Policy Forum: On the Macroeconomic Effects and Policy Implications of Uncertainty

A Short Review of the Recent Literature on Uncertainty

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Abstract

This article summarises the academic contributions presented and discussed during the 2016 edition of the Melbourne Institute Macroeconomic Policy Meetings, which focused on the role played by uncertainty for a number of countries’ business cycle. Considerations on the interaction between uncertainty and financial frictions, the global dimension of uncertainty, uncertainty shocks in times of unconventional monetary policy and the imperfect knowledge that agents have over policy targets are among the discussions entertained in this article. The main insights coming from those papers are connected with the extant literature and directions for future research are offered.

1. Introduction

The Global Financial Crisis (GFC) has triggered discussions on the impact of macroeconomic shocks and how they have led to severe drops in real activity (and dismal economic recoveries) in a number of countries since 2007. One of the most debated macroeconomic factors is uncertainty. The reason is simple. As documented by Bloom (2014) and Castelnuovo (2017), several proxies of uncertainty share similar characteristics; that is, they: (i) co-move with real activity indicators; (ii) are countercyclical; and (iii) abruptly increase during recessions.

These facts suggest that uncertainty could be an exogenous driver of the business cycle or an endogenous response to other shocks or it could represent both an exogenous source for variations, as well as an endogenous response to fluctuations of the business cycle. The potential relevance of uncertainty as a cause and/or a consequence of business cycle fluctuations has motivated the burgeoning literature on the role of uncertainty for the last 10 years or so.

But, what is uncertainty? According to Knight (1921), uncertainty is people’s inability to forecast the likelihood of events happening in the future. This is a concept which is very closely related to risk, which describes a known probability distribution over a set of events. While being theoretically different concepts, these two concepts are hard to distinguish in the data. This article, following most of the extant literature, will use the term ‘uncertainty’ as a catch-all term to cover both uncertainty and risk.
Why is uncertainty relevant to economic analysis? With respect to consumption, there is uncertainty about one’s labour income. This can lead to risk-averse behaviour, such as reducing consumption today and increasing savings to ensure consumption tomorrow; the more uncertain the labour income, the higher the amount of precautionary savings. The concept of precautionary savings (Caballero 1990) illustrates how uncertainty can affect consumption in line with the stylised facts indicated above: (i) consumption and uncertainty co-move; (ii) they are inversely related; and (iii) a jump in uncertainty can lead to a severe drop in consumption.

Turning to investment, irreversible costs of production can generate uncertainty for decision-making. In the presence of high uncertainty, firms may optimally decide to postpone an investment (a behaviour termed ‘wait-and-see’) until the smoke clears (Bernanke 1993; Bloom 2009). Again, this behaviour is consistent with the stylised facts, namely: (i) investment and uncertainty co-move; (ii) they are inversely related; and (iii) a jump in uncertainty can lead to a severe drop in investment. As noted in Bloom (2017) in his contribution to this issue of the Policy Forum, investment is likely to be more sensitive than consumption to variations in uncertainty due the fact that firms are, on average, more forward-looking than households. If jumps in uncertainty can lead to a pause in consumption and investment, dragging growth down, it is not surprising then that policy-makers pay attention to uncertainty.

Various questions on the relationship between uncertainty and the business cycle were asked during the ‘2016 Melbourne Institute Macroeconomic Policy Meeting’, which took place on 5–6 October 2016. The focus of the conference was on the macroeconomic effects and policy implications of uncertainty. Section 2 provides a brief description of the papers presented at the workshop, including the keynote address. The reflections of the panelists discussing ‘Uncertainty: Macroeconomic Effects and Policy Reactions’ are published separately in this issue. Section 3 wraps up and offers directions for future research.
negative impact of uncertainty shocks on investment and hiring. The model is tested using a panel of US firms and a novel instrumentation strategy for uncertainty which exploits the different exposure of firms to exchange rate and factor price volatility. The data support the predictions of their theoretical model. In particular, they find that the effects of uncertainty are strongest when financial frictions bite with severity. This finding highlights why, during the GFC (a phase in which financial frictions were particularly accentuated), uncertainty could have been a major factor behind the substantial drop and the slow recovery of real activity in the United States.

While Bloom’s explanations focus on the demand side of the lending market, a supply-side view is offered by Alessandri and Bottero (2016). The authors study how economic uncertainty—measured via VSTOXX or a news-based policy uncertainty index à la Baker, Davis and Bloom (2016)—can affect the supply of bank credit. To do so, they employ a rich monthly dataset that includes all loan applications submitted by a sample of 650,000 Italian firms between 2003 and 2012. The authors find that an increase in uncertainty: (i) reduces banks’ likelihood to accept new credit applications; and (ii) makes banks’ lending less responsive to changes in the short-term interest rates, therefore weakening the bank-lending channel of monetary policy. The latter result suggests that monetary policy is less effective during times of high economic volatility. Both mechanisms are relatively stronger for poorly capitalised lenders and/or opaque borrowers.

A related paper presented at the workshop was by Choi et al. (2016). The authors show that heightened stock market volatility—taken as a proxy of uncertainty—mainly deteriorates the productivity growth rate of firms belonging to industries characterised by a heavy dependence on external finance. This effect is found to be particularly accentuated during recessions, when financing constraints are more likely to become binding. These results are obtained with a difference-in-difference approach applied to a dataset comprising measures of productivity growth, stock market volatility and other macroeconomic indicators for 25 industries belonging to 18 advanced economies over the period 1985–2010. The authors show that their results are robust to a number of controls, including the different degree of financial development in the countries belonging to their panel, countercyclical fiscal policy and economic policy uncertainty à la Baker, Davis and Bloom (2016), which is used as an alternative proxy of uncertainty in their study.

The above-mentioned studies are a nice complement of the one recently proposed by Ludvigson, Mah and Ng (2016). This study proposes new indices of macroeconomic and financial uncertainty computed by appealing to the data-rich approach recently developed by Jurado, Ludvigson and Ng (2015). These latter authors model the common component of the volatility of forecast errors of a large number of macroeconomic and financial indicators and interpret such volatility as a measure of uncertainty. Ludvigson, Mah and Ng go a step further and distinguish between financial and macroeconomic uncertainty, therefore producing two different proxies for uncertainty: one associated with fluctuations in financial indicators and the other one closer to fluctuations of real activity indicators. They show that the former proxy is likely to be informative as regards uncertainty shocks, while the latter is more informative as far as the endogenous response of uncertainty to first-moment shocks is concerned. Hence, while the studies described above focus on financial frictions as able to influence the transmission of the effects of uncertainty shocks, the Ludvigson, Mah and Ng paper focuses on uncertainty shocks closely related to financial markets.

2.2 International Spillovers

Most of the empirical analysis on the macroeconomic effects of uncertainty shocks has focused on autarkic economies like the United States, where domestic shocks are more important drivers of the business cycle than external, foreign shocks. Exceptions are—among others—Gourio, Siemer and Verdelhan...
(2013), who work with a two-country real business cycle model to study the effects of an increase in uncertainty in the rest of the world (RoW) for domestic consumption and investment and corroborate their model’s prediction with vector auto regression (VAR) evidence for the G7; Colombo (2013), who estimates a VAR framework modelling US and Euro area indicators and finds a jump in economic policy uncertainty (EPU) in the former area exerts a significant effect on inflation and output in the latter; Caggiano, Castelnuovo and Figueres (2016a), who estimate a non-linear model and find that US EPU shocks exert a substantial effect on the unemployment rate of G7 countries. This ‘global approach’ to the effects of uncertainty shocks is corroborated by Davis (2016), who shows that spikes in economic policy uncertainty indices in 16 countries that account for two-thirds of global output are associated with global events such as, for instance, the Global Financial Crisis, the European immigration crisis and Brexit.

The workshop featured two papers on uncertainty spillovers across countries. The paper presented by Kamber et al. (2016) analyses the international spillovers of uncertainty shocks originating in the United States. In particular, they estimate an open-economy, structural factor-augmented VAR (FAVAR) model that identifies US uncertainty shocks and quantifies the impact of these uncertainty shocks on the US economy, some major world economies and New Zealand. The data-rich nature of the model allows the authors to examine different transmission channels. They find the confidence channel (empirically captured using expectations generated in surveys) to be particularly relevant in the transmission of the uncertainty shock to a small, open economy like New Zealand.

The paper presented by Grishchenko, Mouabbi and Renne (2016) is based on a dynamic factor model with time-varying uncertainty. Information from a large number of US and Euro area surveys of professional forecasters are used to obtain the first two moments of future inflation rates. The authors show that their model is able to closely match survey-based inflation expectations. The authors then evaluate if inflation expectations in these two areas are anchored by constructing survey-consistent probabilities of future inflation falling within a given range. Interestingly, they find that, since 2010, inflation expectations noticeably decreased in both economies. Moreover, during their sample period, the United States displayed larger inflation uncertainty relative to the Euro area. Finally, the authors document an increase in the correlation between future inflation rates in these two economies and relate the increase to the evolution of economic policy uncertainty in the two areas. This paper provides fresh and insightful evidence on the role played by monetary policy credibility in tackling uncertainties surrounding main policy targets like the inflation target.

2.3 Uncertainty and Capital Flows

The paper that was presented was by Gourio, Siemer and Verdelhan (2016). The authors use a rich dataset comprising 26 emerging countries, covering the last 40 years, to document that stock market return volatilities forecast capital flows. An increase in a country’s stock market volatility leads to an increase in capital inflows, a decrease in capital outflows. Moreover, stock market return volatility forecasts political risk, which turns out to be also one of the drivers of capital flows. The authors propose expropriation risk as a possible explanation of this fact. They formalise this idea by modelling a portfolio choice under the assumption that foreign investors are more exposed to expropriation risk than domestic ones. Hence, an increase in the probability of expropriation leads foreigners to sell domestic assets to local investors. This leads to a countercyclical home bias, which—under plausible assumption—drives price volatility up. In light of recent findings by Caggiano and Castelnuovo (2017) on the global dimension of financial uncertainty shocks, the conclusions of this paper seem to suggest that potentially relevant spillover effects on the role of uncertainty shocks in the RoW for capital flows in small, open economies could be at play.
2.4 Asymmetric Effects of Uncertainty and the Zero Lower Bound

Recent research has focused on the asymmetric effects of uncertainty shocks. In particular, Caggiano, Castelnuovo and Groshenny (2014) show that financial uncertainty shocks exert a larger effect on unemployment in the United States during recessions. Caggiano, Castelnuovo and Figueres (2016b) find economic policy uncertainty shocks à la Baker, Davis and Bloom (2016) to exert a qualitatively similar effect. Caggiano, Castelnuovo and Nodari (2016) document a statistically and economically significant difference in the responses of employment and industrial production to jumps in uncertainty corresponding to particular events (for instance, 9/11) that occurred in the post-WWII US economic history. They also find that systematic monetary policy is way less effective in stabilising the business cycle during downturns. To the extent that uncertainty is high in recessions, this result complements the one by Aastveit, Natvik and Sola (2013), Pellegrino (2015), Castelnuovo and Pellegrino (2016) and Eickmeier, Metiu and Prieto (2016) on the weaker effects of monetary policy shocks in the presence of high levels of uncertainty. However, another form of non-linearity has characterised a number of industrialised economies in recent times; that is, the presence of a binding zero lower bound (ZLB) (or, more in general, effective lower bound) of the policy rate. Contributions by Basu and Bundick (2015) and Fernández-Villaverde et al. (2015), among others, show with the help of calibrated structural new-Keynesian dynamic stochastic general equilibrium (DSGE) models that exogenous increases in uncertainty exert much more severe effects on real activity in the presence of the ZLB. While these models feature different types of mechanisms, they share a key feature, which is that a binding ZLB on the nominal interest rate makes agents expect a high level of the real interest rate. Such expectations lead households and firms to reduce their level of consumption and investment, therefore causing an economic downturn.

This prediction is examined empirically in the paper by Caggiano, Castelnuovo and Pellegrino (2015). This paper estimates a non-linear VAR model featuring an interaction term involving uncertainty (the variable generating exogenous variations) and the federal funds rate, which is the US conventional policy tool. This non-linear term gives the empirical model the possibility of discriminating between ‘normal times’ (in which the ZLB is not binding) and the ‘ZLB’, in which the policy rate is lower than 25 basis points. Regime-specific impulse responses point to a larger effect of uncertainty shocks when the ZLB is binding, especially for investment. Importantly, the authors show that alternative explanations, like the Great Recession or unconventional monetary policy, are not able to replicate the results obtained with the baseline model, which focuses on the ZLB.

2.5 State-Level Impact of Uncertainty Shocks

Another interesting dimension which has received little attention so far is the geographical one. The paper by Theophilopoulou, Mumtaz and Sunder-Plassmann (2016) is based on an extended FAVAR model that allows an estimated measure of uncertainty (that encompasses volatility from the real and financial sectors of the economy) to influence real income at a state level. The authors find the impact of uncertainty shock to be state-specific, with states like Michigan, Indiana and Arizona featuring a persistent decline in real activity, while states like New York, Alaska and New Mexico are found to be much more economically resilient. Digging deeper, the authors find that in states characterised by a larger share of manufacturing, agriculture and construction industries, a high fiscal deficit and a more volatile housing market, the impact of uncertainty shocks is larger. In contrast, a higher share of mining or oil and gas industries, as well as intergovernmental fiscal transfers, are found to work in favour of dampening the effects of uncertainty.

2.6 Monetary Policy-Related Uncertainty

As discussed above, economic policy uncertainty can be a factor harming a country’s
economy (Baker, Davis and Bloom 2016). An important source of this uncertainty can be monetary policy. Istrefi and Mouabbi (2016) examine the causal effects of interest rate uncertainty through the lens of a small VAR, assuming that uncertainty and real activity cannot contemporaneously react to each other (in line with the data). They proxy interest rate uncertainty with the dispersion of professional forecasts of short- and long-term interest rates and they account for both disagreement among forecasters and the perceived variability of future aggregate shocks. Studying a panel of G7 countries, plus Spain and Sweden, they find that subjective interest rate uncertainty (in particular, short-run interest rate uncertainty) has large, negative and persistent effects on the economy. A substantial heterogeneity across countries is found, with the drop in production varying from 0.4 to 3.8 per cent within the year the shock hits. In response to this uncertainty, unemployment worsens, with rates increasing by 0.15–1.2 percentage points. In addition, prices fall in response to interest rate uncertainty shocks, with producer prices falling up to 2 percentage points. Furthermore, the recovery of the economy to its initial levels is slow, taking about 3–5 years.

A qualification on the relevance of monetary policy uncertainty as a driver of forecasters’ disagreement comes from the paper by Gibbs, Morley and Nodari (2016). The authors document the disagreement regarding future policy rates among about 30 forecasters in the Survey of Professional Forecasters. Then, using forward-looking Taylor rules featuring expected inflation and output, they disentangle the role played by two possible drivers of such disagreement; that is, disagreement about future monetary policy moves (captured by the uncertainty surrounding the parameters of the Taylor rule) versus disagreement about future economic fundamentals (captured by different expectations over the future realisations of inflation and output). Preliminary evidence points to the latter as the major driver of forecasts’ disagreement.

2.7 Natural Disasters as Instruments of Uncertainty

Identifying uncertainty shocks is challenging because uncertainty moves in tandem with the business cycle. While precautionary savings and ‘wait-and-see’ motives suggest a causality running from uncertainty to the business cycle, some contributions in the literature point to the opposite direction. For instance, Bachmann and Moscarini (2012) model heterogeneous firms experimenting in terms of price-setting in the presence of a downturn, therefore giving rise to a large price dispersion in recessions. A way to overcome this issue is to find valid exogenous instruments for uncertainty. Baker and Bloom (2016) construct cross-country panel data for 60 developed and developing countries on stock market levels and volatility as proxies for the first and second moments of business conditions. They then use natural disasters, terrorist attacks and unexpected political shocks as instruments for stock market proxies of first and second moment shocks. Given their obvious exogeneity, these instruments are good candidates for identifying causal relationships going from uncertainty to growth. Importantly, the authors verify that these are also valid instruments; that is, they display predicting power over the selected proxies of uncertainty. The authors find that, in the year following a natural disaster shock, a one standard deviation reduction in stock market levels and rise in stock market volatility are associated with falls in annual gross domestic product (GDP) growth of 3.0 per cent and 6.1 per cent, respectively. Variations in higher moments of stock market returns appear to have little impact on growth. The relevance of this analysis is that it points clearly to uncertainty shocks as a relevant driver of a country’s growth.

2.8 Learning

One form of uncertainty that agents are likely to react to is changes to policy targets. This is an interesting form of uncertainty and a well-documented one in the recent empirical literature. For instance, Baker, Davis and
Bloom (2016) find that fiscal policy uncertainty is one of the drivers of economic policy uncertainty in the United States. Preston and Eusepi (2013) show in their paper that admitting uncertainty in a context which would not otherwise acknowledge any particular role to fiscal policy can lead to gaining crucial insights on the role of debt for the determination of inflation. They propose a theory of the fiscal foundations of inflation based on imperfect knowledge and learning and show that the Great Moderation in the United States would have not been that great if the public debt-over-GDP ratio had been characterised by the same level and composition observed in a number of European countries since the advent of the GFC. The reason is the following. Typically, rational expectation-DSGE models of inflation assign a dominant role to monetary policy and confine fiscal policy to the background. In the language of Leeper (1991), fiscal policy is ‘passive’; that is, it just takes care of determining the value of debt. Alternatively, an active monetary policy (which is a policy aggressively fighting to maintain control over inflation) is identified as the crucial element to determine inflation. Hence, these models point to a switch from bad to good monetary policy when it comes to explaining the dramatic reduction of macroeconomic volatilities (inflation, output growth) experienced by the United States since the mid-1980s and before the GFC. What Preston and Eusepi show is that this result falls apart when imperfect knowledge and learning are introduced. Imperfect knowledge makes agents uncertain about current and future policy regimes and therefore the long-term equilibrium levels of inflation and taxes. Agents will then try to learn these equilibrium levels by estimating econometric models to learn about them. Interestingly, Preston and Eusepi find that stability—defined as the set of policies which ensures agents correctly learn the long-run objectives of policy—is threatened when debt is elevated and of moderate maturity (between 2 and 7 years), which is indeed the maturity for most European countries. This is a crucial policy message because most European countries (with the notable exception of the United Kingdom) feature high debt levels and average debt maturities falling within this range. Preston and Eusepi show that, with a monetary policy as aggressive as the one estimated by Clarida, Gali and Gertler (2000) and debt levels and maturities comparable to the European ones, the US Great Moderation would have hardly occurred.

2.9 Micro and Macro Uncertainty

Jia (2016) completed a study on the relationship between aggregate and micro level uncertainty. He exploits survey-based forecast dispersion series to identify a different type of second moment shocks, which affect the distribution of firm-level beliefs, regardless of whether or not those beliefs are backed by economic fundamentals. This concept, which he relates to ‘informational disagreement shocks’, is different with respect to standard uncertainty shocks, which in his model are innovations that expand the forecast dispersion and lead to a persistent decline in aggregate investment, employment and production, followed by a slow recovery. When uncertainty is measured by the cross-sectional dispersion of future firm-specific productivity innovations, the ‘wait-and-see’ effect of jumps in real uncertainty is robust and a quick ‘rebound-overshoot’ always follows a short-run contraction. Firm-level evidence suggests that more productive firms tend to increase their investments when uncertainty is larger, whereas their investments are reduced as they disagree more about their future business prospects. Identifying the informational second moment shocks helps better rationalise two facts that are not well explained by a model of countercyclical real uncertainty shocks only: (i) the post-crisis recovery can be sluggish; and (ii) the dispersion of firm-level investment rates is procyclical.

3. Conclusions

If a Martian had landed in room 605 at the Melbourne Institute on 5–6 October completely unaware of the ongoing discussion on uncertainty and its macroeconomic and policy consequences in Australia and the RoW,
it would have certainly left the room with a rich set of notes.¹

Our summary points are the following. First, uncertainty appears to exert strong effects on the real economy in the presence of financial frictions, recessions and constraints on the normal conduct of policies like the ZLB on nominal interest rates. Second, financial markets, and in particular the banking system, appear to be crucial to understand the economic dynamics of firms in the presence of uncertainty. Third, a dominant player like the United States appears to be a net exporter of uncertainty shocks, which have the potential to affect the business cycle of small, open economies; for example, New Zealand. Fourth, uncertainty is probably an important driver behind movements in capital flows. Fifth, both monetary and fiscal policy-related uncertainty appears to be a potential driver of the business cycle for countries like the United States and economic realities like the Euro area. Related to this point, learning seems to be a promising way of formalising the consequences of the incompleteness of information by economic agents on the policy targets pursued by policy-makers. Sixth, the impact of an uncertainty shock, either global or domestic in nature, can have different effects in different areas, even in the same country; for example, states in the United States. Seventh, natural disasters and other tail events can be fruitfully used to isolate exogenous variations of uncertainty to overcome endogeneity issues which are obviously present when dealing with the relationship between uncertainty and the business cycle. Finally, the relationship between microeconomic indicators and macroeconomic aggregates appears to be a fruitful way to understand the links between uncertainty and related concepts like forecasters’ disagreement.

What about future research? An obvious way to go is to conduct more country-specific studies. For instance, Australia has clearly been understudied: the only contribution we are aware of is Moore’s (2016) study. Following Baker, Davis and Bloom (2016), Moore creates an economic uncertainty index based on survey data and keyword searches conditional on a set of Australian newspapers and then runs VAR models to quantify the impact of economic uncertainty shocks on the Australian business cycle. He finds significant, but moderate, negative effects on variables like employment and confidence. Are these effects moderate because of the fact that Australia is a structurally different country with respect to the United States or unlike countries in the Euro area or others? Is this moderate impact related to the absence of a recession since 1991, or to a healthier financial sector or to a conventional monetary policy which has so far managed to stay away from the ZLB? Perhaps it is due to a different form of policy communication or is it because of a more solid banking sector? Or should one look at different sources of uncertainties, like those surrounding the change in the volatility of commodity prices recently documented by Kulish and Rees (2016)? Answering these questions would certainly provide us and policy-makers with a better understanding of the drivers of the Australian business cycle.

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Endnote

1. This statement assumes that Martians take notes. An investigation on the different memory-supportive technologies available to Martians and humans, when it comes to academic and policy-related endeavours, is left to future research.

References


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