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Uncertainty shocks and the monetary-macroprudential policy mix


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We study the effects of various uncertainty shocks – of supply-side, demand-side, or financial sector origin – in a structural model with borrowing constraints and a monetary-macroprudential policy mix. Our analysis reveals that when financial uncertainty shocks hit the economy, the effects are significantly larger, with output responding about ten times stronger compared to both productivity and preference uncertainty shocks. Simulating a financial turmoil scenario substantiates that heightened financial uncertainty exacerbates the negative macroeconomic effects triggered by a level financial shock. Our findings underscore the importance of timely and accurate identification of uncertainty surges, which is crucial for the appropriate design and calibration of the monetary-macroprudential policy mix.

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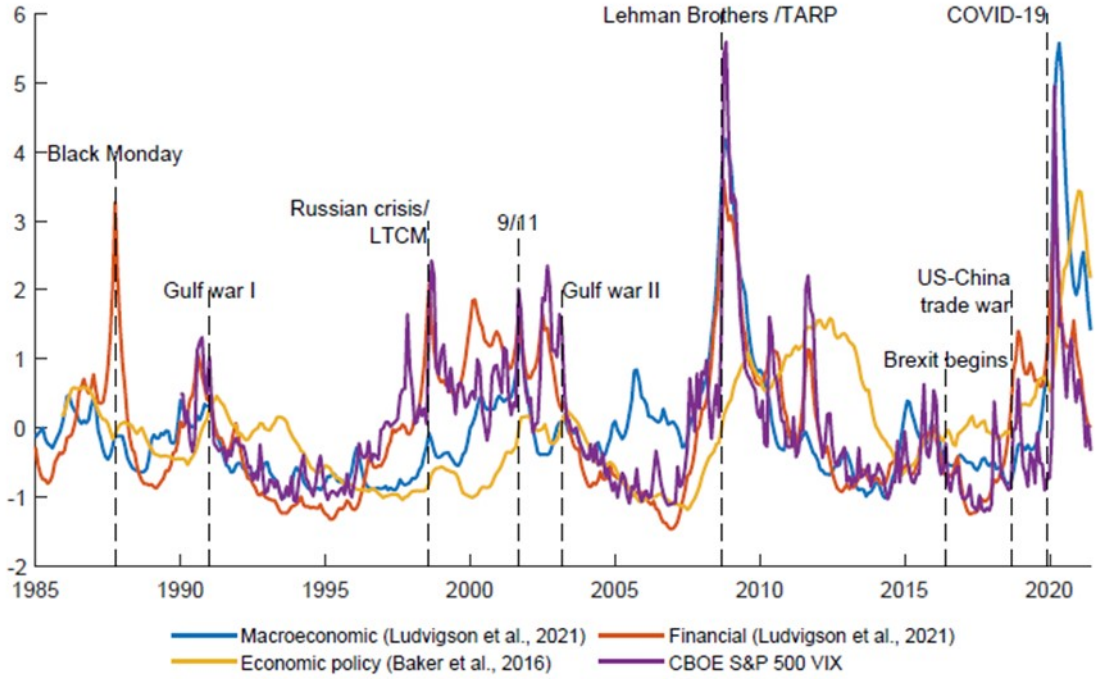
The views expressed are those of the authors and do not necessarily represent the views of De Nederlandsche Bank or the Eurosystem or the IMF, its Executive Board, or IMF management.

Introduction and research question

How should policymakers respond to uncertainty shocks? Addressing this question is of particular importance at the current juncture, since the unfolding COVID-19 pandemic, geopolitical tensions, and other global dynamics pose new challenges for policies aimed at stabilizing the economy, amid persistently heightened uncertainty about the pandemic development, economic outlook, and episodes marked by elevated financial distress. The unprecedented increase in uncertainty at the outset of the pandemic was evident in various proxies used to measure it (Figure 1), such as text-based analysis of newspapers, stock market implied volatility, cross-sectional disagreement in forecasters' estimates about the economic outlook, or the model-based macroeconomic and financial uncertainty indexes as computed by Ludvigson et al. (2021).

Figure 1: Alternative measures of uncertainty



Note: This figure plots the macroeconomic and financial uncertainty indexes calculated by Ludvigson et al. (2021), economic policy uncertainty calculated by Baker et al. (2016), and the CBOE S&P 500 VIX. All variables are standardized for the period January 1985 to June 2021. The economic policy uncertainty is plotted as a 12-month moving average.

What are uncertainty shocks?

Uncertainty shocks are second-moment perturbations that can be formally defined as increases in the standard deviation of the common (first-moment or level) shocks that hit the economy. Interest in the role of uncertainty and its time-variation in driving business cycles has been gaining momentum in both academic and policy circles. Yet, significantly less attention has been paid to identifying the origin and nature of various uncertainty shocks and how different economic policies should adequately respond to them. In a recent paper (Nalban and Smădu, 2022), we study the effects of various uncertainty shocks – of supply-side, demand-side, or financial sector origin – in a New Keynesian model with nominal price rigidities, borrowing constraints, and a monetary-macroprudential policy mix. We explore how the economic trade-offs revealed by each uncertainty shock interact with the adopted policy framework. Therefore, our contribution relates to intersecting a comparative analysis of

the effects of uncertainty shocks of different nature with an assessment of the stabilization role played by the monetary-macroprudential policy mix.

Our modelling framework in a nutshell

To conduct our quantitative analysis, we develop a dynamic, stochastic, general-equilibrium model with nominal rigidities and augmented with financial frictions. Alongside optimizing households and firms, our setting features policymakers who aim at stabilizing the economy using a set of two instruments.

First, to achieve price stability, the central bank steers its short-term nominal interest rate as prescribed by a Taylor rule. Second, to achieve financial stability, we assume that the authorities – either the central bank or a separate independent entity – are also in charge of the design and deployment of macroprudential policies. In particular, our macroprudential policy consists of a loan-to-value ratio imposed by the macroprudential authority in a countercyclical manner such as to minimize credit cycle fluctuations. We assume that the loan-to-value ratio decreases when the gap between the level of credit and its long-run value increases and vice versa.

Our model features a costly enforcement type of financial frictions in the spirit of Kiyotaki and Moore (1997), which implies that firms are collateral constrained and face a borrowing limit linked to the valuation of their assets. We consider three standard level shocks in our model to reflect various origins of economic perturbations: an intertemporal preference shock (which implies that households place relatively more weight on current utility relative to future utility), a technology shock, and a financial shock (associated with the borrowing constraint). For each of these first moment shocks, we allow for a time-varying second moment, capturing the degree of associated uncertainty. This distinction across structural shocks is all the more important considering that the relevant literature has not reached consensus regarding the economic impact of uncertainty shocks, given multiple and possibly counterbalancing propagation channels, as well as endogenous policy responses.

The macroeconomic effects of uncertainty shocks

Our main results can be summarized as follows. First, we trace out the macroeconomic effects of various *uncertainty shocks* and we find that it matters whether the economy experiences heightened uncertainty of demand, or supply, or financial origin. More specifically, our results reveal that the underlying source of uncertainty matters for: *(i)* the shocks' propagation, *(ii)* aggregate economic outcomes, and *(iii)* appropriate policy responses.

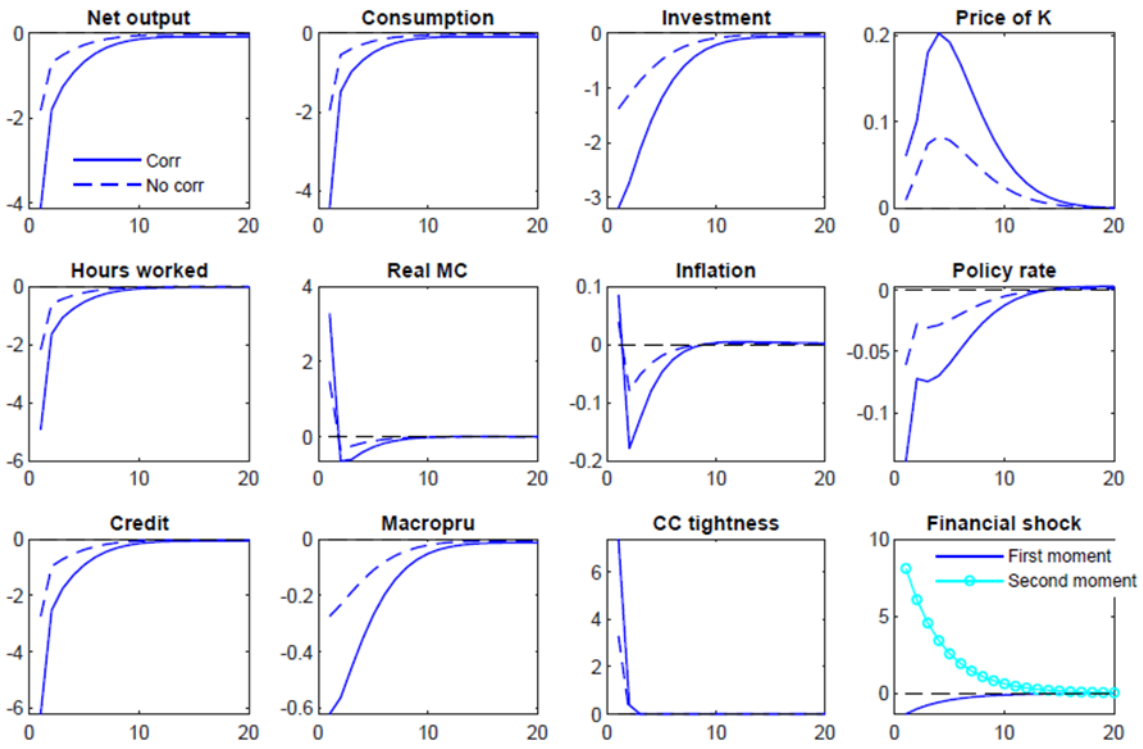
Our analysis reveals that when financial uncertainty shocks hit the economy, the effects are significantly larger, with output responding about ten times stronger compared to both productivity and preference uncertainty shocks of a comparable magnitude. This result substantiates the nexus between financial markets and uncertainty. We find that following productivity and preference uncertainty shocks, the qualitative responses resemble the effects of adverse supply and demand shocks, respectively, but the magnitudes are generally modest (yet, in line with other findings).

Financial markets and heightened uncertainty

Secondly, a simulated financial turmoil scenario illustrates that heightened financial uncertainty exacerbates the adverse macroeconomic effects of a typical financial shock, which is captured in our setting by a reduction in the collateral firms can borrow against to finance their working capital needs. This exercise is motivated by the

observation that during the global financial crisis we witnessed a sharp tightening of financial conditions coupled with heightened volatility in many of the key macroeconomic and financial variables.

Figure 2: Impact of simultaneous financial first and second moment shocks



Note: The solid blue line captures responses in the financial distress scenario (assuming correlation between first and second moment financial shocks), while the dashed blue line depicts responses following only a financial level shock (i.e. no correlation). The generalized impulse response functions are computed at the ergodic mean following Andreasen et al. (2018). All variables correspond to percentage deviations from their deterministic steady state.

Figure 2 displays with solid blue lines the dynamic responses to this financial turmoil scenario. The underlying assumption is that uncertainty responds contemporaneously to first moment financial shocks, which is depicted by the light blue circled line (last panel in the last row). The negative financial friction shock, which limits the borrowing capacity of firms, pushes them against their collateral constraint for several periods (second panel in the last row). As a result, firms hire less labor and undertake fewer investment projects, which imply lower credit activity. These developments lead to a decline in output, which reduces the gains from owning capital, since the marginal revenue of capital falls. The decline in the desired capital stock feeds further into a lower level of investment. In parallel, as the capital stock diminishes, its price gradually goes up, which prompts a relaxation of the borrowing constraint that ultimately becomes not binding. Price stickiness and the strong decline in output result in lower inflation. Concurrently, higher uncertainty induces households to save more, reducing the demand for consumption goods, which directly lowers output. This constellation of disturbances generates a broad-based collapse in economic activity. Therefore, in order to stabilize the economy, the monetary authority promptly reduces interest rates and the macroprudential regulator loosens financing conditions. These targeted instruments complement each other and their deployment ensures that policymakers are able to achieve their price and financial stability objectives over the medium run.

Importantly, Figure 2 shows with dashed blue lines the responses following only an adverse financial shock (i.e. there is no correlation between level and uncertainty financial shocks). The decline in all key macroeconomic variables – output, consumption, and investment – is still sizable, but on impact the fall is less than half its value under financial turmoil (i.e., when level and uncertainty shocks occur simultaneously). This alternative scenario substantiates that financial uncertainty matters and it has strong amplification effects when it increases simultaneously with a deterioration in financing conditions. Moreover, by comparing the solid and dashed blue lines, we can observe that even though both monetary and macroprudential policies react stronger under the financial distress scenario (in line with more adverse effects of the shocks), the recovery phase is more protracted.

The stabilizing role of the monetary-macroprudential policy mix

Finally, we investigate how the economic trade-offs revealed by uncertainty shocks interact with the adopted policy framework. Our model embeds two policy instruments aiming at implementing the dual mandate of price stability and financial stability: the interest rate is steered to bring inflation back to the target, while the macroprudential tool is directly targeting the return of credit to its long-run equilibrium. We showcase how the effects of uncertainty shocks vary across policy frameworks, as embedded in the calibration of the two policy reaction functions, i.e., the magnitudes of inflation coefficient in the interest rate rule and credit coefficient in the loan-to-value rule. Our results stress the importance of carefully designing and calibrating the proper policy mix in response to uncertainty shocks conditional on the authorities' formally assigned mandates in terms of price stability and financial stability.

Given that each uncertainty shock is unique, we argue that there is no "one-size-fits-all" type of policy framework that could be universally adequate in dealing with uncertainty shocks. In the case of financial uncertainty shocks, our model suggests that even if strong macroprudential policy provides a powerful stabilization mechanism, deploying such a tool would not necessarily be preferred in terms of private consumption and, implicitly, societal welfare.

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