy's real productivity or wealth, and upset the economy's equilibrium. "Real" shocks can take a variety of forms, such as the disruption in oil supplies in the 1970s, shifts in demand from one sector of the economy to another, or a technological change like the development of computer microchips. Strikes and productivity shifts in specific industries are further examples, as are shifts in household attitudes towards saving or working.⁷ These changes then set in motion economy-wide adjustments in consumption, production, labor supply, and saving that ultimately re-establish a new equilibrium. The important contribution of

real business cycle theories has been to explain how these adjustments to "real" shocks can generate business cycles.

To understand better how "real" shocks can cause business cycles, suppose there is a temporary decline in one sector's productivity that reduces real income in that sector. Initially, this reduction in real income leads individuals who earn their living in that sector to decrease their consumption of goods and services from their own and all the other sectors. However, people generally do not reduce immediately their current consumption by the full amount of the temporary decline in their real income. Instead, they want to spread over time the effect of the real income reduction by decreasing both their planned consumption and their planned saving. This response of consumer demand not only causes the initial real income shock to spread to other sectors of the economy, but it also means that it takes time before the economy can work its way out of the repercussions of the initial shock. Thus, real business cycle theories can explain both the parallel and the persistent movement in economic activity that marks a business cycle.

The decline in output induced by the initial "real" productivity shock leads firms to want fewer workers at the going wage. The developing slackness in the labor market causes workers to lower their wage demands promptly in an effort to get the relatively scarce jobs. Since, according to real business cycle models, wages adjust readily in response to market pressures, real wages fall temporarily. Thus real business cycle theories predict that real wages move in the same direction as real GNP—that is, procyclically—which accords well with observed behavior.⁸

⁶The recent work on real business cycles has its roots in earlier nonmonetary theories of the cycle. For a survey of the older theories, see Gottfried Haberler, *Prosperity and Depression* (Harvard University Press, 1960). Recent contributions include J. Long and C. Plosser, "Real Business Cycles," *Journal of Political Economy* (February 1983), pp. 39-69, and R. King and C. Plosser, "Money, Credit, and Prices in a Real Business Cycle," *American Economic Review*, (June 1984), pp. 363-380.

⁷Recent empirical studies of the role of real shocks include D. Lilien, "Sectoral Shifts and Cyclical Unemployment," *Journal of Political Economy* (August 1982), pp. 777-793, and J. Hamilton, "Oil and the Macroeconomy since World War II," *Journal of Political Economy* (April 1983), pp. 228-248.

⁸Strictly speaking, this prediction is true because real business cycle models emphasize supply shocks. However, certain "real" disturbances could lead to countercyclical real wage movements. Shifts in workers' tastes for leisure would cause real wages to fall (rise) as output rose (fell). Such disturbances, however, have not been emphasized in the literature on real business cycles.

A key mechanism that causes cyclical variations in employment in these models is the response of individuals to temporary fluctuations in real wages. The real wage earned by an individual represents the return to working. So, if the real wage is perceived to be low relative to its average level, the return to working is low temporarily, and workers will work fewer hours and have more leisure and lower incomes. This type of substitution between work and leisure can take a variety of forms. Employed workers might reduce their hours of work by limiting overtime hours or quitting second jobs. Individuals who had been unemployed and are looking for work may, in response to lower real wages, spend more time searching before taking a job, or they may stop searching altogether and drop out of the labor force. Such individuals perceive the benefits from more extensive job search, or from leisure, to outweigh the net gain from working at the temporarily lower real wage.⁹ Thus, according to these real business cycle models, the supply of labor falls in response to temporary real wage declines. One interesting aspect of the existing real business cycle models is that they do not allow for involuntary unemployment, because wages are assumed to respond readily to changes in labor supply and demand. Each individual is either working, does not wish to work, or else is in the process of searching for the best possible job, that is, voluntarily unemployed.¹⁰ Real business cycle theories

then predict that, just like real GNP and real wages, labor supply will fall (or rise) in response to an adverse (or favorable) "real" shock.

Labor Supply is Procyclical . . . Current empirical research finds that generally labor supply varies procyclically, in accordance with real business cycle theories.¹¹ However, the response of labor supply to real wages varies greatly across different demographic groups in the population. For example, working, married males respond only slightly to real wage changes. In contrast, the supply of labor by married females varies a great deal more with real wages. Much of this greater responsiveness is due to the effect real wages have on the decisions to enter or leave the labor force.¹²

. . . But It Is Not the Whole Story. Real business cycle theories hold that the cyclical variation in employment comes from cyclical variation in labor supply. Unfortunately, it is not clear whether this last prediction is consistent with observation.

1970), pp. 257-305. However, economists have developed models of labor markets that generate involuntary unemployment in equilibrium, even though prices and wages are fully flexible. Involuntary unemployment in these models is generated because firms use high wages to induce workers to perform well on the job. This type of behavior has not been incorporated into real business cycle models as yet. For a survey of this literature, see Janet Yellen, "Efficiency Wage Models of Unemployment," *American Economic Review* (May 1984), pp. 200-205.

¹¹The supply of labor, or the labor force, conventionally is defined as those individuals currently employed plus those who have actively sought work during the previous four weeks. That is, labor supply, or the labor force, consists of those employed plus those who declare themselves unemployed regardless of the reason.

¹²Orley Ashenfelter summarizes recent evidence in "Macroeconomic Analysis and Microeconomic Analysis of Labor Supply," in *Essays on Macroeconomic Implications of Financial and Labor Markets and Political Processes* (Carnegie-Rochester Conference Series on Public Policy, Volume 21, Autumn 1984) pp. 117-156. See also Joseph Altonji, "The Intertemporal Substitution Model of Labour Market Fluctuations: An Empirical Analysis," *The Review of Economic Studies*, Special Issue, (1982), pp. 783-824, and J. Heckman and T. McCurdy, "A Life-Cycle Model of Female Labor Supply," *Review of Economic Studies*, (January 1980), pp. 47-74.

⁹Households may also respond to permanent changes in real wages. However, since business cycle theories attempt to explain the factors leading to temporary deviations of output from its trend growth path, the focus has been on the role of temporary movements in real wages. Factors that might produce a permanent change in real wages would influence the economy's trend growth path. For a discussion of the responses of primary and secondary workers to real wage changes, see B. Horrigan, "The Flat-Tax Rate Controversy: A Guide for the Perplexed," this *Business Review*, (May/June 1985), pp. 3-15.

¹⁰See R. E. Lucas and L. E. Rapping, "Real Wages, Employment, and Inflation," in E. Phelps, et al., *Microeconomic Foundations of Employment and Inflation Theory*, (NY: W. W. Norton

U.S. experience shows that most of the cyclical variation in employment is accounted for by changes in the employment rate, rather than by changes in the supply of labor—the number of individuals seeking work or the number of hours each of these individuals wants to work. For example, only a relatively small fraction of the variation in total hours of employment in the U.S. private business sector is due to changes in hours per worker. Most is due to variation in the number of employed workers.¹³ Also, most of the variation in the number of employed workers is due not to variations in the number of individuals in the labor force, but to variations in the fraction of the labor force which is employed. Particularly during recession years, very little of the decline in total employment is explained by declines in the measured labor force. For example, in the recent recession year of 1982, only about 3 percent of the decline in employment was attributable to reductions in the labor force.¹⁴ While real wage movements may affect some individuals' decisions about whether to work at all and, if so, how many hours, variation from this source seems to account for little of the fluctuation in total employment that characterizes a business cycle.

Real business cycle theorists do have an explanation for this observation that changes in unemployment (rather than changes in the labor force) account for changes in employment. They claim that the collected unemployment statistics do not correspond correctly to the economic concept of unemployment—involuntary unemployment. They claim that many workers now counted as unemployed should not be counted in the labor force at all. These are workers who are not willing to work at the *going* wages and in *available* jobs, though they may want to work at their previous (higher) wages in their

former jobs. Also, there are some workers counted as unemployed who are spending their time searching the job market. These workers are employed in job search, which is a useful activity, and they are not unemployed in an economic sense. According to real business cycle theorists, if the unemployment and labor force statistics are adjusted to measure only involuntary unemployment, it would become clear that the bulk of changes in employment come from changes in the labor force, in accordance with the predictions of real business cycle models. Unfortunately, sufficient data are not available to make such adjustments to the statistics on unemployment and the labor force. Thus, the extent to which real business cycle theories fully account for movements in employment remains an open issue.¹⁵

An important challenge for real business cycle theorists is to give a consistent explanation of the cyclical behavior of money. Money's close relation to GNP during a cycle is the cornerstone of monetary theories, which view changes in the stock of money as the *cause* of cycles. Real business cycle theories, which posit nonmonetary shocks as the causes of cycles, have to show that the close relation between money and GNP is, instead, an *effect*.

REAL BUSINESS CYCLES: WHY IS MONEY PROCYCLICAL?

Real business cycle models explain the close relation between monetary aggregates and real output by focusing on the connection between the level of output and the demand for the transaction services money provides. Money is demanded because of its usefulness in lowering the transaction costs involved in transferring goods from their producers to their consumers. As output expands or contracts during a business

¹³BLS *Handbook of Labor Statistics*, Table 96. See also Heckman's comment on Ashenfelter and Kydland, footnote 4, above.

¹⁴BLS *Handbook*, Table 1.

¹⁵Most economists, however, would attribute this apparent inability to explain the magnitude of observed employment fluctuations to the real business cycle models' assumption that wages are flexible and can adjust quickly to equilibrate labor supply and demand.

cycle, so does the volume of transactions. Thus, the demand for money will tend to expand and contract along with real output.

Furthermore, according to real business cycle theories, an increase (or decrease) in the demand for money elicits an increase (or decrease) in the supply of money. A rise in output causes both the demand for money and interest rates to rise. As rates rise, banks attempt to reduce their holdings of excess reserves, which earn no interest, by purchasing interest-earning assets, such as government securities, or by making new private loans. Since all such new loans end up as demand deposits (or their close substitutes) at some bank, the money supply expands in response to a rise in market interest rates. This expansion occurs even if monetary authorities keep the total reserves supplied to the banking system unchanged.¹⁶ Consequently, broadly similar movements in the monetary aggregates and real GNP can result even if reserves supplied by the monetary authority to the banking system do not vary over the business cycle.

Real business cycle theorists also cite the Federal Reserve's operating procedures to help explain the close relation between money growth and real GNP after World War II. In most of this period, the Federal Reserve set short-term interest rate targets as a means of managing money growth. Under such a policy, if the demand for money increases, then the monetary authority attempts to counter the resulting higher interest rates by increasing reserves to the banking system, thus increasing the money supply. Given such an operating procedure, any disturbance that causes real output to vary would also cause the

money stock to change in the same direction.

The parallel movement of money and output, then, is consistent with both monetary theories and real business cycle theories, even though in real business cycle theories, fluctuations in money growth do not cause business cycles.

CONCLUSION

Real business cycle theories explain how "real" shocks in one or more sectors of the economy can generate output and employment movements across all sectors and through time—the hallmarks of business cycles. Thus real business cycle theories can account for recessions not obviously generated by monetary shocks. Real business cycle theorists, however, go further and argue that most observed business cycles in the U.S. have been caused by nonmonetary factors. Real business cycle theories also can account for the observed close correlation between monetary aggregates and real GNP—the observation that traditionally has provided the key support for monetary business cycle theories. In contrast to monetary theories, real business cycle theories also imply that real wages are procyclical, which seems consistent with the U.S. experience.

An apparent weakness of real business cycle theories, however, is that they rely on labor supply movements to explain the fluctuations in employment over a business cycle. It is not clear whether movements in the labor force can explain the actual fluctuations in employment that occur during a business cycle.

Perhaps the most important contribution of real business cycle models at this stage of their development lies in the reminder they provide that monetary shocks are not the only cause of business cycles. A more complete understanding of business cycles almost surely will require a broader theory that incorporates the key elements of both monetary and real business cycle theories.

¹⁶For extensive discussions of the money supply process, see S. Goldfeld and L. Chandler, *The Economics of Money and Banking*, 8th ed. (New York: Harper & Row, 1981) Chapter 6, or C. Henning, W. Pigott, and R. Scott, *Financial Markets and the Economy*, 3rd ed. (NY: Prentice-Hall, 1981), Chapter 4.

THE CASE HISTORY OF A REAL BUSINESS CYCLE? NOVEMBER 1973 - MARCH 1975

The recession that began in November 1973 and ended in March 1975 was the most severe since the end of World War II. From the fourth quarter of 1973 to the first quarter of 1975, real GNP fell by 4.8 percent, and the unemployment rate averaged 8.5 percent in 1975—up from 4.9 percent in 1973. Is it possible to identify “real” shocks to the economy that might account for this recession?

Two such shocks were much in the news at the time. First, 1972 marked the beginning of a series of bad harvests worldwide which continued into 1973. As a result, food prices rose dramatically. From December 1972 to December 1973, the food component of the Consumer Price Index (CPI) rose 20.1 percent. The second real shock was associated with the OPEC oil embargo and the energy price increases resulting from the Arab-Israeli War that started in October 1973. The energy component of the CPI rose 16.8 percent from December 1972 to December 1973, and another 21.6 percent from December 1973 to December 1974. In contrast, the CPI for all items other than food and energy rose only 4.7 percent from December 1972 to December 1973, and 11.3 percent from December 1973 to December 1974.^a The energy price increases and the resulting supply distribution difficulties reduced consumer real income and, since energy is a factor of production, reduced aggregate supply.

Real business cycle models predict that both current consumption and saving would fall as consumers attempted to spread the impact of such an income reduction over time. Consumption of food and autos did fall in the fourth quarter of 1973. Total consumption then rose slightly over the first three quarters of 1974 before collapsing in the last quarter. This large decline in the last quarter of 1974 is what made the recession so severe. But it is difficult to explain the timing of this decline as a response to any perceived new “real” shock to the economy.

As real business cycle models would predict, average real wages and the labor force both fell relative to trend during the recession. The average real wage in the private nonagricultural sector declined by 0.1 percent in 1973, by 2.8 percent in 1974, and by 0.7 percent in 1975. The labor force, as a fraction of the civilian population, fell by 0.2 percent in 1975. However, employment relative to the population fell by 3.1 percent.^b Hence, almost all of the fall in employment was due to a rise in the fraction of the labor force that was unemployed, and not to worker withdrawal from the labor force in response to the decline in real wages. Total labor hours in the private business sector did fall about 4 percent in 1975. However, only about one-eighth of this decline can be attributed to a fall in hours per worker. Almost all the reduction took the form of a decline in the number of employed workers.

While bad harvests and oil supply disruptions were shocks of the type emphasized in real business cycle models, there is evidence to suggest that monetary factors contributed to the onset of the recession in late 1973. M1 grew at an average rate of 8.3 percent during 1972, and it declined slightly in the first quarter of 1973 to 8.2 percent. It then decelerated, and averaged only a 4.7 percent annual growth rate during the last three quarters of 1973. Given the pattern of real GNP, the mechanism postulated by real business cycle models cannot explain fully these large changes in the growth rate of M1. Coinciding with this monetary deceleration was the removal of the remaining price controls during late 1973 and early 1974. The removal of price controls produced a rapid rise in all prices, and the real quantity of money fell 8 percent from the first quarter of 1973 to the first quarter of 1975. This analysis suggests that, while real disturbances played an important role in the recession, so did monetary factors.^c

^aData on the CPI are from the *Economic Report of the President*, (February 1985), Tables B55 and B56.

^bThe average growth rates for these series for 1962-1982 are .5 percent for real wages, .4 percent for the ratio of the labor force to civilian population, and .2 percent for the ratio of employment to civilian population.

^cA detailed discussion of this recession can be found in Alan S. Blinder, *Economic Policy and the Great Stagflation*, (NY: Academic Press, 1981).

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