Economic Brief

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Learning about Fiscal Policy Uncertainty

By Christian Matthes and Tim Sablik

In response to the financial crisis and recession of 2007–09, the federal government enacted a number of emergency fiscal policies intended to aid recovery. These included short-term stimulus measures, such as the American Recovery and Reinvestment Act of 2009, and temporary tax reductions, such as the payroll tax cut in 2010. However, the unconventional and transitory nature of these fiscal policies may have contributed to greater economic uncertainty. Given the slow recovery that has followed the recession, economists are studying how such uncertainty might impact growth.

Some economists have pointed to an increase in overall economic uncertainty as a contributing factor to the slow recovery from the 2007–09 recession. Theory suggests that uncertainty can affect the economy in a number of ways. It might prompt firms to delay investment or hiring decisions or make households more likely to postpone consumption and increase savings, all of which could hamper growth. In the wake of the recession, Congress enacted a number of emergency fiscal provisions designed to aid recovery. These policies were often temporary measures that were subject to last-minute modifications or extensions. For example, Congress cut the payroll tax rate in 2010. The measure was set to expire on Dec. 31, 2011, but continued economic weakness prompted Congress to pass an extension just eight days before that date.

Policy changes such as these appear to have contributed to an overall increase in uncertainty in recent years. To quantify this trend, Scott Baker and Nick Bloom of Stanford University and Steven J. Davis of the University of Chicago developed an index to measure economic uncertainty over several decades. They looked at newspaper coverage containing terms related to the economy, uncertainty, and policy, as well as scheduled tax code expirations and the level of agreement among economic forecasters.[1] They found that the overall level of uncertainty has increased beginning in 2008. This change seems to be driven in large part by an increase in policy uncertainty. (See Figure 1.)

This *Economic Brief* explores two key questions about the role fiscal policy uncertainty might play in the economy. First, how do firms and households learn about changes in fiscal policy, and how is that learning process affected by their prior beliefs about the nature of policy changes? Second, what are the economic effects of uncertainty, and are those effects temporary or permanent?

Modeling Learning

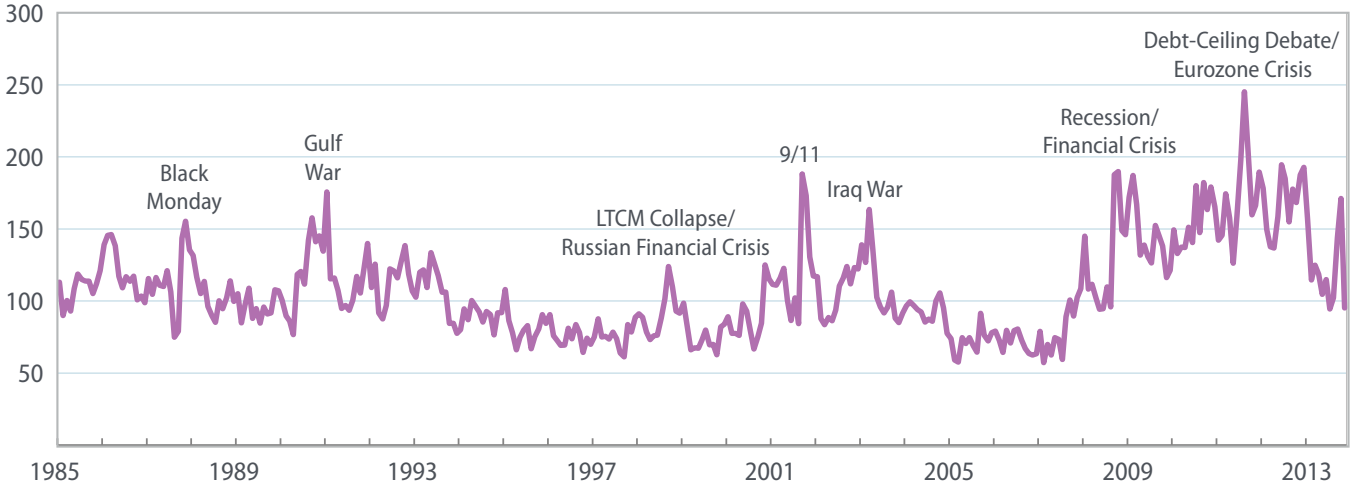
Many macroeconomic models of the business cycle are built on a framework of rational expectations. This theory posits that firms and

households (or "economic agents") have complete knowledge of the structure of the economy. In the event of a change, they immediately and rationally incorporate new knowledge into their expectations for the future. For example, in the 2007–09 recession, the government enacted a number of fiscal policy changes to counteract negative economic shocks, such as the collapse of the housing market. The rational-expectations model predicts that agents with access to complete information would expect the new policies to improve economic conditions, and they would immediately adjust their expectations for future economic growth upward. This could allow the economy to move quickly toward recovery, or even bypass the recession altogether, since firms and households would not be as concerned about the negative economic shocks.

But some economists have argued that rational expectations may not be the most realistic way to model how agents react during periods of policy change. It is not clear that agents have full knowledge of the policies in place at any given time, especially when those policies are subject to sudden changes. These economists propose an alternative model framework called adaptive learning. Under adaptive learning, firms and households are uncertain about the current and future structure of the economy, including fiscal policy. They form expectations about how policies are set based on their observations of how the government acts. Thus, unlike the full-information, rational-expectations model, there is a period of uncertainty surrounding each policy change. Models using the adaptive-learning framework predict very different responses to policy changes than rational-expectations models. Economic effects from the policies may ultimately be larger than the impact predicted under rational expectations, and adjustment to the new equilibrium may take longer.[2]

Models with adaptive learning typically assume that agents are uncertain about the structure of the entire economy. This may make it difficult to isolate how uncertainty about a policy change specifically impacts economic outcomes. In a recent working paper, one of the co-authors of this brief (Matthes) and Josef Hollmayr of the Deutsche Bundesbank develop a model to explore how learning and uncertainty affect the economic response to fiscal policy changes.[3] In order to isolate these effects, they assume agents are fully knowledgeable about the structure of the economy but are uncertain about how the government sets fiscal policy in response to changes in economic factors, such as past output and government debt. In other words, agents don't know what "rules" the government follows when setting policy. Instead,

Figure 1: Index of Economic Policy Uncertainty



Note: The index is an aggregation of four components: a scaled count of news articles that refer to the economy, uncertainty, and policy; a discounted dollar-weighted sum of scheduled expirations of federal tax code provisions; and indexes of disagreement among professional forecasters about future Consumer Price Index inflation and future government purchases.

Sources: Scott Baker, Nick Bloom, and Steven J. Davis at www.policyuncertainty.com

they use their observations of the government's actions over time to update their expectations of the fiscal policy rules.[4]

Estimating the Effects of Uncertainty

Matthes and Hollmayr compare the predictions of their adaptive-learning model to those of a full-information, rational-expectations model. They run a simulation with both models in which there is a negative economic shock followed by a general increase in government spending.[5] Under rational expectations, economic agents are immediately aware of the fiscal policy change, and there is no period of uncertainty or learning. The model predicts that the policy change generates a small short-term increase in overall output, but this comes at the cost of several long-run effects, including higher debt and lower consumption.

Under the learning model, agents behave similarly to the predictions under rational expectations up until the fiscal policy change. Immediately after the change, there is a spike in uncertainty that quickly fades as agents learn about the new policies and incorporate that knowledge into their decisions. This follows the pattern Baker, Bloom, and Davis observe in their uncertainty index. Yet despite the fact that this period of heightened uncertainty is brief, it generates economic outcomes that are significantly different than those predicted under rational expectations because agents initially respond to perceived rather than actual policy changes. In the period immediately following the policy change, average consumption is higher and average hours worked are lower, making firms and households in the learning model better off than those in the rational-expectations model on average. But at the same time, consumption and other variables, such as gross domestic product (GDP), are significantly more volatile.

This short-run volatility has long-lasting effects. The model predicts that 10 years after the policy change, cumulative GDP is 2 percent lower. The stock of physical capital is also persistently lower due to a sudden drop in investment immediately following the policy change. During the period of uncertainty, agents underestimate the persistence of the increase in government spending because they initially attribute part of the change in policy to short-lived shocks. As a result, they underestimate future increases in debt and taxes, leading them to view immediate investment as less favorable than it actually is. In contrast, agents with rational expectations immediately realize the new long-run levels of debt and taxes and therefore find it more profitable to invest even during the crisis.

The extent to which the predictions of the learning model differ from the rational-expectations model also depends on the likelihood agents assign to policy changes. The less firms and households believe a policy change will occur, the larger the gap in average outcomes predicted by the two models. In essence, it takes the agents in the learning model longer to modify their expectations when they don't expect a change. This difference substantially decreases the short-run volatility predicted by the model, but it increases the negative long-run effects. This occurs because the agents place a greater weight on their prior beliefs. In the opposite scenario, when agents think that a policy change is more likely (for example, when policymakers announce a change ahead of time), they react more strongly to new information as it becomes available. The result in this case is greater short-term volatility, as agents tend to "overreact" to the new data.

Implications

Adaptive-learning models suggest that economists and policymakers should exercise caution when evaluating the effects of fiscal policy changes. Assuming that firms and households have access to full information may lead to underestimates of long-run economic effects. Matthes and Hollmayr find that even limiting the uncertainty agents face to fiscal policy changes yields results that are significantly different from those predicted under rational expectations. It is likely that firms and households face additional uncertainties about the economy as well.

The results of the learning model also suggest a possible role for communication about fiscal policy changes. Increased communication by policymakers may reduce the negative long-term economic outcomes, but to the extent that increased commu-

nication increases the public's belief that large policy changes are likely, it may also substantially increase short-term volatility. ■

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Endnotes

1. For a full description of the methodology used to construct the index, see Baker, Scott, Nick Bloom, and Steven J. Davis, "Has Economic Policy Uncertainty Hampered the Recovery?" George J. Stigler Center for the Study of the Economy and the State, University of Chicago, Working Paper No. 242, February 3, 2012. To learn more about the uncertainty index, visit www.policyuncertainty.com.
2. See, for example, Giannitsarou, Chryssi, "Supply-Side Reforms and Learning Dynamics," *Journal of Monetary Economics*, March 2006, vol. 53, no. 2, pp. 291–309, and Mitra, Kaushik, George W. Evans, and Seppo Honkapohja, "Fiscal Policy and Learning," Centre for Dynamic Macroeconomic Analysis, University of St. Andrews, Working Paper No. 1202, January 17, 2012, revised June 18, 2013.
3. Hollmayr, Josef, and Christian Matthes, "Learning about Fiscal Policy and the Effects of Policy Uncertainty," Federal Reserve Bank of Richmond Working Paper No. 13-15, September 2013.
4. In the model, economic agents know that the government budget constraint must hold in each period. Matthes and Hollmayr also make certain assumptions that, while they may not hold in reality, allow for the construction of a model that provides insight into the real-world effects of uncertainty. For example, the government in the model does not include a central bank, allowing Matthes and Hollmayr to isolate the effects of fiscal policy changes from monetary policy changes.
5. Matthes and Hollmayr also test their model with a variety of other fiscal policy changes and find that overall effects are similar to those estimated under a general spending increase.