



## Okun's Law: A Meaningful Guide for Monetary Policy?

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Okun's law is an empirical relationship between changes in aggregate output (relative to its potential trend) and changes in the unemployment rate (relative to its natural rate). In other words, this law (named after economist Arthur Melvin Okun) is intended to tell us how much of a country's gross domestic product (GDP) may be lost when the unemployment rate is above its natural rate. Many economists have argued that Okun's law is a useful guide for monetary policy because it suggests room for policymakers to improve aggregate output by further reducing unemployment. (Recall that one side of the Federal Reserve's dual mandate is maintaining maximum employment.) However, despite its popularity, the stability and usefulness of Okun's law have been disputed.

The top-left panel of the chart depicts Okun's law based on quarterly data for 1948:Q1–2012:Q1. The vertical axis shows the percentage change in real GDP relative to its long-run HP trend.<sup>1</sup> The  $x$ -axis shows the change in the unemployment rate relative to its natural rate (also defined as its long-run HP trend). Each dot in the chart represents the observed changes in GDP and unemployment in a particular year. The solid line through the dots is the fitted value of the relationship, which captures the average slope ( $-1.8$ ) of the two variables. Thus, this empirically estimated Okun's law states that for each 1-percentage-point increase (decrease) in the unemployment rate from its natural rate, total output on average will be lowered (raised) by nearly 2 percent relative to its long-run HP trend. For example, suppose the natural rate of unemployment is 6 percent in 2012; then the current 8.1 percent unemployment rate implies that real GDP is about 3.6 percent below its potential trend.

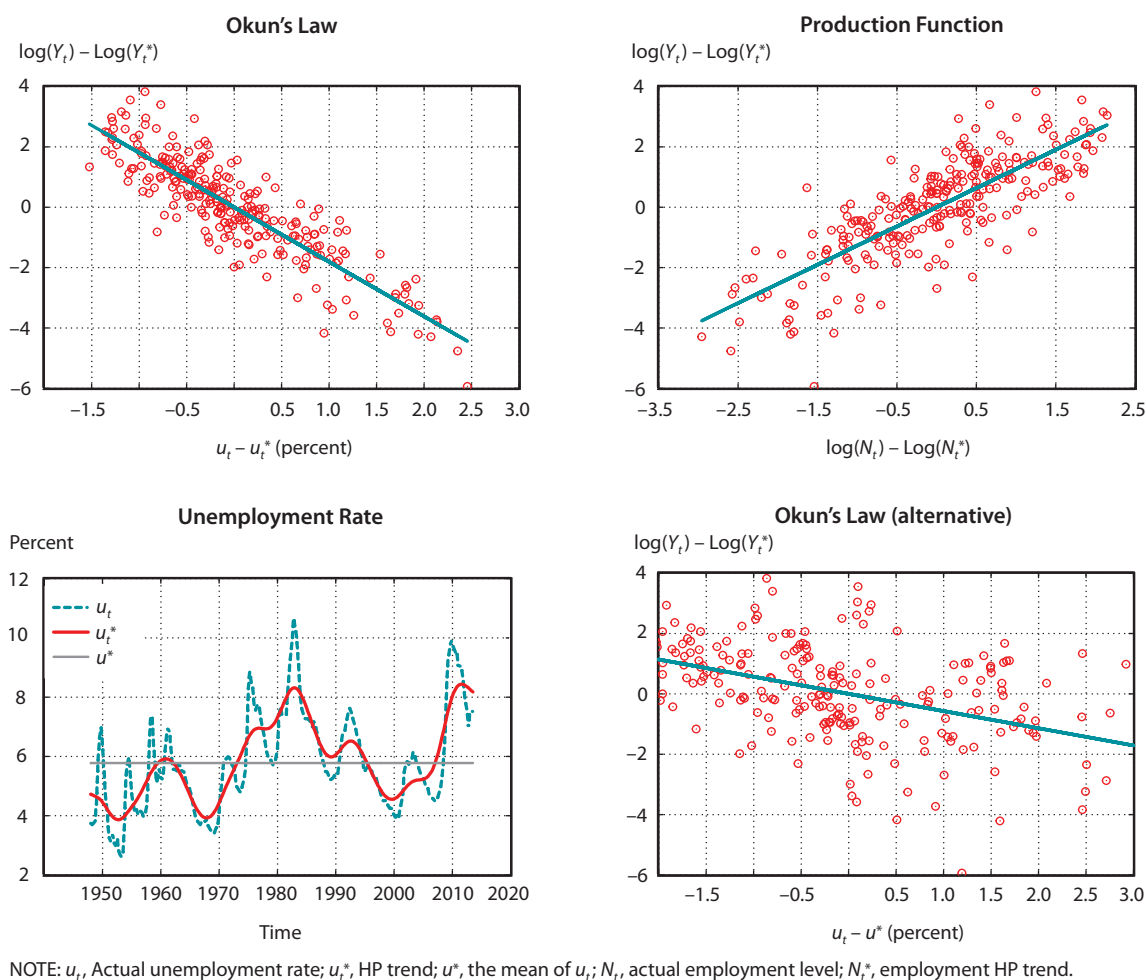
The logic behind Okun's law is simple. Output depends on the amount of labor used in the production process, so there is a positive relationship between output and employment. Total employment equals the labor force minus the unemployed, so there is a negative relationship between output and unemployment (conditional on the labor force). Hence, Okun's law can also be measured as a positive relationship between changes in output and changes in employment (shown in the top-right panel of the chart, which resembles a mirror image of Okun's law). This mirror image has a positive slope ( $1.27$ ), suggesting that aggregate output will increase by about 1.3 percent for every 1-percentage-point increase in total employment relative to its long-run HP trend.

However, the stability and significance of Okun's law depend on how the long-run trends for GDP and the unemployment rate are defined. When the HP trend is used as the long-run trend (as in the top-left panel), Okun's law appears to be very stable and significant over time, even if the estimation is based only on more recent samples including the financial crisis period.

Suppose we re-define the potential long-run trend as a linear timeline; then the graph of Okun's law would look completely different. For example, suppose we define the long-run natural rate of unemployment as the average of the actual rate of employment rather than its HP trend. The lower-right panel in the chart shows the alternative Okun's law based on this definition. The slope is now much less steep ( $-0.57$ ) and much less significant since the dots no longer form a clear pattern with high concentrations. In fact, Okun's law almost disappears. It is therefore hard to imagine that the solid line in this panel can be reliably used to measure the loss of output caused by unemployment or as a meaningful guide for monetary policy.

**Okun's law can be a useful guide for monetary policy, but only if the natural rate of unemployment is properly measured.**

Why are the results so different? The lower-left panel shows the actual rate of unemployment (the dashed blue line  $u_t$ ), the HP trend (the solid red line), and the mean (the straight line  $u^*$ ). Notice how the HP trend closely tracks the movements in the actual rate of employment, suggesting that the long-run rate of unemployment is not a constant over time. For example, the high unemployment rate since the financial crisis is mainly driven by a rising long-run trend in the natural rate. Judged by this trend, the current 8.1 percent unemployment rate is already about 0.3 percentage points below its natural rate (which, under the conditions of this panel of the chart, would be 8.4 percent for 2012:Q2),<sup>2</sup> suggesting that output is already 0.54 percent above its long-run trend. Thus, further monetary stimulus packages may no longer be needed. In sharp contrast, the mean unemployment rate (the straight line  $u^*$ ) is around 6 percent through the sample period. Judged by this second trend, the current unem-



employment rate is still more than 2 percentage points above its natural rate. Using the alternative Okun's law (lower-right panel), output would still be more than 1 percent below its long-run trend. However, given the large standard errors in the alternative Okun's law, we are not confident that this 1 percent output gap is credible; it could equally likely be 2 percent or 0 percent.

This difference presents a dilemma. If Okun's law is to be useful as an indicator of the status of the economy for monetary policy purposes, it needs to be stable and statistically significant. Achieving this requires us to adopt a time-varying trend for the variables involved in estimating Okun's law. A time-varying trend, however, indicates that the economy is already above the trend in terms of both the unemployment rate and the output gap. Conversely, if we adopt a linear trend, Okun's law indicates that the economy is still in deep recession with plenty of room for monetary policy actions. However, we are not confident in this judgment about the large unemployment gap or the possible

effects of this gap on aggregate production because the alternative Okun's law states that lowering the unemployment rate may not necessarily lead to significantly higher output.

So, to answer our original question: Is Okun's law a useful guide for monetary policy? The answer may be "yes," but only to the extent that the natural rate of unemployment is properly measured. ■

<sup>1</sup> The HP trend of a variable captures not only the variable's constant growth rate but also slow-moving fluctuations. The HP trend is obtained by applying the Hodrick-Prescott (HP) filter.

<sup>2</sup> Since the endpoint of the HP trend cannot be estimated accurately, we extended the data by six more quarters using an autoregressive moving average forecast model.

Prachowny, Martin. "Okun's Law: Theoretical Foundations and Revised Estimates." *Review of Economics and Statistics*, May 1993, 75(2), pp. 331-36.