

# Real Business Cycles: A Legacy of Countercyclical Policies?

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**B**usiness cycles have troubled market-oriented economies since the dawn of the industrial age. The upward march of living standards in capitalistic countries has been repeatedly punctuated by periods of markedly high unemployment rates and slow growth or an outright decline in the living standard of the average person. This alternating pattern of boom and bust is what the term business cycle means.

In an article published in 1986, Edward

Prescott forcefully argued that during the post-World-War II period, business cycles in the United States mostly resulted from random changes in the growth rate of business-sector productivity.<sup>1</sup> He showed that upswings in economic activity occurred when productivity grew at an above-average rate and downswings oc-

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<sup>1</sup>Edward Prescott is a professor of Economics at the University of Chicago and a long-time research consultant to the Federal Reserve Bank of Minneapolis. The antecedents of his views appear in an article he wrote with Finn Kydland in 1982 and in a 1983 article by John Long and Charles Plosser.

curred when productivity grew at a below-average rate.

Prescott challenged the dominant view that business cycles are caused by monetary and financial disturbances. According to that view, upswings in economic activity result from unexpectedly rapid increases in the supply of money, while downswings result from slow growth or a fall in the money supply. In contrast, Prescott and his collaborators presented evidence that business cycles of the sort seen during the postwar era would occur even if there were no monetary or financial disturbances.

John Long and Charles Plosser coined the term real business cycles to describe business cycles whose proximate causes are random changes in productivity.<sup>2</sup> Without a doubt, the most controversial aspect of real-business-cycle theory is its implications for countercyclical monetary and fiscal policies. Real-business-cycle theory appears to ascribe no importance to existing countercyclical policies. Moreover, it implies that some policies aimed at reducing the severity of business cycles are likely to entail more costs than benefits.

Both implications contradict long-held views. Indeed, these policy implications strike many economists as so outrageous that they simply dismiss real-business-cycle theory as false. Yet, the theory has successfully countered the many objections leveled against it.<sup>3</sup> As a result, macroeconomists are beginning to take it more seriously.

Of course, countercyclical policies are of paramount importance to the Federal Reserve System. As real-business-cycle theory gains increas-

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<sup>2</sup>In this context, the term real means that the business cycle is caused by factors not related to changes in the money supply.

<sup>3</sup>See my 1995 *Business Review* article for a more detailed discussion of real-business-cycle theory and an account of how well the theory has rebutted the criticisms brought against it.

ing acceptance among economists, an understanding of its policy implications becomes crucial. Consequently, this article briefly describes real-business-cycle theory, then turns to a discussion of its implications for countercyclical policies.

The policy lessons of real-business-cycle theory are more subtle than they appear at first blush. Although the theory ascribes no ostensible role to postwar countercyclical policies, its success in accounting for U.S. business cycles may be the clearest indication yet of the effectiveness of these policies. At the same time, though, the doubts raised by the theory about the wisdom of some policy initiatives to control business cycles may be well founded.

#### A PRIMER ON REAL-BUSINESS-CYCLE THEORY

Real-business-cycle theory uses changes in productivity to explain the cyclical ups and downs in economic activity. To understand the theory, we need to know what productivity means and how changes in it can cause booms and recessions.

The total output of an economy can be measured by the sum of *value-added* in all firms. The value-added in a firm during a quarter is the value of goods and services produced by the firm in that quarter less the value of goods and services purchased from other firms and used up in production in that quarter.<sup>4</sup> Clearly, total output is related to the total time people spend working in these firms and the quantity of producers'

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<sup>4</sup>Goods and services purchased from firms and used up in production in the same quarter are called intermediate inputs. When value-added is summed over all firms, purchases of intermediate inputs cancel out, and all that remains are goods and services sold to consumers and governments plus goods and services sold to firms but not used up in production during that quarter. Hence, total output could also be calculated as the value of final goods and services (i.e., goods and services that are not intermediate inputs) sold by firms during a quarter plus additions to inventory.

goods (such as machinery or buildings) that assist in production.

However, total output could also change if the effectiveness of the workers and equipment used in production changes. For instance, suppose a manufacturer of plastic products figures out some mechanical modification that reduces wastage of plastic, i.e., the modification allows the same quantity of products to be manufactured using less plastic. In that case, value-added at any given level of hours worked and equipment used will be higher. Economists refer to this change in the effectiveness with which workers and machinery generate value-added as a change in *total factor productivity (TFP)*.

The most important reasons TFP changes over time are improvements in the technology for producing goods and services (as in the example above) and improvements in workers' skills. However, TFP could also change for other reasons. For example, TFP rises when new products are invented and sold by firms or when the price of an imported input (such as oil) falls. TFP may fall when the government imposes stiffer environmental protection laws or when a drought reduces crop yields.<sup>5</sup>

According to real-business-cycle theory, an above-average rate of growth of TFP means that more than the usual opportunities exist for the gainful employment of labor and machinery. To exploit this bonanza, firms invest more than usual in buildings and equipment and hire more than the usual number of workers. The additional income generated by above-average TFP growth and by the increased production of buildings and equipment leads to an increase in consumption. Thus, macroeconomic variables such as total output, consumption, investment, and hours worked simultaneously rise above their respective long-term trends. Furthermore, a quarter of above-average TFP growth tends to be fol-

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<sup>5</sup>For a fuller discussion of factors affecting TFP, see my 1995 *Business Review* article.

lowed by more quarters of above-average TFP growth, so that the increase in macroeconomic variables tends to persist for some time. That is how real-business-cycle theory explains a boom. In an analogous fashion, real-business-cycle theory explains recessions as the result of several quarters of below-average TFP growth.

How well does this theory work? Charles Plosser calculated the values of several key macroeconomic variables predicted by the theory for the years 1954 through 1985 (Figures 1 and 2).<sup>6</sup> As is evident, the match between theory and facts is not perfect, but it is remarkably close. In a 1991 article, Finn Kydland and Edward Prescott calculated that real-business-cycle theory can account for about 70 percent of postwar business-cycle fluctuations in U.S. output.

To summarize, real-business-cycle theory uses fluctuations in the growth rate of TFP to explain business cycles. The theory gives a good account of the cyclical behavior of major U.S. macroeconomic variables during the postwar period. Still, since the theory leaves about 30 percent of the cyclical fluctuations in U.S. output unexplained, it doesn't offer a complete explanation of business cycles.

## LESSONS FOR COUNTERCYCLICAL POLICY

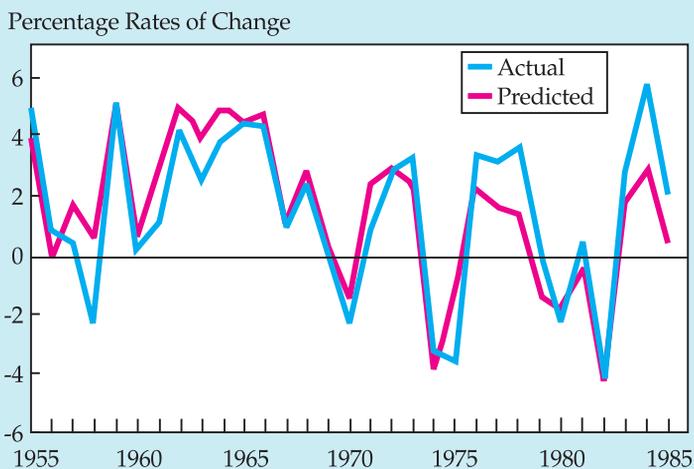
What lessons concerning countercyclical macroeconomic policies can be drawn from real-business-cycle theory? Many economists think that real-business-cycle theory implies that existing countercyclical policies aren't necessary. But is that really true?

Real-business-cycle theory simply calculates the optimal response to random variations in TFP growth for an economic model that resembles

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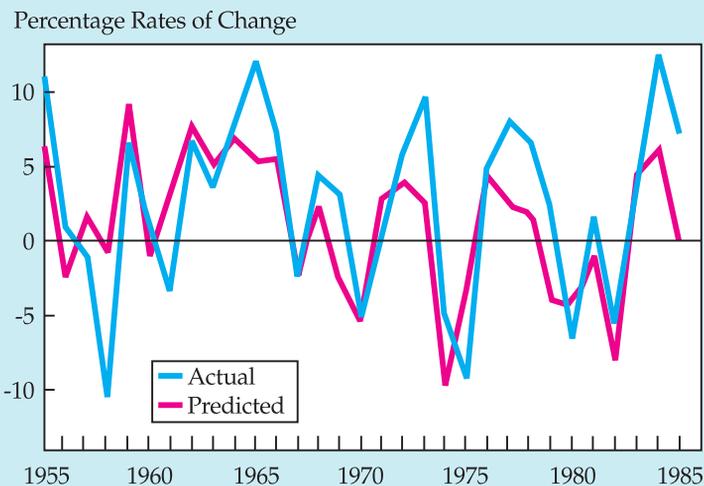
<sup>6</sup>These plots were taken from Charles Plosser's 1989 article, Figure 2 (p. 64) and Figure 4 (p. 65). To conserve space, the figures for consumption and hours worked were omitted. The reader may consult Plosser's 1989 article for the omitted figures and more detail about real-business-cycle theory.

**FIGURE 1**  
**Annual Growth Rate**  
**Of Real Output**



Reprinted, with permission, from Plosser, Charles I., "Understanding Real Business Cycles," *Journal of Economic Perspectives* 3, 1989, p. 64.

**FIGURE 2**  
**Annual Growth Rate**  
**Of Real Investment**



Reprinted, with permission, from Plosser, Charles I., "Understanding Real Business Cycles," *Journal of Economic Perspectives* 3, 1989, p. 65.

the U.S. economy in important respects. Prescott presented these calculations as a prediction of how the U.S. economy would *actually* behave when faced with erratic TFP growth. He made this connection by invoking a general principle of economics, namely, that competition tends to produce economically optimal outcomes.<sup>7</sup>

In other words, Prescott proceeded on the assumption that for the purposes of business-cycle analysis, the actual workings of the U.S. economy are well approximated by a model economy with *perfect markets*, that is, a model economy in which all markets are highly competitive and all markets function smoothly without any need for government regulation. Since, according to economic theory, a perfect-markets economy will generate optimal economic outcomes, Prescott simply calculated the optimal response of his model economy to fluctuations in TFP growth and took

<sup>7</sup>The principle dates back, in the guise of Adam Smith's famous "invisible hand," to the origin of modern economics. Smith was one of the first social philosophers to argue that intrusive regulation of commerce and industry is economically harmful. He argued that the freedom to form mutually advantageous contracts (unregulated markets) is the best guarantor of efficient economic outcomes.

these responses to be a prediction of how the *actual* U.S. economy would behave with respect to those same fluctuations. The close match between predictions and fact means that his assumption was not far off the mark; somehow, the U.S. economy manages to mimic a perfect-markets economy.

Real-business-cycle theorists' oft-repeated claim that the U.S. economy behaves like a perfect-markets economy has fostered the impression that the theory means the economy doesn't need countercyclical policies. However, the perfect markets of economic theory do not exist in the real world. The economic outcomes against which the predictions of real-business-cycle theory are compared have resulted from an interplay of *imperfect* markets and a vast array of laws, regulations, policies, and customs that help or hinder the workings of these markets. Thus, the important policy question raised by real-business-cycle theory is: Did postwar countercyclical policies *help* the U.S. economy attain its near-optimal business-cycle behavior or did they *hinder* it?

A question like this cannot lie too long without eliciting some response. And one came in a 30th anniversary review of Milton Friedman and Anna Schwartz's *A Monetary History of the United States, 1867-1960*.<sup>8</sup> The reviewer was Robert E. Lucas, Jr., a leading proponent of the monetary view of business cycles and a recent recipient of the Nobel Prize in Economics. Lucas used the review as an opportunity to trace the book's significance for subsequent developments in mac-

roeconomics. Toward the end of his review, he appraised real-business-cycle theory in the light of *A Monetary History*.

Unlike other critics of real-business-cycle theory, Lucas accepts the theory's central finding, namely, that TFP shocks can lead to "output variability of about the same magnitude as observed in the U.S. in the postwar period" and can realistically explain the behavior of other variables. Most important, he reconciles this finding with the lessons of *A Monetary History* by noting that one may think of real-business-cycle theory as "providing a good approximation to events when monetary policy is conducted well and a bad approximation when it is not." He then goes on to say, "Viewed in this way, the theory's relative success in accounting for postwar experience can be interpreted simply as evidence that postwar monetary policy has resulted in near-efficient behavior, not as evidence that money doesn't matter." Simply put, Lucas's point is that since real-business-cycle theory shows it's not necessary to invoke monetary and financial disturbances to explain postwar business cycles, monetary policy during the postwar period must have been better than in the prewar period studied by Friedman and Schwartz.

Lucas's reconciliation of real-business-cycle theory with U.S. monetary history suggests an answer to the question posed earlier about whether postwar countercyclical policies helped or hindered the U.S. economy: The postwar U.S. economy may mimic a perfect-markets economy in part *because* postwar monetary policy and other countercyclical policies have prevented monetary and financial instabilities from dominating business fluctuations. Still, it is possible that instead of guiding the U.S. economy toward optimal behavior, these policies may have caused the discrepancy between actual and optimal behavior (Figures 1 and 2). Thus, to argue convincingly that postwar countercyclical policies were beneficial, we should also explain how these policies improved the economy's cyclical per-

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<sup>8</sup>For those not in the know, *A Monetary History*, published in 1963, is *the* definitive statement of the view that monetary instability is a major factor in business cycles. In the words of the authors, the objective of the book is to give an account of "the stock of money in the United States" and of the "reflex influence that the stock of money exerted on the course of events." It is still the book to read for obtaining the factual basis of the view that business cycles result from monetary and financial disturbances.

formance and provide some evidence that they, in fact, did so.

### FINANCIAL MARKETS AND THE BENEFITS OF COUNTERCYCLICAL POLICIES

The legal and regulatory framework that shaped U.S. countercyclical policies in the post-war era was established in the years following the Great Depression, the disaster that spurred the adoption of policies to regulate many sectors of the U.S. economy. The policies most relevant for counteracting business cycles are those aimed at banks and financial markets.

Historically, financial markets have displayed a tendency to overreact to a deterioration in business conditions. During a downturn, it's normal practice for financial intermediaries to raise their credit standards and for risk-averse investors to shift out of stocks and bonds into cash and government securities. These actions reduce the amount of credit extended to the private nonfinancial sector and raise interest rates charged on loans. Usually, the cutback in credit does not lead to widespread financial distress, although some firms (and households) go bankrupt. But if the cutback is severe, many firms may fail. Widespread business failures, in turn, may cause the failure of financial intermediaries and lead to further cutbacks in credit and more bankruptcies. This self-propelled cycle of credit cutbacks and bankruptcies leads to a *financial crisis* that results in low output, high unemployment, and very low investment.

Why a business downturn becomes a full-blown financial crisis is not fully understood, but investor pessimism plays an important role. If enough people think that a business contraction is about to degenerate into a financial crisis and act accordingly, the crisis will, in fact, materialize: investors, fearing a financial crisis, may withdraw so much cash from banks and other depository institutions that they may force even sound financial institutions to run out of cash and fail. Furthermore, an economy that suffers

one financial crisis becomes prone to suffering more crises because investors begin to view every downturn with alarm, and their pessimism and fear cause downturns to degenerate into crises more often. In such a situation, countercyclical policies can restore investor confidence in the ability of financial markets to weather downturns.

In the United States, three financial-market countercyclical policies serve this purpose. The first is the federal insurance through which each account at a bank or other depository financial institution is insured up to \$100,000.<sup>9</sup> This insurance protects small depositors from bank failures and removes their incentive to withdraw deposits during downturns or at any other time, thus blocking one channel through which large-scale cutbacks in credit occur.

The second policy is a commitment by the Federal Reserve to act as "lender of last resort" when some event threatens to precipitate a crisis. Generally, these are events that have the potential to inflict serious losses on loans made by the banking system. In such a situation, the Fed acts as "lender of last resort" by arranging loans that permit illiquid but solvent financial institutions to honor their obligations. For instance, during the 1987 stock-market crash, the Fed made more credit available to the banking system until the crisis had passed. The policy prevents a "run" on uninsured deposits in banks and thus blocks a second channel through which large-scale cutbacks in credit occur.

Finally, the Fed's countercyclical interest rate policy also helps keep financial crises at bay. By raising interest rates and slowing down the growth of debt in booms, the policy makes it less necessary for banks and investors to cut back drastically on credit during the next contractionary phase. And by reducing interest

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<sup>9</sup>Although the FDIC insures each account, there are restrictions on the amount of insurance a single individual with multiple accounts at the same institution can get.

rates during contractions, the Fed makes it easier for businesses and households to service their debts, reducing the number of bankruptcies.

In summary, post-WWII monetary and banking policies were aimed at preventing financial markets from amplifying the effects of both business downturns and the financial disturbances (such as a stock-market crash) that often precede business downturns. But how well did these policies do? Real-business-cycle theory suggests they did well because the theory holds that it's not necessary to invoke monetary and financial disturbances in order to explain postwar business cycles. However, we also have more direct evidence of their benefits: business cycles from the prewar era exhibit greater financial instability and sharper fluctuations in output than those from the postwar era.

#### A COMPARISON OF PRE- AND POST-WORLD-WAR-II BUSINESS CYCLES

Scholars who have examined the evolution of U.S. business cycles document important differences between post-WWII cycles and those from the prewar era. First, financial crises were more common during business downturns in the pre-WWII era. In his 1992 book on business cycles, Victor Zarnowitz records that a financial crisis occurred during the contractionary phase of four out of the 15 business cycles between 1870 and 1927, and two financial crises occurred during the contractionary phase of the business cycle that began in November 1927 and ended in March 1933. Generally speaking, the prewar downturns in which financial crises occurred were more severe than those in which no crisis occurred. In contrast, in the 66 years since 1933, the United States has not suffered a single prewar-style financial crisis.<sup>10</sup>

Second, during downturns, depositors tend to increase their holdings of cash and banks tend to increase their cash reserves while making fewer loans. This shift toward greater liquidity on the part of depositors and banks is reflected in the fall in the ratio of bank loans to the monetary

base (the sum of currency held by the public and bank reserves) during downturns. Clearly, this ratio should be much more volatile when the financial system is prone to crises than when it is not: the fear of a crisis and the passing of such fear should cause the ratio to plunge and soar over time. Indeed, it appears that the cyclical volatility in the ratio of bank credit to the monetary base was much more marked in the pre-WWII era (Figure 3).<sup>11</sup> The same is true for the U.S. money supply, of which the ratio of bank loans to the monetary base is an important determinant (Figure 4).<sup>12</sup> Overall, cyclical monetary control has been far better in the postwar period compared with the prewar era.<sup>13</sup>

Did a fall in the volatility of economic activity accompany the fall in the volatility of the U.S. money supply? Apparently it did. Business-cycle fluctuations in the gross national product (GNP) of the United States also show a dramatic reduction of volatility in the postwar period (Figure 5).<sup>14</sup> Furthermore, there is a strong association between up-and-down movements in the money

<sup>10</sup>This is not to say that there were no financial disorders in the postwar period. For instance, the S&L industry faced a serious crisis in the 1980s. However, there were no major runs on banks associated with this crisis.

<sup>11</sup>The proxy measure of bank credit used in Figure 3 is the difference between the M2 measure of money supply and the monetary base.

<sup>12</sup>The volatility of the ratio of bank loans to the monetary base, as measured by the standard deviation, fell from 5.4 percent in the prewar period (1875-1941) to 2.1 percent in the postwar period (1946-1997). The standard deviation of the money supply fell from 4.7 percent in the prewar period to 1.7 percent in the postwar period.

<sup>13</sup>Of course, in another important sense, it has not been. As is well known, the postwar era has witnessed the worst inflation in U.S. history. The rapid increase in the money supply that fed the inflation of the 1960s and the 1970s caused the trend path of the money supply to shoot up. Nevertheless, fluctuations around this rapidly rising trend line were small compared with similar fluctuations in the prewar era.

**FIGURE 3**  
**Cyclical Changes in the Ratio**  
**Of Bank Loans to Monetary Base**  
**1875-1997**

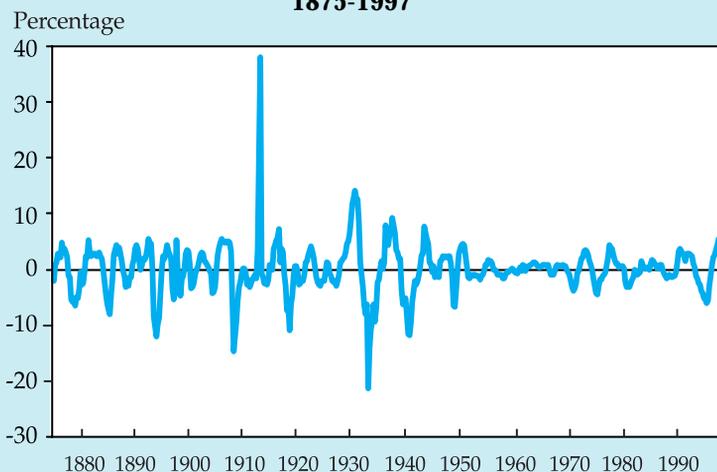


Figure shows percentage deviations from trend. In this figure, as in the following ones, the trend is calculated using a procedure described by Robert Hodrick and Edward Prescott. The percentage deviation from trend is simply 100 times the ratio of the difference between the actual and trend value of a variable to its trend. The historical data on which this figure and the following ones are based are taken from Appendix B of the *The American Business Cycle*, Robert J. Gordon, ed., Chicago: University of Chicago Press, 1986.

**FIGURE 4**  
**Cyclical Changes in the Money Supply**  
**1875-1997**

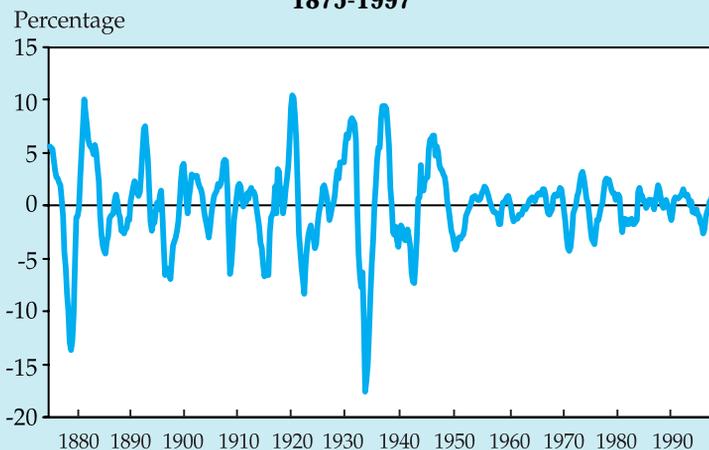


Figure shows percentage deviations from trend of the M2 measure of the money supply.

supply during the prewar period and the up-and-down movements in prewar GNP.<sup>15</sup> This lends credence to the view that better monetary control was a key factor in the decline in volatility of postwar GNP in the United States.

Although Lucas and others are right to stress the importance of better monetary policies, we should not think that the entire drop in the GNP's volatility is a result of better monetary control. Other elements of postwar countercyclical policies, particularly various "income-

<sup>14</sup>The standard deviation of fluctuations around trend in prewar GNP is 4.8 percent, as compared to 2.3 percent in the postwar period. However, because of the fragmentary nature of information on prewar GNP, there is controversy about how volatile prewar GNP really was. Some scholars have suggested that for the period preceding the Great Depression, U.S. GNP was only slightly more volatile than in the postwar period. For details, consult the 1989 articles by Christina Romer and by Nathan Balke and Robert Gordon.

<sup>15</sup>The correlation coefficient between the fluctuations around trend in money supply and real GNP, a measure of how closely two data series move together, is +0.56 in the prewar period, but -0.02 in the postwar period.

**FIGURE 5**  
**Cyclical Changes in Real GNP**  
**1875-1997**

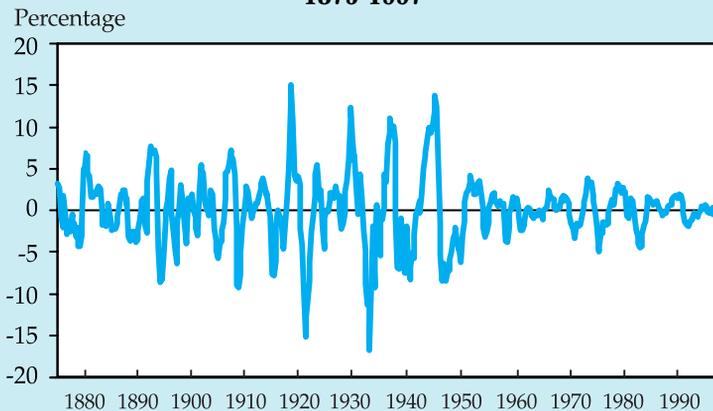


Figure shows percentage deviations from trend of real GNP measured in 1972 prices.

maintenance” programs, probably contributed to the decline as well. For instance, unemployment insurance (which didn’t exist in most states before 1930, but covered more than half the civilian workforce by the late 1940s) and progressive taxation (which reduces the income-tax rate for households that experience a decline in income) probably helped reduce output volatility by shoring up demand for goods and services during business downturns.<sup>16</sup>

#### ARE ADDITIONAL COUNTERCYCLICAL POLICIES DESIRABLE?

Because fluctuations in the growth rate of TFP are a major source of business cycles, the most

<sup>16</sup>Another factor to keep in mind is that the structure of the U.S. economy has changed over time and some of these changes may have reduced business-cycle volatility. For instance, the rising share of service-sector income and employment, a sector that’s not very cyclical, must have reduced the cyclical volatility of postwar GNP. Thus, economists must assess the contribution of these types of structural changes to gain a keener appreciation of the beneficial role of postwar countercyclical policies.

effective countercyclical policy is one that eliminates—or at least reduces—the random movements in TFP growth. Because people generally like stable economic environments, such a policy would make them better off.

Unfortunately, economists and policymakers do not know a sure-fire way to eliminate random fluctuations in TFP growth. However, what policymakers can do is adopt policies to buffer people against the consequences of fluctuations in TFP growth. But a surprising

implication of real-business-cycle theory is that such buffering may make people worse off.

To see why, suppose that policymakers enact a plan that dissuades businesses from increasing the rate of investment during periods of above-average TFP growth and encourages them to keep up their rate of investment during periods of below-average TFP growth. By forcing businesses to invest at a steadier rate, the policy will reduce random fluctuations in consumption, hours worked, and output. However, by discouraging investments when the growth rate of TFP is above average and encouraging investments when it’s below average, the policy also entails a loss in output.<sup>17</sup> Thus, the policy would make people better off only if the benefits of

<sup>17</sup>The expected return on new investment is above average when the growth rate of TFP is above average and it is below average when the growth rate of TFP is below average. Therefore, the loss in future output from curtailing new investments during periods of above-average TFP growth will exceed the gain in future output from expanding new investments during periods of below-average TFP growth.

greater stability outweighed the value of lost output.

However, recall that according to real-business-cycle theory, people and firms adjust investment spending and hours worked so that the value of output foregone by not responding more aggressively to fluctuations in TFP is balanced by the benefits of the resulting stability in the levels of income, consumption, and hours worked. In other words, according to the theory, the “predicted” paths for output and investment shown in Figures 1 and 2 are the U.S. economy’s optimal responses to TFP shocks. Because the optimal response calls for large fluctuations in real investment, a policy that attempts to smooth away these fluctuations will make people worse off: the value of lost output will outweigh the benefits of greater stability.

More generally, the resemblance between actual and optimal business cycles implies that further progress in reducing the ill effects of business cycles can come only from reducing random fluctuations in the rate of TFP growth. Merely buffering the economy against these random changes is unlikely to make people better off because people and businesses seem to be responding to these random changes in an almost optimal way.

However, it’s possible that other countercyclical policies could reduce fluctuations in TFP growth. For instance, some researchers have argued that the bank failures during the Great Depression may have caused TFP to fall by making it more difficult for businesses to carry out production. Thus, the conduct of monetary policy could have direct effects on fluctuations in TFP. However, no one has yet created an economic model that convincingly demonstrates this possibility. Until we have such a model, Prescott’s questioning of the need for additional countercyclical policies deserves to be heeded.

## SUMMARY

Real-business-cycle theory cites changes in business-sector productivity as a proximate cause of booms and recessions. The theory succeeds in accounting for a large fraction of the cyclical fluctuations in postwar U.S. output and gives a good account of the cyclical behavior of key macroeconomic variables.

This article has discussed the theory’s implications for existing and prospective countercyclical policies. The theory suggests that policy initiatives to buffer the effects of business cycles may not be necessary; postwar business cycles are close to what we would ideally expect as a result of random fluctuations in the growth rate of business-sector productivity. Unless we can devise policies that reduce the fluctuations in business-sector productivity itself, there may be little to be gained by shaping the U.S. economy’s response to these fluctuations.

However, the theory’s implications for existing countercyclical policies remains a matter of debate. One possibility is that the success of real-business-cycle theory reflects better post-WWII countercyclical policies. In particular, federal deposit insurance and lender-of-last-resort facilities, along with superior cyclical control of the money supply and income-maintenance programs such as unemployment insurance and progressive taxation, reduced some of the instabilities that characterized pre-WWII business cycles. As a result, the volatility of output over the course of business cycles fell after World War II, and fluctuations in the growth rate of business-sector productivity (rather than monetary and financial disturbances) surfaced as the dominant source of business cycles. In this sense, real business cycles may be the legacy of countercyclical policies.

## REFERENCES

- Balke, Nathan S., and Robert J. Gordon. "The Estimation of Prewar Gross National Product: Methodology and New Evidence," *Journal of Political Economy* 97 (1989), pp. 38-92.
- Chatterjee, Satyajit. "Productivity Growth and the American Business Cycle," *Business Review* (October 1995), pp. 13-22.
- Friedman, Milton, and Anna J. Schwartz. *A Monetary History of the United States, 1867-1960*. Princeton: Princeton University Press, 1963.
- Kydland, Finn E., and Edward C. Prescott. "Time to Build and Aggregate Fluctuations," *Econometrica* 50 (1982), pp. 1345-70.
- Kydland, Finn E., and Edward C. Prescott. "Hours and Employment Variation in Business Cycle Theory," *Economic Theory* 1 (1991), pp. 63-81.
- Long, John B., and Charles Plosser. "Real Business Cycles," *Journal of Political Economy* 91 (1983), pp. 1345-70.
- Lucas, Robert E. Jr. "Review of Milton Friedman and Anna J. Schwartz's 'A Monetary History of the United States, 1876-1960'," *Journal of Monetary Economics*, 34 (1994), pp. 5-16.
- Plosser, Charles I. "Understanding Real Business Cycles," *Journal of Economic Perspectives* 3 (1989), pp. 51-77.
- Prescott, Edward C. "Theory Ahead of Business Cycle Measurement," Federal Reserve Bank of Minneapolis *Quarterly Review* 10 (1986), pp. 9-21.
- Romer, Christina D. "The Prewar Business Cycle Reconsidered: New Estimates of Gross National Product, 1869-1908," *Journal of Political Economy* 97 (1989), pp. 1-37.
- Zarnowitz, Victor. *Business Cycles: Theory, History, Indicators, and Forecasting*. Chicago: University of Chicago Press, 1992.