



**H**AVING a concept named after you is as much a mark of honor in economics as it is in other sciences. By this standard, Stanford's John Taylor is among the most honored macroeconomists of his generation. Indeed, concepts bearing his name have become so pervasive that U.S. Federal Reserve Board Chairman Ben Bernanke joked that "with our appetites whetted

Taylor's work, the IMF's First Deputy Managing Director, John Lipsky, a graduate school classmate of Taylor's, said: "If there had been a yearbook of our Ph.D. cohort at Stanford, the caption beneath John's picture might well have stated: 'Most Likely to Develop a Successful Monetary Policy Rule.' His interests and training surely pointed toward such a contribution."

## The Quest for Rules

by the Taylor rule, the [Taylor] principle, and the [Taylor] curve, we now look forward to the Taylor dictum, the Taylor hyperbola, and maybe even the Taylor conundrum."

The best known of these concepts, the Taylor rule, is a simple equation that Taylor propounded in 1992 to describe the response of the Fed's interest rate target to inflation and business cycles. The equation succeeded as both description and prescription: it described how the Fed had been setting its interest rate target and prescribed what the Fed ought to—and might—do next. The equation quickly gained wide acceptance among central banks as a useful guide for policy.

Those who know John Taylor well are not surprised at this success. At a conference held in Dallas last year to honor

The academic work laid the foundation, Taylor agrees, but what "made it all gel" was his policy experience in Washington during two stints at the U.S. Council of Economic Advisers (CEA), he tells *F&D*. "I doubt I would have had that idea without the CEA experience." Indeed, Taylor's career has been marked by an easy back-and-forth between academia and policymaking, most recently as the U.S. Treasury's top official for international affairs. When in academia,

he jumps into teaching and research with an abandon that seems uncharacteristic of a Washington policymaker: to grab students' attention in a class on agricultural supply and demand, he once pranced around the classroom in a California raisin costume to the tune of Marvin Gaye's "I Heard It Through the Grapevine."

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interviews

**John Taylor**

## From discretion to rules

Until the 1970s, the workings of the Fed and other central banks were shrouded in mystery. Monetary policy was considered an esoteric topic best left to the discretion of technicians. The problem was that this use of discretion often led to costly mistakes: for example, during the Great Depression, when the Fed sent the economy into a tailspin by stepping on the brakes instead of the accelerator, or during the Great Inflation of the 1970s, when the Fed let inflation ratchet up to double digits.

The solution, according to conservative economists such as the late Milton Friedman, was to bind the Fed into following fairly rigid rules. In fact, Friedman had for decades been calling for a rule under which the Fed would keep the money supply growing at a fixed rate of about 3–5 percent a year—essentially turning over the conduct of monetary policy to a computer. However, when the Fed tried such money supply–based rules in the early 1980s, it was unsuccessful—the short-run relationship between the money supply and the economy was too unstable for the rules to be a good guide to monetary policy.

Sympathetic to Friedman’s advocacy of rules over discretion, Taylor was one of a younger generation of conservative macroeconomists interested in devising a monetary policy rule that would fare better. He brought remarkable skills and training that positioned him as the front-runner in the quest to formulate a practical monetary rule. As an undergraduate at Princeton in the mid-1960s, he wrote an award-winning senior thesis that simulated the economy’s response under different types of economic policies. He built on this foundation during his graduate work at Stanford, where he studied with famous statisticians such as T.W. (Ted) Anderson on so-called joint estimation and control problems—sophisticated statistical methods of simultaneously modeling the behavior of the economy and the choice of optimal economic policies.

At Columbia University, his first position after graduate school, he worked with Edmund (Ned) Phelps—who won the Nobel Prize in 2006—on models that incorporated sticky, or sluggish, behavior of prices and wages. By bucking the then-prevalent academic trend of assuming flexible prices and wages, Taylor was able to impart greater realism to his models and make them more palatable to those working on models at the Fed and other central banks.

Taylor says his time at Columbia was memorable for the intellectual excitement of being around “established stars like Ned Phelps and Phil Cagan and stars in the making like Guillermo Calvo [profiled in *F&D* in March 2007] and Carlos Rodriguez.” Both Taylor and Calvo went on, among their other academic achievements, to do path-breaking work on sticky prices and wages. Indeed the terms “Taylor contracts” and “Calvo contracts,” referring to the alternate ways that the two proposed for capturing sluggish wage and price behavior, have both entered the lexicon of economics.

## Taylor rules!

It was during his two tours at the CEA that Taylor discovered the practical side of making monetary policy. As a staff economist in 1976–77, he learned how important the measurement

of economic concepts such as potential GDP and the natural rate of unemployment was to the conduct of monetary policy. One of the major achievements of the CEA during this time, he says, was to bump up the estimate of the U.S. natural rate of unemployment from 4 percent to 4.9 percent. “The political people were scared of going up to 5 percent,” Taylor says with a laugh. “It was a bit like gas stations pricing gasoline at \$1.995 a gallon instead of \$2.”

In 1989—he had by then moved from Columbia to Stanford—Taylor returned to Washington after U.S. President George H.W. Bush appointed him one of the three members of the CEA. Among his responsibilities was to serve as the administration’s liaison with the Fed. “I could see that the Fed’s behavior was not as chaotic and discretionary as was often being described. Fed officials I spoke to saw themselves as trying to react to events in the economy in a fairly systematic way,” Taylor says.

**“The equation that Taylor proposed was simplicity itself—so simple that Taylor was able to put it on the back of his business card.”**

Donald Kohn, a longtime Fed official who is now vice-chairman of the board, recalls those conversations with Taylor: “[They] began in earnest in the late 1980s, when John was on the Council of Economic Advisers [and] occurred not only in offices and classrooms in Washington and Stanford and at numerous conferences around the globe, but also around dinner tables in Washington and Palo Alto and on hiking trails from Vermont to Wyoming.”

In 1991, at the end of his second stint at the CEA, Taylor began to think seriously about devising “a simple and practical rule”—an equation that would both help outsiders understand how the Fed behaved and give the Fed a benchmark against which to measure its performance. Taylor presented this equation at the November 1992 Carnegie-Rochester conference. It soon drew plaudits, not just in academia but also in policymaking circles and the private sector. Lipsky, then at Salomon Brothers, gave it an early thumbs-up. “We utilized Taylor’s equation in our December 1993 forecast publication to signal to our clients that a monetary tightening was both overdue and imminent,” Lipsky said at last year’s conference in Dallas. “Indeed, the Fed did tighten in February 1994, a development that confounded the market consensus.”

The equation that Taylor proposed was simplicity itself—so simple that Taylor was able to put it on the back of his business card (see Box 1). It said that from 1987 to 1992, the Fed’s setting of its policy instrument, the federal funds rate, had been motivated in large part by two considerations:

- How close the U.S. inflation rate was to 2 percent. If inflation inched above 2 percent, the Fed tended to raise the federal funds rate target to cool inflation.

- How far the economy's real income was from its potential. If income was below potential, the Fed tended to lower the target interest rate to stimulate the economy.

Taylor showed that if his proposed equation had been adhered to in the 1970s, the performance of the U.S. economy would have been superior to what it was. Inflation would not have ratcheted out of control because the Fed would have met each increase in the inflation rate (above 2 percent) with a greater-than-proportional response of the federal funds rate—this more-than-proportional response of interest rates to inflation has become enshrined as the Taylor principle.

Using the metric of his rule, Taylor gives the Fed mixed grades in its more recent performance. At the annual economic conference in Jackson Hole, Wyoming, last year, Taylor showed that between 2002 and 2005, the Fed increased the federal funds target rate more slowly than his rule would have suggested. Had the Fed followed the rule, much of the boom in housing starts as well as the subsequent bust might have been mitigated, according to Taylor.

Why did such a simple equation gain acceptance as a successful monetary policy rule? One reason was Taylor's reputation as someone who had worked on much larger-scale and more complicated multicountry models of the global economy, particularly at a time when few other macroeconomists were doing so. Andrew Levin, one of a number of Stanford graduate students nurtured by Taylor who are in senior positions in the Fed system, says that Taylor was always known for "pushing the limits of the Stanford supercomputer" to solve his models. That such a person was proposing a simple rule gave it a credibility that it might not otherwise have had.

### Cooperation amid chaos

In 2001, Taylor returned to Washington, this time as U.S. Treasury Undersecretary for International Affairs in the administration of President George W. Bush. His work centered on rallying political support from finance ministries to freeze

terrorists' assets in the wake of the 9/11 attacks. Taylor says he is proud that the 9/11 Commission, which examined the government's response to the attack, gave the work on freezing terrorist finances "its top grade, an A-, among a sea of Ds and Fs" received by other aspects of the war on terror.

Taylor also had to deal with central banks again, but in a very different context. He oversaw the establishment of an independent central bank in Iraq and the huge logistical challenges of introducing a new currency, the Iraqi dinar. The task was complicated by Saddam Hussein's order to remove \$1 billion worth of currency from the central bank's vaults just before his regime fell in 2003. That meant that if the new currency was not successful and people wanted to trade it in for U.S. dollars or euros, there would be no way for the central bank to accommodate them. "The image of the Iraqi central bank with its foreign exchange reserves depleted was enough to send shivers up the back of a monetary economist like me," Taylor wrote in his 2007 book, *Global Financial Warriors*. When much of the stolen money showed up buried in Saddam's palace grounds, Taylor wanted it returned to the central bank. But, he says, "in most people's minds, using the funds for reconstruction projects" like water systems and sanitation repair was a better idea.

So the introduction of the new dinar had to be undertaken with little room for error. The new money was "enough to fill twenty-seven 747 planeloads." It was flown to Iraq from seven different printing plants around the globe and delivered by armed convoys to 240 locations across the country. Fortunately, the currency proved to be so popular that people started trading in their U.S. dollars for the new dinars. As they did so, the central bank's foreign reserves started to rise. "When they rose above the billion-dollar mark, I breathed a sigh of relief," Taylor wrote in his book.

Looking back on his Iraqi effort, for which he received the U.S. Treasury's Distinguished Service Award, Taylor says he is struck by "how much of it required a lot of international

#### Box 1

#### Taylor-made concepts

What is now called the Taylor rule was a simple equation that John Taylor presented at a conference in 1992 and elaborated on in a 1999 book:

$$r = 1.5p + 0.5y,$$

where  $r$  is the deviation of the Fed's target for the real federal funds rate from its long-run average,  $p$  is the deviation of the inflation rate from an inflation target, and  $y$  is the gap between actual and potential output. The federal funds rate is the interest banks charge each other for overnight loans of excess reserves and is the Fed's key market tool for monetary policy.

Viewed as a prescription, the equation says that the Fed ought to raise the target interest rate above its neutral level when inflation is above the central bank's (explicit or implicit) target or when output is above potential.

In short, the equation asks the Fed to "lean against the wind." The equation also embodies what has come to be known as the Taylor principle: the central bank should respond to an

increase in inflation with a more-than-proportional increase in the federal funds target.

Taylor showed that from 1987 to 1992, this equation also described the actual behavior of the federal funds rate. Taylor suggested that the widely acknowledged good performance of monetary policy over this period was a result of implicitly following such a rule.

Though it was the Taylor rule that gave him celebrity status, John Taylor's reputation as an outstanding macroeconomist would have been secure without it. In the 1970s, he did work on what is now called the Taylor curve. Like the famous Phillips curve, it is a relationship between inflation and unemployment. But while the Phillips curve posited a relationship between the *level* of inflation and unemployment, Taylor showed that the trade-off that policymakers actually face is between the *volatility* of inflation and unemployment. Good central bank policies can improve this trade-off by lowering not just the volatility of inflation but also that of unemployment.

cooperation and diplomacy.” The efforts to freeze assets eventually included more than 180 countries, he notes, calling it one of the best examples in international cooperation “at least since the founding of the Bretton Woods institutions.”

### New rules for the IMF

Taylor’s stint at the U.S. Treasury was also notable for his attempts to guide the reform of the IMF. Consistent with his emphasis on rule-based policies, Taylor thought that “one of the problems with the IMF was that there was too little systematic behavior. Will it bail out a country or won’t it? When will it?” He felt that this lack of systematic behavior helped create uncertainty in the markets and was one of the reasons there was “so much contagion” during the financial crises of the 1990s.

Taylor therefore strongly supported the reforms adopted at the IMF that sought, in his words, “to put some more rules on the IMF.” These included the 2003 decision to clarify the criteria under which countries would be eligible for very large loans from the IMF. In a 2005 article, Taylor wrote that

Box 2

#### Breaking the rules

When it comes to teaching economics, John Taylor believes in breaking all the rules. Most people wince when recalling their college economics courses: the image that comes to mind is often that of a colorless professor droning on about some abstract concept. Taylor feels that economics professors “should look for ways to entertain as they educate” and be willing to “court disaster” to make abstract economic concepts come alive.

In addition to reflecting his ideas on teaching in his popular principles of economics textbook, now in its sixth edition, Taylor often exchanges experiences with other professors through presentations at conferences. In one of those presentations, he urged professors to practice “surprise-side economics,” whose tenets he said are to make economics lectures “less abstract, more intuitive, more relevant, and more memorable.” To practice what he preaches, Taylor—in addition to donning the California raisin costume—has tried to make his lectures memorable by having the voice of “Adam Smith” piped into a lecture hall through its public address system.

Such devotion to teaching has endeared him to a generation of students at Stanford—and won him teaching awards—but he says that his most famous student was “one that got away.” In the fall of 1995, one of the students who took Taylor’s introductory economics course was golfer Tiger Woods, who left Stanford soon thereafter. “Perhaps I explained the concept of opportunity costs a bit too clearly,” Taylor jokes. He adds that he now uses the example of Woods—and the estimate of the \$40 million in earnings the golfer would have forgone had he stayed at Stanford—to explain the concept of opportunity costs to incoming students. “They get the idea right away.”

this clarification would help “reduce uncertainty and create the right incentives for both policymakers and private investors.” For the same reasons, he also championed the adoption of collective action clauses in sovereign bonds. These aim to provide greater predictability in the event of a debt restructuring. Such clauses were introduced in debt issued by the Mexican government in 2003 and have since become the market standard.

Taylor’s work on these contracts was portrayed in the press as putting him in bitter conflict with his former Stanford colleague Anne Krueger, then the IMF’s First Deputy Managing Director, who had suggested setting up a centralized sovereign debt restructuring mechanism. Taylor says he did oppose such a mechanism, but in *Global Financial Warriors* he wrote that “the idea that Anne Krueger and I were having some kind of personal feud was ridiculous. . . . We played golf together at the IMF’s Bretton Woods golf course in Maryland just as we played golf at Stanford’s course in California. As former academics, it seemed natural to have differences of opinion on professional issues and still remain friends.” Who won at golf? The matches tended to be “pretty even,” Taylor says.

Taylor also championed the IMF’s introduction in 2005 of a Policy Support Instrument, which he has called “an IMF program without the borrowing.” Taylor argues that this new instrument—which has so far been used by Cape Verde, Mozambique, Nigeria, Senegal, Tanzania, and Uganda—allows countries to receive the benefits of IMF programs, such as expert advice on designing economic programs, even when they have no pressing financial need. Without this instrument, Taylor writes, “IMF loans were being given and then rolled over because they were the only way” for countries to signal to markets and donors that they had received “the important seal of approval” from the IMF.

### Between Stanford and Washington

In 2005, Taylor says, he decided that it was time to move back to Stanford after what had been “four very intense years” at the U.S. Treasury. Only 61, he is active again in teaching (see Box 2), research, and keeping a watchful eye on the Fed. He has been supportive of the Fed’s actions during the recent global turmoil, including the dramatic 75-basis-point cut in the federal funds rate in between meetings of the Federal Open Market Committee. Taylor told the *Financial Times* that this cut “was moving forward something that was going to happen anyway. The idea of doing it in the middle of very difficult market times seems to me was a good thing.”

This year, as in the past several U.S. presidential elections, John Taylor is also busy as an economic advisor to the Republicans. He is working for the campaign of Senator John McCain, which brings him back to Washington quite frequently. Asked to speculate on the outcome of the election, Taylor laughs and says: “Sorry, I don’t have a Taylor rule to predict what’ll happen in elections!” ■

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