

Monetary Policy with a New View of Potential GNP

*John Boschen and Leonard Mills**

An important goal of U.S. macroeconomic policy has been to keep the economy operating close to the potential level of real GNP—the total amount of goods and services the economy can supply when its factories and workers are fully employed. The economic rationale for this goal is clear-cut. If actual GNP falls below

potential GNP, losses in real production and employment occur. On the other hand, real output levels above potential GNP cannot be sustained indefinitely and may put upward pressure on the price level.

In their attempts to keep the economy operating close to potential GNP, policymakers face an important practical problem: even though they have data on actual GNP at their disposal, they cannot directly observe potential GNP. Until recently, potential GNP was generally thought to follow a smooth upward trend. With potential GNP growing smoothly, abrupt

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swings in actual GNP could be interpreted as “gaps” between the actual and potential levels. However, some economists have recently raised the possibility that potential GNP follows a much more variable path. In their view, fluctuations in economic growth need not reflect gaps between actual and potential GNP. They may simply reflect actual GNP and potential GNP moving together.

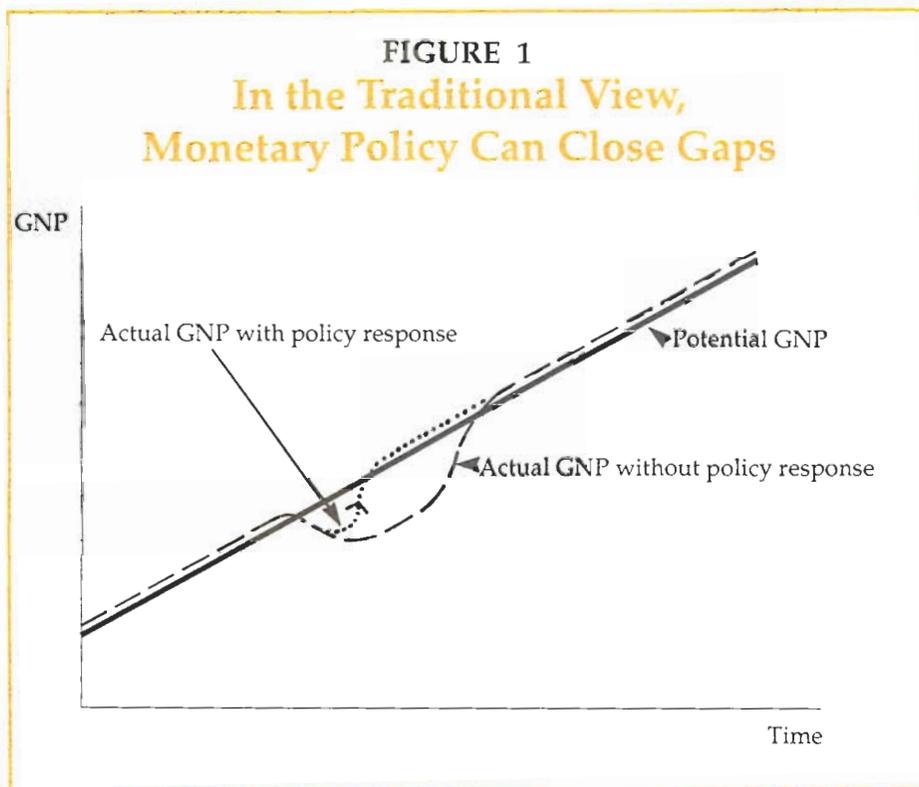
This new view challenges monetary policies that attempt to minimize the gap between actual and potential GNP. For

monetary policy to be successful in a world of highly variable potential GNP, policymakers need more information on the sources and duration of macroeconomic fluctuations. Indeed, if policymakers do not have this information, a monetary policy designed to smooth actual GNP could inadvertently widen, rather than close, the gap between actual and potential GNP.

**THE TRADITIONAL VIEW:
POLICYMAKERS SHOULD LEAN
AGAINST CHANGES IN ACTUAL GNP**

The traditional view assumes that potential GNP grows gradually, but that shifts in aggregate demand make actual GNP fluctuate erratically. Thus policymakers see themselves as smoothing aggregate demand to keep actual GNP in line with aggregate supply, hoping to avoid gaps and the problems they create. Consider these traditional GNP stabilization scenarios:

- Firms reevaluate their sales outlook and slow their rate of investment spending. Aggregate demand slumps and actual GNP falls below potential. Seeing the slowdown in GNP, the Federal Reserve engages in expansionary monetary policy, lowering interest rates and increasing money growth in order to stimulate aggregate demand. Because lower interest rates induce firms to invest more, this policy restores output and employment to potential levels (Figure 1).
- Consumers become overly optimistic and begin buying goods at a faster rate than the economy can produce in the long run, leading to upward pressure on the price level. Seeing the rapid increase in GNP, the Fed engages in restrictive monetary policies, raising interest rates and slowing money growth, to slow the economy’s rate of spending to a more sustainable pace. Thus, the Fed mitigates the inflationary pressure



that the demand surge could create and promotes its goal of price stability.

In both scenarios, smoothing fluctuations in actual GNP promoted the Fed's goals because potential GNP was growing steadily.

BUT...CHANGES IN ACTUAL GNP MAY BE DUE TO SHIFTS IN POTENTIAL GNP

The theoretical impetus for a new view of variable potential GNP comes from the real business cycle (RBC) theory of economic fluctuations.¹ Unlike other macro theories, the RBC theory claims that all fluctuations in actual GNP are due to shifts in potential GNP.

The RBC model is based on two fundamental ideas. The first idea is that changes in aggregate-supply factors are not smooth. For example, because labor force and productivity growth fluctuate significantly, growth in potential GNP can shift erratically from year to year and even from quarter to quarter.

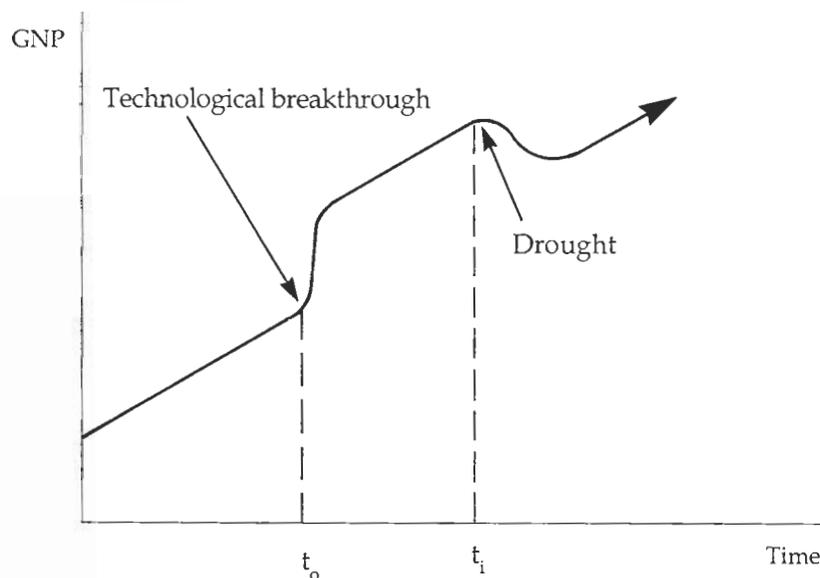
The second fundamental idea is that the economy is always operating at its potential. According to the RBC theory, market prices adjust rapidly enough to insulate the economy from aggregate-demand shifts and to keep its resources fully employed. Although employment and out-

put may fluctuate, these fluctuations do not represent harmful gaps because the economy always maintains full employment.²

A critical point in the RBC model is that even an economy driven solely by shocks to potential GNP can experience ups and downs as adverse shocks follow beneficial shocks. For example, suppose the economy initially experiences a beneficial supply shock—a technological breakthrough, say, that raises the level of potential and actual real GNP. Then comes an adverse supply shock, perhaps a long-term drought in the Midwest. Potential GNP shifts down again, lowering actual GNP. A series of unexpected, frequent shifts in potential GNP could generate what looks like “cyclical” behavior in actual GNP (Figure 2).

²The idea in the RBC theory that economic fluctuations do not reduce people's welfare is discussed extensively in Robert E. Lucas, *Models of Business Cycles* (New York: Basil Blackwell, 1987).

FIGURE 2
A Series of Shifts in Potential GNP Can Generate Cycles



¹For useful summaries, see Carl Walsh, “New Views of the Business Cycle: Has the Past Emphasis on Money Been Misplaced?” this *Business Review* (January/February 1986), and the symposium on “Real Business Cycles,” *Journal of Economic Perspectives* (Summer 1989).

IF POTENTIAL GNP IS VARIABLE, POLICYMAKERS MAY HAVE TO DO SOME RETHINKING

If the RBC theory could explain all of the fluctuations in the economy, then monetary policy would be straightforward. Monetary policy is thought to be a factor that influences only aggregate demand. Hence, monetary policy has no impact on output in the RBC view; it affects only prices. Thus, policymakers need only worry about inflation.

But policymaking is more difficult if only *part* of the RBC model is correct: potential GNP shifts erratically, but, contrary to the RBC theory, monetary policy can affect the gap between actual GNP and potential GNP. Thus, a monetary policy that smooths actual GNP fluctuations could have some undesirable repercussions if the sources of the fluctuations are shifts in potential GNP. Two examples follow:

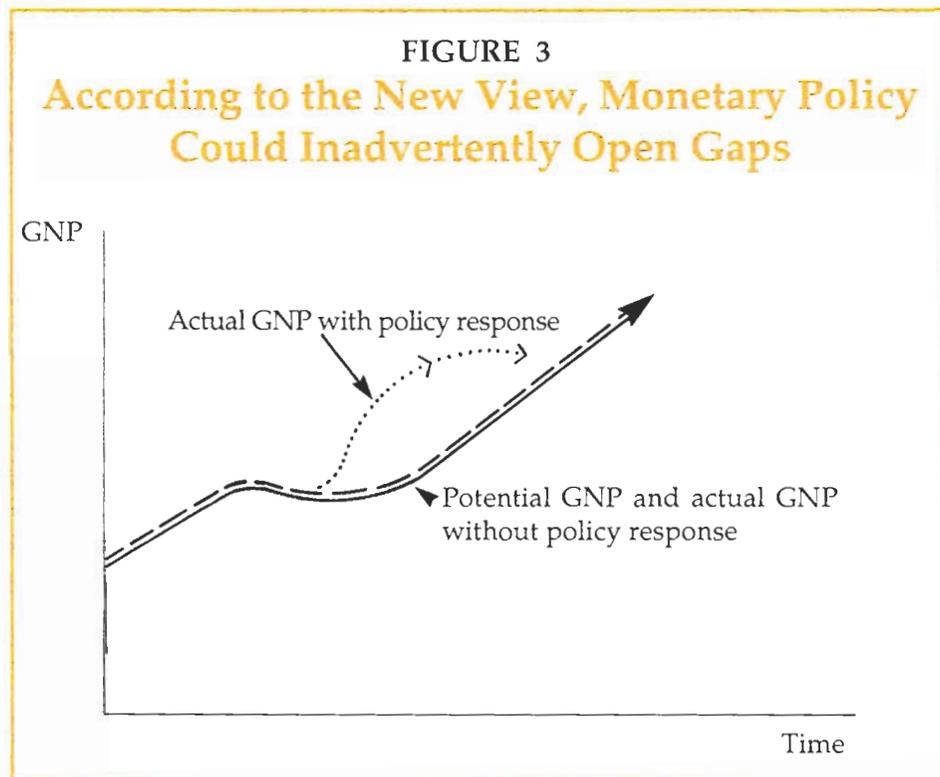
- A sudden decline in productivity reduces both actual and potential GNP. If the Fed does not respond, actual GNP falls toward its new, lower potential path. But if the Fed misinterprets the decline in actual GNP and engages in expansionary monetary policy, it would drive output above its potential level, creating additional inflationary pressures (Figure 3).
- A technological advance makes potential GNP grow faster than is generally recognized. If the Fed does not-

ing, real GNP rises to its new, higher potential. But if the Fed runs a tighter monetary policy, it pushes actual output below potential and creates unnecessary losses in production and employment.

In both of these examples, the policy response to the movement in actual GNP widened the gaps because potential GNP had shifted. But policymakers did not recognize this shift.

IDENTIFYING SHIFTS IN POTENTIAL GNP IS DIFFICULT

Because recognizing shifts in potential GNP is important to setting appropriate policy, economists have recently attempted to estimate the variation in actual GNP growth that is due to shifts in the growth of potential GNP. The major problem these studies face is that potential GNP is not directly observable. Consequently, identifying movements in potential GNP involves making some assumptions about its behavior. The real business cycle assump-



tion that all movements in real GNP are due to movements in potential GNP is one possibility. But recent studies have made a variety of less extreme assumptions to identify changes in potential GNP. Interestingly, all of the recent estimates of the variation in real GNP that can be attributed to shifts in potential GNP are greater than the traditional estimates.

The Traditional Method. The traditional approach to estimating potential GNP is to assume that growth in potential GNP is a constant number—for example, the commonly used assumption of 2.5 percent per year. A slightly more sophisticated version of the constant-time-trend assumption allows slight adjustments to the growth rate on a few occasions. An example of the traditional assumption is the Federal Reserve Board's measure of potential GNP, which increases smoothly over time, albeit at a slightly diminishing growth rate.³

Using Long-Term Information. A newer method associates changes in potential with long-run GNP fluctuations. This association seems reasonable because the potential level of GNP is determined by the supply of productive resources, and changes in these resources are likely to be persistent. In studies by Olivier Blanchard and Danny Quah, Matthew Shapiro and Mark Watson, and John Judd and Bharat Trehan, a key assumption is that demand disturbances can influence the economy's level of output only for a short time.⁴ Thus, any long-term fluctuations in GNP are associated with supply shifts. Because aggregate supply shifts

could also be behind some of the transitory movements in GNP, this approach places a lower bound on the variation in actual GNP that is due to potential GNP movements.

A similar approach to estimating potential GNP that focuses on long-term movements in GNP is to assume that permanent shifts common to several macroeconomic variables must be caused by the same permanent supply shocks. By estimating the correlations between the long-term movements in GNP, consumption, and investment expenditures, researchers Robert King, Charles Plosser, James Stock, and Mark Watson have been able to isolate permanent movements in GNP.⁵

Using Exogenous Information. A different method that has been used recently is to link shifts in potential GNP to a set of exogenous variables. This approach is used by John Boschen and Leonard Mills, who isolate fluctuations in GNP explained by a set of observable variables thought to determine potential output. This set included population growth, oil price shocks, and marginal tax rates.⁶

Edward Denison has studied a more comprehensive set of variables in attempting to explain long-term economic growth.⁷ This list includes many exogenous forces that may cause

³This potential GNP series is from Jeffrey J. Hallman, Richard D. Porter, and David H. Small, "M2 Per Unit of Potential GNP as an Anchor for the Price Level," Staff Study 157, Board of Governors of the Federal Reserve System (April 1989). For the methodology underlying these estimates, see Peter K. Clark, "Okun's Law and Potential GNP," Board of Governors of the Federal Reserve System (October 1982).

⁴Olivier Blanchard and Danny Quah, "The Dynamic Effects of Aggregate Demand and Supply Disturbances,"

American Economic Review (September 1989); Matthew D. Shapiro and Mark W. Watson, "Sources of Business Cycle Fluctuations," *NBER Macroeconomics Annual 1988*; and John P. Judd and Bharat Trehan, "Unemployment-Rate Dynamics: Aggregate-Demand and -Supply Interactions," Federal Reserve Bank of San Francisco *Economic Review* (Fall 1989).

⁵Robert King, Charles Plosser, James Stock, and Mark Watson, "Stochastic Trends and Economic Fluctuations," Working Paper from the Rochester Center for Economic Research (November 1989).

⁶John Boschen and Leonard Mills, "Tests of the Relation Between Money and Output in the Real Business Cycle Model," *Journal of Monetary Economics* (November 1988).

⁷Edward F. Denison, *Trends in American Economic Growth, 1929-1982* (Washington, D.C.: The Brookings Institution, 1985).

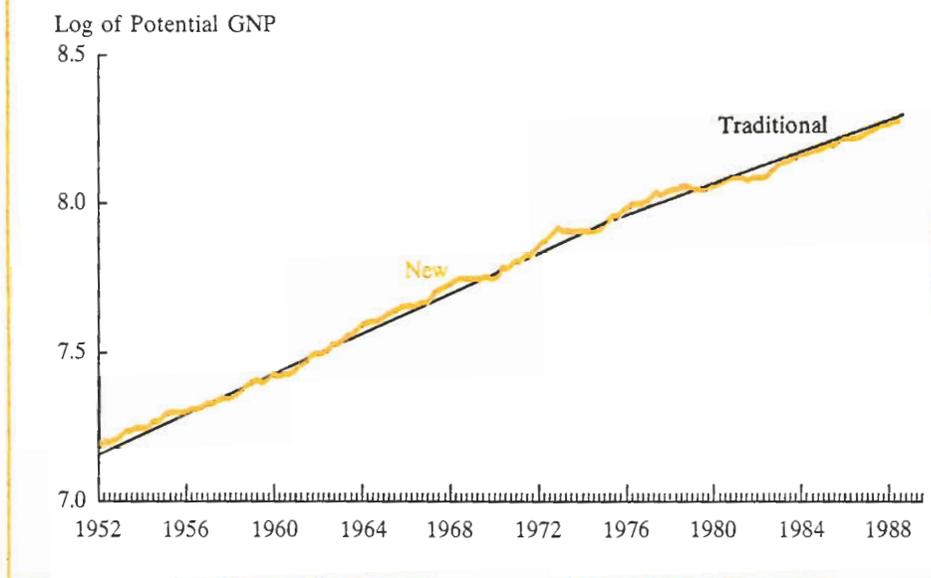
changes in capital, labor, and the productivity of these inputs. Denison's measure of potential GNP is measured annually. A quarterly approximation can be constructed by measuring movements in labor supply and worker productivity.⁸ The variability in this measure of potential GNP is representative of the variability in the other, newer estimates, but contrasts sharply with the traditional view of the relatively stable path for potential GNP (Figure 4).

Shifting Potential GNP Helps Explain

Actual GNP Growth. The traditional measure of potential GNP assigns only about 1 percent of the variation in actual GNP growth to fluctuations in potential GNP (see *Percentage of Variance in Quarterly Real GNP Growth...*). In contrast, all of the more recent estimates of potential GNP indicate that shifts in potential GNP explain a large part of the movements in actual GNP. The recent estimates range from a low of 27 percent to a high of 72 percent. The high estimate is from the Shapiro and Watson study, which differs from the others mainly in that it attributes a large amount of quarterly GNP movements to labor supply fluctuations

⁸This measure of potential GNP is the log of population over age 20 plus the log of labor productivity in the nonfarm business sector. The difference between this series and the log of actual real GNP is stationary around a linear trend over the period 1952:Q1 to 1988:Q4. The linear trend was included in the measure of potential GNP used in the figures.

FIGURE 4
New Measures of Potential GNP Are More Variable than Traditional Measures



(roughly 46 percent of the total variation). In contrast, Judd and Trehan attribute about 2 percent of quarterly GNP movement to labor supply, and Boschen and Mills attribute 5 percent to this variable. Overall, the consensus from this recent research is that, although the majority of the variation in quarterly GNP growth is from transitory components, a substantial portion is due to the more long-lasting shifts in potential GNP.

Because the newer estimates of potential explain a larger percentage of the variation in real GNP than the more traditional measures, the gaps between potential and actual GNP are smaller. Moreover, the gaps do not appear to last as long as in the traditional view (Figure 5, p. 10).

CONCLUSION

A new view of economic fluctuations has grown out of recent research that builds on the theory of real business cycles: growth in poten-

Percentage of Variance in Quarterly Real GNP Growth Due to Variability in the Growth of Potential

Method	Percent
<u>Traditional</u>	1
<u>Isolating Long-Run GNP Fluctuations</u>	
Blanchard and Quah	36
Judd and Trehan	36
King, Plosser, Stock, and Watson	54
Shapiro and Watson	72
<u>Examining Exogenous Variables</u>	
Boschen and Mills	27
Simple Growth	38

TECHNICAL NOTES: Each of the studies attempts to estimate the fraction of current-quarter real GNP growth that can be explained by changes in potential GNP. Many of the studies provide a range of estimates depending on different assumptions. The estimate reported for each study is the one corresponding to the set of assumptions that is most similar to the other studies.

Traditional: Ratio of the variance of growth in potential real GNP (from Hallman, Porter, and Small) to the variance of actual real GNP growth. Sample period is 1952:Q1 to 1988:Q4.

Blanchard and Quah: 1-quarter-ahead horizon, average of Tables 2A and 2C, pp. 666-67. The estimates in these tables allow for the stochastic trend in real GNP that is consistent with the other recent studies.

Judd and Trehan: Exhibit 1B, p. 28.

King, Plosser, Stock, and Watson: 1-quarter-ahead horizon, Table 6.

Shapiro and Watson: 1-quarter-ahead horizon, Table 2, p. 128

Boschen and Mills: Average of the combined effects of oil, population growth, and tax rate shocks, Table 3, p. 367.

Simple Growth: One minus the ratio of the variance in growth in the series (actual GNP - linear trend - population over age 20 - labor productivity in the nonfarm, business sector) to the variance in actual real GNP growth. All series are logged. See Footnote 8.

tial GNP is highly variable and causes the fluctuations we see in actual GNP. While many economists feel that the real business cycle view is extreme, it has reminded economists that there are many possible sources of fluctuations in real GNP, including shifts in potential

GNP. And although the estimates differ slightly, recent evidence suggests that actual GNP movements that are due to variation in potential GNP are surprisingly large.

This idea that potential GNP is variable questions the traditional rationale for GNP

stabilization policies that assume steady growth in potential output. If potential GNP is highly variable, policymakers should be aware that attempts to smooth changes in actual GNP growth could widen, rather than close, the gap between actual and potential output if changes in potential GNP are not recognized. Moreover, such lack of recognition would thwart the goal of price stability. Policymakers can lessen the likelihood of this error by gathering as much information as possible about the sources and duration of the observed fluctuations in real GNP.

