The Fault in R-Star

Has the natural rate of interest lost its luster as a navigation aid for monetary policy?

BY TIM SABLIK

In a 2018 speech at the annual Economic Policy Symposium in Jackson Hole, Wyo., Fed Chairman Jerome Powell compared monetary policymakers to sailors. Like sailors before the advent of radio and satellite navigation, Powell said, policymakers should navigate by the stars when plotting a course for the economy. Powell wasn't referring to stars in the sky, however. He was talking about economic concepts such as the natural rate of unemployment and the natural real interest rate. In economic models, these variables are often denoted by an asterisk, or star.

The natural rate of interest in particular sounds like the perfect star to guide monetary policy. The real, adjusted-for-inflation interest rate is typically represented in economic models by a lowercase "r." The natural rate of interest, or the real interest rate that would prevail when the economy is operating at its potential and is in some form of an equilibrium, is known as r* (pronounced "r-star"). It is the rate consistent with the absence of any inflationary or deflationary pressures when the Fed is achieving its policy goals of maximum employment and stable prices. Since the financial crisis of 2007-2008, Fed officials have often invoked r-star to help describe the stance of monetary policy. But lately, r-star seems to have lost some of its luster.

"Navigating by the stars can sound straightforward," Powell said in his Jackson Hole address. "Guiding policy by the stars in practice, however, has been quite challenging of late because our best assessments of the location of the stars have been changing significantly."

Even New York Fed President John Williams, who helped pioneer estimating r-star, recently bemoaned the challenges of using the natural rate as a guide for policy. "As we have gotten closer to the range of estimates of neutral, what appeared to be a bright point of light is really a fuzzy blur," he said in September 2018.

Why did r-star become so prominent in monetary policy discussions following the Great Recession, and why have its fortunes seem to have waned?

A Star is Born

The concept of the natural rate of interest dates back more than 100 years. In an 1898 book titled *Interest and Prices: A Study of the Causes Regulating the Value of Money*, Swedish economist Knut Wicksell argued that one could not judge inflation by looking at interest rates alone. High market rates did not necessarily mean that inflation was speeding up, as was commonly believed at the time, nor did low rates mean that the economy was experiencing deflation. Rather, inflation depended on where interest rates stood relative to the natural rate.

Wicksell's natural rate seemed like an ideal benchmark for monetary policy. The central bank could slow down an economy in which inflation was accelerating by steering interest rates above the natural rate, while aiming below the natural rate could help stimulate an economy that had fallen below its potential. Indeed, Fed officials in the past made occasional reference to the natural rate of interest as a way to explain monetary policy. During testimony before Congress in 1993, then-Fed Chairman Alan Greenspan explained that "in assessing real rates, the central issue is their relationship to an equilibrium interest rate... Rates persisting above that level, history tells us, tend to be associated with slack, disinflation, and economic stagnation -- below that level with eventual resource bottlenecks and rising inflation, which ultimately engenders economic contraction."

Despite some passing references to the natural rate of interest, however, Wicksell's idea didn't truly rise to prominence until the early 2000s when Columbia University economist Michael Woodford incorporated it into a modern macroeconomic framework to describe how central banks should behave. In his book, titled *Interest and Prices: Foundations of a Theory of Monetary Policy* in a nod to Wicksell's work, Woodford argued that a central bank should seek to close the gaps between actual economic conditions and the economy's potential for output and employment (y-star and u-star, respectively) as well as the gap between actual real interest rates and the natural rate (r-star) all at the same time to obtain an optimal outcome. There was just one problem: No one knows exactly what r-star, or any of the stars, is equal to.

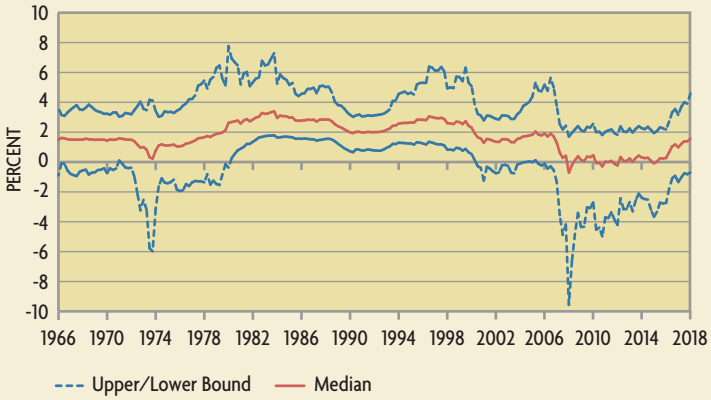
"R-star, just like potential GDP or the natural rate of unemployment, is fundamentally unobservable," says Thomas Lubik, a senior advisor in the research department at the Richmond Fed.

In 2003, New York Fed President Williams, then an economist at the San Francisco Fed, and Thomas Laubach, an economist with the Fed Board of Governors, published a paper in the *Review of Economics and Statistics* that attempted to estimate the natural rate of interest.

"The paper was highly cited, but it took some time before policymakers began to view r-star as a potential operational guide," says Lubik.

Finding R-Star

The Lubik-Matthes Estimate of the Natural Rate of Interest



SOURCE: Thomas A. Lubik and Christian Matthes, "Calculating the Natural Rate of Interest: A Comparison of Two Alternative Approaches," Federal Reserve Bank of Richmond *Economic Brief* No. 15-10, October 2015.

From the perspective of monetary policymakers, a key problem was that estimates of r-star are highly uncertain. This can be seen in the r-star measure developed by Lubik and fellow Richmond Fed economist Christian Matthes. Their median estimate represents the most likely value of r-star, which was 1.56 percent at the end of 2018, but that estimate exists in a range of potential values. (See chart.) The inability to measure the natural rate of interest precisely seemed to limit its usefulness as a benchmark for setting monetary policy. But after the Great Recession, policymakers began to take a closer look at r-star.

The New Normal

Given the severity of the financial crisis of 2007-2008 and the recession that followed, it was not entirely surprising when the Fed dramatically reduced the federal funds rate to nearly zero. But as the crisis subsided and the economy slowly started to recover after 2009, interest rates remained near zero year after year. In part, this was because the Fed held the federal funds rate low to keep monetary policy accommodative during the recovery, but it was also the case that low inflation and weak economic conditions left little room for rates to rise.

"I think most people expected that as the economy rebounded, interest rates would also rebound. But that didn't happen," says Andrea Tambalotti, a vice president in the research and statistics group at the New York Fed. "So the question became: Why?"

The answer, it turned out, could be found in r-star. In previous decades, many economists assumed the natural rate of interest was fairly constant over time. But in the wake of the Great Recession, new estimates by Laubach and Williams pointed to a dramatic collapse in the value of r-star, from 2.5 percent to less than 1 percent.

"It became pretty clear that r-star, at least in the short run and possibly even in the long run, may not be constant," says Marco Del Negro, also a vice president in the research and statistics group at the New York Fed.

Alongside Tambalotti and other New York Fed colleagues, Del Negro developed estimates for the natural rate of interest to complement the earlier work by Laubach and Williams. Around the same time, Lubik and Matthes in Richmond also developed their alternative methodology to estimate r-star. All of these estimates pointed to the same trend: The natural rate of interest had fallen dramatically since the financial crisis of 2007-2008, continuing a trend that had started in the 1990s.

Fed officials stipulated that some of this decline was likely transitory. On Dec. 2, 2015, then-Chair Janet Yellen remarked that "the *neutral* nominal federal funds rate ... is currently low by historical standards and is likely to rise only gradually over time." Two weeks later, when the Federal Open Market Committee (FOMC) voted to raise the federal funds rate for the first time since the Great Recession began, it noted that "the neutral short-term real interest rate was currently close to zero and was expected to rise only slowly as headwinds restraining the expansion receded," according to the minutes from the meeting. But estimates of r-star also pointed to a longer-run problem.

"The whole world was stuck at low interest rates long after the financial crisis had passed," says Tambalotti. "Researchers began looking at the work that John Williams and Thomas Laubach had done on r-star in the early 2000s. They realized that there was something unusual going on. It was not just the financial crisis. Something else was keeping interest rates low."

While monetary policy can influence short-term interest rates, economists believe that long-run interest rates are driven by forces outside the central bank's control. One such force is the demand for global savings. Before becoming chairman of the Fed, Ben Bernanke gave a speech in 2005 in which he talked about the "global saving glut." Increased global demand for safe assets, such as U.S. Treasuries, was bidding up their price and driving down interest rates, he said. As long-run interest rates remained low in the wake of the Great Recession, the global savings glut re-entered the policy discussion as a possible explanation. Economists also pointed to slowing productivity growth and aging populations in advanced economies as additional factors depressing r-star.

If changes in the global economy had caused a longer-run decline in r-star, then returning monetary policy to neutral might look quite different from past economic recoveries. In December 2016, when the FOMC raised the federal funds rate for only the second time since the financial crisis of 2007-2008, it signaled that the factors holding down interest rates might be long-lasting and outside of its control.

According to the minutes from that meeting, "Many participants expressed a view that increases in the federal funds rate over the next few years would likely be gradual in light of a short-term neutral real interest rate that currently was low — a phenomenon that a number of participants attributed to the persistence of low productivity growth, continued strength of the dollar, a weak outlook

for economic growth abroad, strong demand for safe longer-term assets, or other factors."

Fading Light?

Despite the difficulties in estimating r-star, it helped monetary policymakers identify a decline in the natural rate of interest. It also proved to be both a useful guide for policy during the recovery from the Great Recession and a helpful communication device to explain to the public why interest rates had been so low for so long. Why, then, have policymakers recently downplayed r-star's utility? As Powell suggested in Jackson Hole, it has to do with the different context the Fed finds itself in today.

"When interest rates were close to zero, it was pretty safe to assume that we were far from the long-run natural rate, regardless of the uncertainty surrounding estimates of r-star," says Del Negro. "Now that nominal interest rates are above 2 percent, pinpointing the actual long-run level for the federal funds rate matters more, and the uncertainty around estimates of r-star plays a bigger role."

To be sure, Fed officials have always stressed the imprecision of r-star in their public communications. In a January 2017 speech, then-Chair Yellen remarked that "figuring out what the neutral interest rate is and setting the right path toward it is not like setting the thermostat in a house: You can't just set the temperature at 68 degrees and walk away. ... We must continually reassess and adjust our policies based on what we learn."

Failing to stay on top of changes to r-star and other unobservable economic indicators may result in the Fed drawing the wrong conclusions for monetary policy. During the Great Inflation of the 1970s, for example, loose monetary policy contributed to mounting inflation. Some economists have blamed this on incorrect estimates of the natural rate of unemployment at the time. On the other hand, the Fed has correctly interpreted hard-to-measure changes in the economy before. During the tech boom of the late 1990s, falling unemployment led many on the FOMC to call for raising interest rates to head off inflation. Then-Chairman Greenspan resisted, arguing that the data were pointing to rising productivity. He was vindicated when unemployment fell but inflation remained low and stable. During his 2018 Jackson Hole speech, Powell focused on a similar challenge now facing the Fed.

"The FOMC has been navigating between the shoals of overheating and premature tightening with only a hazy view of what seem to be shifting navigational guides," he said.

Even setting aside questions of measurement, some economists have questioned whether r-star should be used as a benchmark for monetary policy at all. While economists have traditionally assumed that long-run interest rates are driven by fundamental factors in the economy rather than monetary policy, Claudio Borio and Phurichai Rungcharoenkitkul of the Bank for International Settlements and Piti Disyatat of the Bank of Thailand argued in a 2018 paper that monetary policy decisions in the short run may in fact influence the long-run natural rate of interest. Easy policy in the short term may lead to "financial imbalances," which can generate losses in the long run when the economy goes bust. This boom and bust cycle may influence the natural rate of interest, according to the authors, compromising its ability to serve as an independent guide for policy.

One among Many

In a sense, the Fed's view on r-star hasn't changed. Early in the recovery, policymakers used it to help explain why interest rates were low and why they were likely to remain low for some time. But they were always careful to communicate the uncertainty surrounding r-star. As the federal funds rate has risen and that uncertainty has become more relevant, the Fed's communications have reflected that heightened concern. One thing has changed in the last decade, though. The renewed interest in r-star has spawned more efforts to better estimate and understand it.

"Multiple Reserve Banks are now contributing to the effort to measure r-star," says Lubik. "Some estimates are on the high end and some are on the low end, but together they provide a good assessment of the most likely value for r-star under a variety of assumptions and methodologies."

The Fed is making use of these and other data to gain a better picture of the economy while it shifts monetary policy into neutral. At the FOMC's September 2018 meeting following Powell's Jackson Hole speech, participants noted that "estimates of the level of the neutral federal funds rate would be only one among many factors that the Committee would consider in making its policy decisions," according to the meeting's minutes.

R-star has become an important tool in the Fed's kit following the Great Recession, but it should not come as a surprise to see its fortunes wax and wane as economic conditions change over time. It's a rare kind of navigational aid, one that becomes blurrier as it gets closer. **EF**

Readings

Borio, Claudio, Piti Disyatat, and Phurichai Rungcharoenkitkul. "What Anchors for the Natural Rate of Interest?" Paper prepared for the Federal Reserve Bank of Boston 62nd Annual Economic Conference, Sept. 7-8, 2018.

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