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Economic effects of uncertainty

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DIW Roundup

Politik im Fokus

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Economic Effects of Uncertainty

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Economic effects of uncertainty

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This Roundup discusses the literature on the effects of uncertainty on economic activity. Uncertainty will be generally referred to as the agents' inability to form clear expectations about the future path of relevant economic variables. After motivating the analysis from a policy perspective, the Roundup outlines the key channels through which uncertainty exerts an impact on the economy. It then discusses in an intuitive manner the challenges in empirically estimating such effect, and the recent developments in the literature.

Uncertainty and the policy discussion

Uncertainty plays an important role in the policy discussion. It is common to find explicit reference to upside and downside risks in the outlook of international and national institutions. These, in turn, take complex policy decisions in an environment in which uncertainty about the future state of the economy can never be ruled out. For example, in the introductory statement to the press conference on January 21, 2016, [Mario Draghi](#) affirmed

“The risks to the euro area growth outlook remain on the downside and relate in particular to the heightened uncertainties regarding developments in the global economy, as well as to broader geopolitical risks. These risks have the potential to weigh on global growth and foreign demand for euro area exports and on confidence more widely.”

Given the potentially far-reaching relevance of uncertainty for the future course of the economy, it is not surprising that considerable attention has been dedicated in the economic literature to characterize the effects of uncertainty on the economy. Different channels have been proposed to explain the effects of uncertainty on the economy, and several identification strategies have been developed to empirically study such causal effect.

Channels through which uncertainty can affect the economy

The literature has proposed three main channels through which uncertainty potentially affects the real economy, as explained for example in [Bloom \(2014\)](#).

The first channel is through possible wait-and-see effects, as agents might decide to postpone spending decisions in order to avoid costly mistakes ([Bernanke, 1983](#), [Ramey and Shapiro, 2001](#)). Under higher uncertainty, firms might choose to postpone investment decisions and consumers might choose to postpone purchases

of durables. Such theory is usually referred to as a real option theory to uncertainty, because the option value of waiting in the face of uncertainty increases. This theory predicts not only an impact on the level of investment and consumption decisions, but also on their response to policy actions. In an environment of heightened uncertainty, policy makers might need to exert strong policy rate cuts or tax cuts in order to successfully stimulate the economy.

A second channel goes through risk premia ([Arellano, Bai and Kehoe, 2010](#), [Hansen, Sargent and Tallarini, 1999](#)). Agents are likely to demand a higher risk premium in the presence of higher uncertainty, pushing up borrowing costs. This effect relates to agents' confidence, and can result from the situation in which uncertainty leads the agent to struggle to form an assessment of the future outcome of the economy. Such incentives are likely to exert an extra constraint on economic activity, and cumulate to the real option effects discussed above.

The above two channels predict that higher uncertainty leads to a contraction of the economy. There are also theories that predict the opposite effect. One argument within this third channel is that higher uncertainty also affects best case scenarios ([Bar-Ilan and Strange, 1996](#)). For example, a stock investor bears the bounded downside risk of losing the entire investment. However, the upside risk is in principle unlimited. This effect is usually referred to as growth option effects and can be used in interpreting the dotcom bubble in the late 1990s. Accordingly, while the development of Internet raised uncertainty as it was a brand new technology, the upside potential was perceived as unbound, hence leading to higher investment in the new technology.

Identifying the effects on the economy of economic uncertainty

While it is widely believed that variations in uncertainty can have real effects on the economy, estimating empirically such effects is far from trivial, due to an endogeneity problem. In fact, while on the one hand uncertainty generates effects on the economy, on the other hand economic developments affect uncertainty. The circularity implied by this simultaneity problem poses the question of how to isolate the effects of uncertainty on the economy from the reverse effect of the economy on uncertainty. For example, an increase in uncertainty about future profits might lead firms to postpone investments. Such decision, which at the aggregate level can worsen economic conditions, potentially generates more economic uncertainty on future profits. How can one interpret the worsening of economic conditions as the reaction to an initial increase in uncertainty, and not as the *cause* of higher uncertainty?

To address the above endogeneity issue, the literature typically starts from Vector Autoregressive models that include several possible variables. These typically are a measure of uncertainty (based for example on stock market volatility), several proxies for economic activity, and a measure of monetary policy intervention. The latter is included in order to capture the role of monetary policy in attenuating potential effects stemming from economic developments. A financial variable is also added in order to control for financial developments that potentially reflect the evolution of uncertainty. The model then serves as a point of departure to identify so-called uncertainty shocks, i.e. variations in uncertainty not generated by economic developments, but orthogonal to economic activity. Identifying such shocks then requires an identification strategy.

[Bloom \(2009\)](#) was the first to use the above mentioned model to identify the causal effect of uncertainty on the economy. To identify uncertainty shocks, Bloom uses a recursive strategy that rests on the following restriction: a shock is labelled as an

uncertainty shock if it contemporaneously affects the measure of uncertainty added to the model, and if it is the only shock, with the exception of financial shock, that contemporaneously affects the measure of uncertainty. The underlying restriction is that economic events take time to materialize into higher uncertainty.

The identification strategy implicit in the recursive structure crucially relies on the assumption that (with the exception of financial shocks) economically relevant shocks do not affect uncertainty contemporaneously. This identification strategy has been considered problematic by many in the literature ([Stock and Watson, 2012](#), [Baker and Bloom, 2013](#)). One of the criticisms is that structural shocks that differ from financial and uncertainty shocks should be allowed to contemporaneously affect uncertainty even within one month. Similarly, it is hard to defend the assumption that financial variables price uncertainty shocks with a delay of one month, while uncertainty prices financial developments immediately. These and other criticisms led the literature to explore other possibilities.

[Caldara, Fuentes-Albero, Gilchrist and Zakrajsek \(2014\)](#) depart from a similar Vector Autoregressive Model and use a different identification approach to extract uncertainty shocks. To distinguish uncertainty shocks from other shocks, the authors label as uncertainty shocks the shocks that have the strongest impact effect on the measure of uncertainty.

[Alessandri and Mumtaz \(2014\)](#) take a different approach and explicitly model the volatility of structural shocks. Departing from a linear Vector Autoregressive model, they assume that the structural shocks that drive the data have a time-varying variance. Such time-variation is modelled as the result of shocks. Accordingly, uncertainty shocks are defined as the ones that generate average increases or decreases of the variance of all the remaining structural shocks.

[Carriero, Mumtaz, Theodoridis and Theophilopoulou \(2015\)](#) propose to identify uncertainty shocks using a different approach. They compute a dummy variable taking value of 1 whenever a measure of financial volatility takes extreme values. They then define an uncertainty shock as the structural shock that has the strongest correlation with such dummy variable. The identification approach relies on the assumption that strong stock market volatility is the endogenous response to uncertainty shocks, and uses such effect as a guidance to tell apart uncertainty shocks from other economically relevant shocks.

[Ludvigson, S. C., S. Ma, and S. Ng \(2015\)](#) also depart from a Vector Autoregressive model and propose a statistical approach for the construction of a measure correlated with uncertainty shocks. They build an iterative procedure that constructs a measure correlated with uncertainty shocks as the residual in regressions that disentangles the volatility in uncertainty from the endogenous response to real activity and financial variations. The authors then propose a convergence criteria that isolates a unique series of uncertainty shocks.

More recently, [Piffer and Podstawski \(2015\)](#) proposed to use the price of gold as a point of departure to identify uncertainty shocks. The underlying idea is that, being perceived as a safe asset, the price of gold indirectly reflects the developments of uncertainty. The authors collect a series of political, historical and natural events that generated exogenous variations in uncertainty. Examples are the 9/11 terrorist attack in the United States, or the Iraqi invasion of Kuwait in August 1990. Variations in the price of gold in the hours around such events can then be interpreted as reflecting the response of economic agents to such variations in uncertainty. Accordingly, shocks will be labelled as uncertainty shocks if they have the highest correlation with the external measure of uncertainty shocks computed from the price of gold. This methodology is capable of detecting several events that affected

uncertainty, including the Iranian hostage crisis of 1980, the Chernobyl nuclear disaster and the 9/11 terrorist attack.

Results

Overall, the results of the papers discussed in the previous Section suggest that uncertainty shocks have significant effects on the real economy. In particular, an exogenous increase in uncertainty is generally found to generate a statistically significant decline in economic activity, an increase in financial volatility, a decline in employment and an expansionary response of monetary policy. The responses typically take at least four months to reach the maximum effect, and then revert back.

While the general response to uncertainty shock is widely agreed-upon, there are several differences that regard the quantitative nature of the effects as well as dynamics involved. For example, [Carriero, Mumtaz, Theodoridis and Theophilopoulou \(2015\)](#) and [Piffer and Podstawski \(2015\)](#) find that the effects of an uncertainty shocks are largely underestimated when using the recursive approach used in [Bloom \(2009\)](#). Also the response of monetary policy seems to be underestimated when using the recursive identification approach, relative to the use of an external instrument, as discussed. In particular, [Piffer and Podstawski \(2015\)](#) find that uncertainty shocks explain around up to 50% of the volatility of US real activity, and drive 25% of the variation of the US monetary policy interest rate, showing that monetary authorities intervene actively to mitigate the effects of uncertainty on the economy.

In addition, the papers that identify both uncertainty shocks and financial shocks tend to find that the latter are even more important for business cycle fluctuations. In addition, [Caldara, Fuentes-Albero, Gilchrist and Zakrajsek \(2014\)](#) find that financial variables respond strongly to an uncertainty shock, a finding consistent also with [Piffer and Podstawski \(2015\)](#). In addition, [Ludvigson, S. C., S. Ma, and S. Ng \(2015\)](#) find that it is the financial distress following uncertainty shocks that explains most of the overall effect of uncertainty shocks on the economy.

Conclusions

This Roundup has discussed part of the economic literature on the effects of uncertainty on the economy. Departing from the consideration that uncertainty plays a crucial role in policy decisions, this Roundup has illustrated the main channels through which uncertainty is expected to affect the current and future state of the economy. It has then highlighted the main channel in empirically identifying this causal effect, discussing the recent frontier of research.

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