

Shorter Recessions and Longer Expansions

*Francis X. Diebold & Glenn D. Rudebusch**

Have the patterns of U.S. business cycles changed since World War II? And if so, have they changed in ways consistent with the hypothesis that postwar business cycles have been more stable than prewar cycles? These questions are difficult to answer, and different researchers have arrived at sharply divergent conclusions.

Earlier research, which failed to produce a consensus, focused almost exclusively on business-cycle *volatility*. Recent research, however, examines business cycles from the different (and complementary) perspective of *duration*, focusing in particular on the lengths of expansions, contractions, and whole cycles. The duration perspective—unlike its volatility counterpart—reveals striking changes in the nature of postwar business cycles.

*Francis X. Diebold is J.M. Cohen Assistant Professor of Economics at the University of Pennsylvania and a Visiting Scholar at the Federal Reserve Bank of Philadelphia. Glenn D. Rudebusch is an Economist in the Research and Statistics Division at the Board of Governors of the Federal Reserve System.

THE STABILITY DEBATE: VOLATILITY PERSPECTIVE

Steady growth in the 1960s produced a generally accepted view that the U.S. economy had

become more stable in the period after World War II. This consensus was reinforced by formal studies that focused on business-cycle volatility and concluded that it had decreased in the postwar period.¹

But the consensus on postwar volatility stabilization has been seriously challenged by Christina D. Romer, in a provocative and stimulating series of papers.² Romer argues that the higher volatility displayed by prewar aggregates—whether real GNP, industrial production, or the unemployment rate—reflects differences in methods of prewar and postwar data construction, and that the difference between prewar and postwar volatility is greatly lessened if similar methods are employed for both periods. In Romer's interpretation, the apparent moderation of the business cycle is largely an artifact of inconsistent data.

Romer's contention has not gone undisputed. Various authors have constructed alternative versions of prewar aggregates and have reached traditional conclusions about volatility stabiliza-

tion.³ Still others have argued that Romer's reconstructed aggregates—like the original series—depend significantly on unverifiable assumptions and therefore are not unambiguously superior to the original series.⁴

Currently, then, the debate focusing on volatility stabilization is deadlocked. The lesson emerging from the literature is that, given the limited availability of prewar data, it is difficult to measure quantitative prewar U.S. economic aggregates, even annually. Moreover, because the size of fluctuations in these macroeconomic aggregates will be crucial for resolving the volatility debate, inadequate measures of prewar aggregates make any comparison of pre- and postwar volatility rather uncertain.

THE STABILITY DEBATE: DURATION PERSPECTIVE

It is possible, however, to provide *new* evidence on the stability of the postwar economy by investigating a different aspect of stabilization and employing a different type of data.⁵

¹The focus was typically on fluctuations in measures of aggregate economic activity, such as real GNP, industrial production, or the unemployment rate. The variability, or volatility, of such aggregates was defined as the variance of the detrended series—that is, the average squared deviation from trend. Two well-known and representative studies are Martin N. Baily, "Stabilization Policy and Private Economic Behavior," *Brookings Papers on Economic Activity* (1978:1), pp. 11-60; and J. Bradford DeLong and Lawrence H. Summers, "The Changing Cyclical Variability of Economic Activity in the United States," in R.J. Gordon, ed., *The American Business Cycle: Continuity and Change* (University of Chicago Press for NBER, 1986). See also Robert J. Gordon, "Postwar Macroeconomics: The Evolution of Events and Ideas," in M. Feldstein, ed., *The American Economy in Transition* (University of Chicago Press for NBER, 1980).

²See her papers, "Spurious Volatility in Historical Unemployment Data," *Journal of Political Economy* 94 (1986), pp. 1-37; "Is the Stabilization of the Postwar Economy a Figment of the Data?" *American Economic Review* 76 (1986), pp. 314-34; and "The Prewar Business Cycle Reconsidered: New Estimates of Gross National Product, 1869-1908," *Journal of Political Economy* 97 (1989), pp. 1-37.

³David R. Weir, for example, considers historical unemployment series in "The Reliability of Historical Macroeconomic Data for Comparing Cyclical Stability," *Journal of Economic History* 46 (1986), pp. 353-65, while Nathan S. Balke and Robert J. Gordon consider GNP in "The Estimation of Prewar Gross National Product: Methodology and New Evidence," *Journal of Political Economy* 97 (1989), pp. 38-92.

⁴See, for example, Stanley Lebergott's discussion of Romer's paper in *Journal of Economic History* 46 (1986), pp. 367-71.

⁵This idea is developed more fully in "Have Postwar Economic Fluctuations Been Stabilized?" by Francis X. Diebold and Glenn D. Rudebusch, Economic Activity Working Paper 116, Board of Governors of the Federal Reserve System (1991). The present article is largely a nontechnical synopsis of that paper, which in turn builds upon our earlier work in "Scoring the Leading Indicators," *Journal of Business* 62 (1989), pp. 369-92, and "A Nonparametric Investigation of Duration Dependence in the American Business Cycle,"

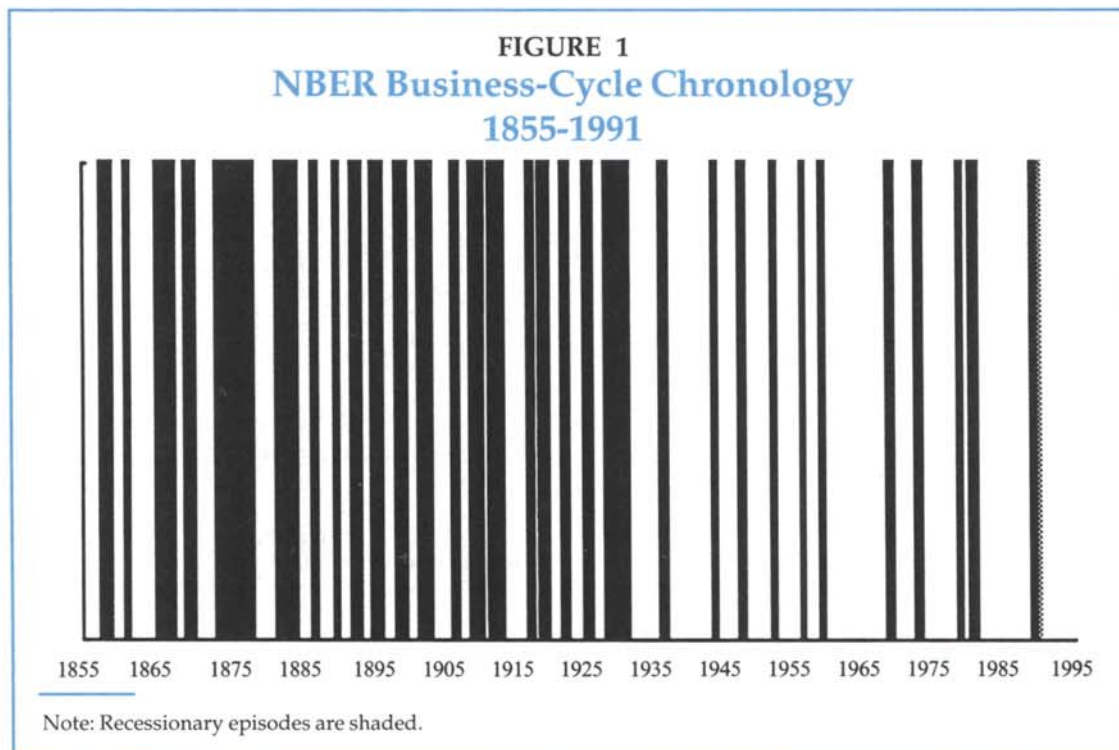
The different aspect of stability concerns the relative *duration*, rather than the relative volatility, of pre- and postwar business cycles. In other words, the duration perspective considers explicitly the *lengths* of phases of the business cycle, whereas the volatility perspective focuses on amplitude.

The different data are a chronology of business-cycle turning points. Compared to an aggregate measure of economic activity, a business-cycle chronology contains both less information, because the chronology is qualitative rather than quantitative, and more information, because the chronology can incorporate

more sources of cyclical information. The former attribute is obvious: identification of turning points requires only a qualitative sense of the direction of general business activity. Thus, it is easier to determine, for example, that the second quarter of 1894 was a cyclical peak than it is to determine that real GNP rose x percent and fell y percent in the second and third quarters of that year.

At the same time, because only qualitative information is required, a business-cycle chronology can be constructed from a broader set of indicators of business activity than just the components of aggregate measures such as real GNP or industrial production. For example, the National Bureau of Economic Research (NBER) business-cycle chronology, which we use, incorporates a variety of sources of cyclical information, including the price movements of stocks and other assets as well as descriptive accounts of economic activity from historical

Journal of Political Economy 98 (1990), pp. 596-616. See also our paper with Daniel E. Sichel, "Further Evidence on Business Cycle Duration Dependence," forthcoming in J.H. Stock and M.W. Watson, eds., *New Research on Business Cycles, Indicators and Forecasting* (University of Chicago Press for NBER, 1991).



business annals. Such sources have necessarily been ignored in the volatility stabilization debate, which has focused only on aggregate measures; thus, the NBER business-cycle chronology implicitly brings new information to the debate about the changing nature of business fluctuations.

DOCUMENTING DURATION STABILIZATION

Duration stabilization is suggested by even a casual examination of the history of U.S. expansions and contractions, shown in Figure 1, in which recessions appear in black. The period before World War II contains a great deal more black; however, formal statistical analysis can assess the likelihood that the apparent postwar change in the business cycle is *real* rather than merely good luck.

Statistical analyses of data on lengths of expansions and contractions reveal that the apparent shifts in duration patterns following World War II are real. Statistically speaking, we can reject the hypothesis of no change in the behavior of expansion and contraction durations at the 0.1 percent level; that is, the probability that the rejection is incorrect is no larger than one-tenth of 1 percent. Furthermore, the nature of postwar change is clear: expansions have become longer, and contractions have become shorter.

It is unusual in empirical macroeconomics to obtain such high significance levels, particularly with such small samples as the number of expansions or contractions since World War II. But what of the more important question: are the postwar shifts significant from an economic, as opposed to statistical, perspective? Clearly, the answer is yes, as can be seen from three related perspectives.

First, consider average duration. The average duration of a prewar expansion is about 25 months, whereas that for postwar expansions is about 50 months; thus, the average duration of expansions has roughly *doubled*. Conversely,

the average duration of prewar contractions is about 20 months, whereas that for postwar contractions is about 10 months; thus, the average duration of contractions has roughly been *halved*.

Second, consider the ratio of expansion duration relative to the duration of the preceding contraction. The prewar average of this ratio is 1.5, whereas the postwar average is a much larger 4.5.

Third, consider the amount of time spent in recession. More than 40 percent of the prewar period was spent in recession, compared to a much smaller 20 percent for the postwar period.

The striking changes in expansion and contraction duration patterns are readily seen by comparing the cumulative proportion of expansions and contractions lasting no longer than k months, for various values of k . We call the cumulative proportion $F(k)$ in the prewar period and $G(k)$ in the postwar period. Our interest centers on the overall shapes of $F(k)$ and $G(k)$ for expansions and contractions, and particularly on the relative speeds with which they rise from zero to 1. A fast rise corresponds to durations that are short on average, and conversely.

The pre- and postwar cumulative proportions $F(k)$ and $G(k)$ are graphed in Figures 2 (expansions) and 3 (contractions). The axes in each figure are scaled identically, so the two figures are comparable. Duration stabilization shows clearly in the rightward shift of the cumulative proportion for expansions, and by the leftward shift of the cumulative proportion for contractions. For example, Figure 2 shows that in the prewar period about 80 percent of expansions lasted less than 40 months, whereas in the postwar period only 50 percent lasted less than 40 months.

The behavior of whole-cycle duration patterns (whether measured peak-to-peak or trough-to-trough) is very different. Unlike the expansions and contractions of which they are

composed, whole cycles show no evidence of postwar change. In fact, the hypothesis of no change cannot be rejected even at the 20 percent level. Thus, a reasonable distillation of the results is that the lengthening of postwar expansions and shortening of postwar contractions approximately cancel one another, leaving the patterns of whole-cycle durations unchanged. The time per business cycle has remained approximately constant, but *within* each cycle much more time is now spent in expansion.

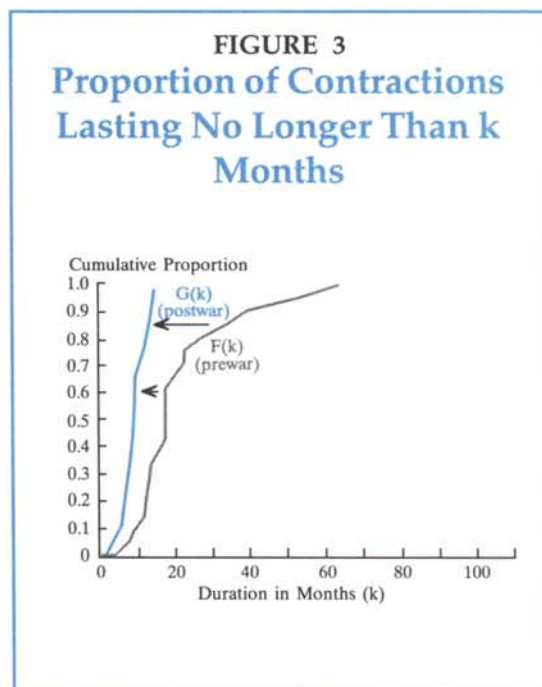
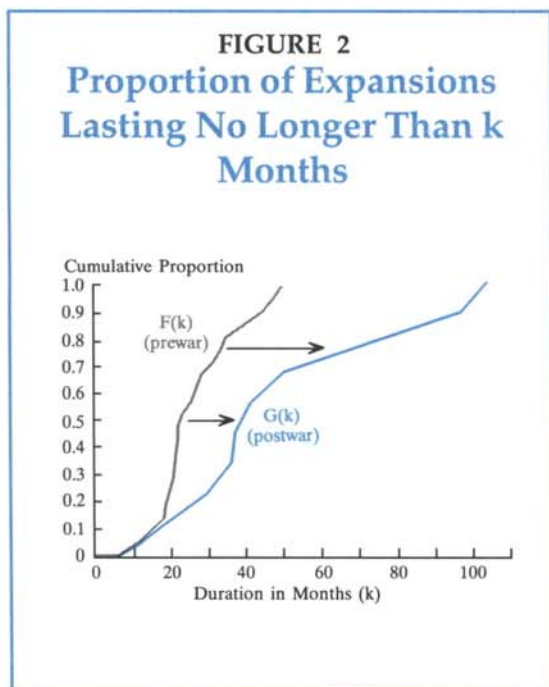
All of the conclusions discussed here are robust to 1) changes in the ending date for the prewar sample (June 1938, August 1929, December 1914) to exclude the influence of the Great Depression or the interwar period in general; 2) exclusion of the pre-1885 turning-point dates in order to avoid potentially unreliable dates in the very early period; 3) exclusion of the 1887 and 1899 recessions, to account for the possibility that these were merely growth

recessions; and 4) exclusion of wartime expansions (and whole cycles that include wartime expansions) to avoid the possibility of spuriously long observations.

**UNDERSTANDING
DURATION STABILIZATION**

One obvious potential source of duration stabilization, ironically enough, is volatility stabilization! That is, to the extent that postwar volatility actually *was* stabilized, one expects, *ceteris paribus*, concomitant duration stabilization because of the upward trend in aggregate economic activity.⁶ Therefore, potential sources of postwar volatility stabilization are also po-

⁶To see this, note that if the volatility of fluctuations around an upward trend is decreased, expansions are lengthened and contractions are shortened. In the limit, when volatility is zero, the economy is in permanent expansion, growing at the trend rate.



tential sources, at least in part, for postwar duration stabilization.⁷ It is unlikely, however, that *all* of the postwar duration stabilization is associated with volatility stabilization. To the extent that volatility actually was stabilized, previous research has found that the reduction was small and hard to detect. The postwar shift toward duration stabilization, however, is large and difficult to deny. It is therefore likely that at least some of the duration stabilization arose independently of volatility stabilization.

The remaining potential factors underlying postwar duration stabilization can be broadly classified into three categories: 1) postwar changes in the nature of macroeconomic shocks; 2) postwar improvements in discretionary government policy; and 3) structural changes in the postwar economy. It is conceivable that these factors may have produced concomitant volatility and duration stabilization, or duration stabilization alone.

The first possibility—a direct change in the nature of postwar shocks—is certainly a logical possibility, but no evidence, either econometric or anecdotal, has been given as support. In particular, we know of no evidence indicating that macroeconomic shocks have changed in a way that led either to duration stabilization independent of volatility stabilization (a change in pattern but not size), or to concomitant

duration and volatility stabilization (a change in size and perhaps pattern).

As for the second possibility, the start of the postwar period saw both a significant strengthening of the powers of monetary and fiscal policy and of the public commitment to use them to stabilize the economy. There is some evidence that this commitment alleviated fears of macroeconomic catastrophes, by eliminating very long, deep recessions.⁸ However, attempts to smooth the postwar period's moderate swings in business activity have been judged, even by those who normally might be somewhat sympathetic, as neutral at best, with successes offset by failures.⁹ Overall, it would appear that if discretionary government

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policy in the postwar period produced duration stabilization, it did so independently of volatility stabilization. Such a scenario is not unreasonable, if policymakers perceived a link between the durations of expansions and contractions and welfare, perhaps along the lines discussed below, and took (successful) policy action accordingly.

⁸See J. Bradford DeLong and Lawrence H. Summers, "How Does Macroeconomic Policy Affect Output?" *Brookings Papers on Economic Activity* 2 (1988), pp. 433-80.

⁹See Robert J. Gordon, "Postwar Macroeconomics: The Evolution of Events and Ideas," in Martin Feldstein, ed., *The American Economy in Transition* (University of Chicago Press for NBER, 1980); Alan S. Blinder, *Economic Policy and the Great Stagflation* (New York: Academic Press, 1981); and Arthur M. Okun, "Postwar Macroeconomic Performance," in M. Feldstein, ed., *The American Economy in Transition*.

⁷Even the estimates least favorable to the volatility stabilization hypothesis—Romer's—indicate the possibility of some volatility stabilization in the postwar period.

The last set of factors—postwar structural changes in the economy—also includes likely sources of duration stabilization. Some of those changes have occurred independently of policy, such as the increased share of services (which have a very moderate cycle), increased availability of consumer credit (with a reduction in the number of liquidity-constrained households), and technical improvements leading to better inventory management. Others represent part of the postwar Keynesian institutional order, such as the introduction of “automatic stabilizers” (countercyclical entitlement programs, such as unemployment insurance, and an increasing marginal tax rate) and deposit insurance and regulation (which act indirectly through stabilization of the financial system).

Welfare Effects of Duration Stabilization. A natural question is whether duration stabilization improves welfare. A proper evaluation of this issue requires an economic model, and different models clearly produce different welfare rankings. Thus, an incontrovertible specification of the welfare gains and losses of duration stabilization will have to await a consensus theory.

From a Keynesian perspective, the lengthy periods of reduced output and low utilization of capital and labor inputs during recessions represent inefficient coordination failures; in particular, the additional unemployment and idleness incurred by workers during recessions is involuntary. The welfare cost of recessions in the Keynesian framework is clearly evident in the shortfall of actual output from potential output. In this framework, the duration stabilization of the postwar period is welfare-improving.

In contrast, a different welfare assessment may be obtained from a neoclassical perspective. Models in the neoclassical tradition treat economic fluctuations as efficient outcomes of free-market competition; for example, the additional unemployment incurred during recessions represents a voluntary—and optimal—

response by workers to changing opportunities. Thus, for neoclassical economists, duration stabilization need not be associated with increased welfare.

Recent work has tended to focus on equilibrium interpretations of economic fluctuations. However, an important subset of this work has stressed the existence of multiple equilibria: the economy may end up at a low level of output with higher unemployment or at a high level of output with lower unemployment. These outcomes are rankable in terms of welfare, suggesting that duration stabilization improves welfare because less time is spent in the low-output equilibrium.¹⁰

One condition associated with multiple equilibria is the presence of a complementarity or spillover between aggregate conditions and the actions or opportunities of individual agents.¹¹ A natural technological spillover occurs when the level of aggregate activity in one period affects firms’ production functions in the next. For example, knowledge accumulated in one production period may affect subsequent production possibilities.¹² Furthermore, the accumulation of knowledge can be linked to the level of activity.¹³ Indeed, a large literature suggests that the costs of idleness on human capital are substantial, because a crucial factor in accumulating human capital is the opportu-

¹⁰See, for example, Steven N. Durlauf, “Nonergodic Economic Growth,” NBER Working Paper 3719 (1991).

¹¹See, for example, Russell Cooper and Andrew John, “Coordinating Coordination Failures in Keynesian Models,” *Quarterly Journal of Economics* 103 (1988), pp. 441-63.

¹²Paul Romer, for example, focuses on spillovers associated with human capital accumulation in “Increasing Returns and Long-Run Growth,” *Journal of Political Economy* 94 (1986), pp. 1002-37.

¹³See Kenneth J. Arrow, “The Economic Implications of Learning by Doing,” *Review of Economic Studies* 29 (1962), pp. 155-73.

nity to maintain and update skills through employment. In contrast, unemployment results in an atrophy of skills, which reduces the effective supply of labor.¹⁴ Thus, the shorter durations of postwar contractions may have curtailed the loss of human capital and raised the level of production during subsequent expansions.

CONCLUSION

Investigating the stabilization hypothesis

¹⁴Extensive discussion of these effects can be found in Edward Phelps, *Inflation Policy and Unemployment Theory* (New York: Norton, 1972), and in Robert E. Hall, "The Phillips Curve and Macroeconomic Policy," *Carnegie-Rochester Conference Series on Economic Policy* 1 (1976), pp. 127-48.

from the perspective of duration (or length), as opposed to volatility (or amplitude), has proved fruitful. There is strong evidence of a postwar shift toward longer expansions and shorter contractions, which is consistent with a broad interpretation of the stabilization hypothesis. Moreover, there is no evidence of a postwar shift in the distribution of whole-cycle durations, which suggests a reallocation of business-cycle time away from contraction and toward expansion.

Much less is known, however, about the sources and welfare effects of duration stabilization. Although it is easy to list potential sources of duration stabilization and potential welfare effects, deciding among them is difficult. Additional research along those lines will likely prove useful.