Monetary policy decision-making and communication under high uncertainty

Insights from a survey of central banks in the Americas and beyond

Eduardo Amaral, Torsten Ehlers, Ilhyock Shim and Alexandre Tombini[1]

Abstract

Extremely high levels of uncertainty pose challenges for monetary policy decision-making and communication by central banks. This chapter summarises the results of a survey among central banks in the Americas and some additional emerging market economies. The survey responses show that, even though uncertainty is not explicitly embedded in monetary policy reaction functions, it affects several important aspects of the decision-making process such as macroeconomic modelling and the choice of relevant scenarios. Uncertainty also plays a significant role in shaping central banks' communication strategies, including the use of a range of communication and visualisation tools as well as a more restricted use of forward guidance.

Keywords: uncertainty; monetary policy; monetary policy communication; monetary policy reaction function; forward guidance; high-frequency data; scenario analysis.

JEL classification: E44, E58, F42, G01.

Table of contents

1. Introduction

Many indicators of economic uncertainty have reached levels last seen during the Great Financial Crisis (GFC) in 2008–09 or the Covid-19 pandemic. This poses challenges for monetary policy decision-making and communication by central banks. The high level of uncertainty gives rise to both a wider range of economic outcomes and a higher likelihood of rapid and profound changes in financial markets and the macroeconomy. At the same time, central banks have increased their focus on communication, expanded their range of tools and further developed their analytical capabilities during these recent crises.

The Consultative Group on Monetary Policy (CGMP), consisting of Bank for International Settlements (BIS) member central banks in the Americas and working under the auspices of the Consultative Council for the Americas (CCA), conducted a survey to explore how central banks navigate times of heightened uncertainty in economic analysis, monetary policy decision-making and external communication. This chapter summarises central banks' responses to the survey. It highlights key trends, challenges and practices among the participating central banks.

The survey responses show that heightened uncertainty plays an important role in shaping central banks' monetary policy decisions and communication. Even though uncertainty is not explicitly embedded in monetary policy reaction functions, it affects several important aspects of the decision-making process such as macroeconomic modelling and the choice of relevant scenarios. Central banks in the Americas have also adjusted their communication strategies, including a more restricted use of forward guidance.

The key findings from the survey responses can be summarised as follows:

- To identify periods of heightened uncertainty, financial market volatility is the most closely scrutinised indicator. High-frequency data are a particularly valuable resource for central banks during these periods, as they enable the formation of real-time insights. However, volatility, gaps in coverage, definitional inconsistencies and the need for advanced technological infrastructure and skilled personnel can complicate their integration into monetary policy decision-making processes.

- The key sources of uncertainty and major shocks considered by central banks in 2025 include tariff/trade-related shocks and exchange rates, followed by oil prices, inflation and geopolitical risks. Some central banks also look at fiscal shocks and other non-oil commodity shocks.

- Central banks face significant modelling challenges from uncertainty, particularly in modelling the relationship between the output gap and prices, wage-price dynamics and exchange rate pass-through. Scenario analysis is widely used to evaluate alternative economic trajectories, with some central banks providing probability distributions around forecasts. Other central banks are exploring advanced techniques like artificial intelligence (AI)/machine learning (ML) and neural networks to analyse high-frequency data. All central banks extensively incorporate expert judgment.

- Central banks hold divided views on the relevance of the central scenario during periods of extreme uncertainty. While some central banks prioritise alternative scenarios in response to large, realised shocks such as the Covid-19 pandemic,

others emphasise the central scenario as a critical anchor for economic agents that helps to ensure predictability. The differing approaches often depend on the source and nature of uncertainty and the tendency of monetary policy committees to focus more on scenarios with quantifiable likelihoods than unforeseen events.

- To navigate uncertainty, central banks often adopt a cautious approach, adjusting policy rates in small, incremental steps. This gradualism is justified to provide a degree of predictability to economic agents and to support financial stability, which are particularly important during highly uncertain times. In addition, most central banks have revised their monetary policy strategies to make them more robust to shocks and more adaptable.

- Forward guidance tends to be more effective in environments with low uncertainty, as it provides clearer and more reliable signals on future monetary policy actions. Some respondents suggest that its impact diminishes in periods of heightened uncertainty, leading to divergent approaches among central banks. Some central banks avoid using forward guidance altogether during such periods, while others continue to employ it but attach specific conditions to account for the highly uncertain environment.

- During periods of heightened uncertainty, most central banks adapt their communication strategies by revising the frequency of updates or the way they present projections and scenarios. These changes are often driven by economic news, real-time market observations and feedback collected through institutional communication channels.

- One significant challenge for central banks is effectively communicating economic forecasts under high uncertainty to different audiences. To address this challenge, some central banks rely on visualisation tools such as fan charts, scenario analyses, conditional forecasts and probability distributions. However, using complex tools to describe uncertainty often risks being misunderstood or lost in translation, making it difficult to convey the nuances of uncertainty in monetary policy.

The remainder of this chapter is organised as follows. The next section provides details about the survey, while sections 3–8 are organised around the six main topics covered in the survey. The final section concludes.

2. Survey structure and respondents

The survey captured six main topics, starting with general questions around external communication and closing with questions on specific technical modelling issues and scenario analysis:

1. Capturing and quantifying uncertainty in economic analysis by central banks

2. Incorporating uncertainty into models and tools

3. The role of scenario analysis

4. Uncertainty and the monetary policy reaction function

5. Forward guidance under uncertainty

6. Central bank communication with the public under uncertainty

The survey questions were both quantitative and qualitative in nature and are provided in Appendix A.

Central banks from 12 countries responded to the survey questions: the Central Bank of Argentina, Central Bank of Brazil, Bank of Canada, Central Bank of Chile, Central Bank of Colombia, Central Bank of Costa Rica, Bank of Mexico, Central Reserve Bank of Peru, South African Reserve Bank, Central Bank of the Republic of Türkiye, US Federal Reserve (Board of Governors of the Federal Reserve System and Federal Reserve Bank of New York) and Central Bank of Uruguay.

The survey questionnaire included a combination of multiple-choice and open-ended questions. It was distributed in June to August, and the 12 central banks submitted their responses by early September 2025. Due to the breadth and depth of the questions, not all central banks provided answers to every question. Nevertheless, the responses collected offer a comprehensive perspective on how central banks address uncertainty across various aspects of their operations. To enrich the discussion, this chapter also integrates key insights from the subsequent CGMP meeting held in October 2025.

Responses were aggregated by giving equal weight to all respondents. When we interpret aggregated responses to questions where central banks were asked to rank alternatives by degree of importance (eg from most important to not important), the ordering assumes that discrete degrees are equally spaced. In cases of a tie, higher degrees of importance were given priority in the ranking ordering. However, each surveyed central bank has its own view and strategy on how to handle uncertainty, which may not necessarily coincide with the aggregate results presented in this chapter and the lessons derived from them. Individual survey responses are confidential and individual central banks are named only if their responses are solely based on publicly available information.

The presentation of the results in this chapter follows an inward-to-outward approach in the sequence of the monetary policy decision-making process, beginning with the capture and quantification of uncertainty and progressing towards its communication.

3. Capturing and quantifying uncertainty in economic analysis

Central banks use a range of tools and techniques to measure and incorporate uncertainty into economic analysis. Economic projections are usually based on a central scenario, and there is divergence among central banks with respect to how uncertainty affects the importance of the central scenario. In addition, based on past data, large shocks reduce the accuracy of economic projections. Central banks in some cases build alternative scenarios with different shocks ("known unknowns") for internal purposes, which may also be used for communication. Discussions at board meetings also tend to focus more on "known unknowns" than on "unknown unknowns".

Central banks rely on a set of criteria to identify changes in the level of uncertainty. Financial market volatility is the most frequently used, perhaps as it is readily available and well understood. All central banks acknowledge the stochastic nature of uncertainty and try to quantify it. Macro-at-risk models are the most widely used, which shows that central banks are in search of objective probabilities that may account for extreme scenarios and, possibly, scenarios with asymmetric probabilities.

Regarding the relevance of the central scenario or the need to use alternative scenarios during periods of extreme uncertainty, central banks have divided views. Roughly half of the survey respondents rely more on alternative scenarios during extreme uncertainty. Several of these central banks mentioned the Covid-19 pandemic as an example of an episode in which the central scenario lost importance. The other half of central banks believe that the central scenario maintains its relevance or even becomes more important if rising uncertainty makes economic agents more reliant on guidance and forecasts made by the central bank. It should be noted that monetary policy committees tend to focus on scenarios with quantifiable likelihoods, either objective or subjective, rather than on highly unexpected events that are difficult to estimate and often overlooked by decision-makers.

The differing views seem to be related to the source of uncertainty. If it is due to a large, realised macroeconomic shock, past data may prove to be of limited value due to the presence of non-linear effects or possible structural breaks, in addition to questions over the persistence of a large macroeconomic shock. If a shock is expected but has not been clearly observed yet, scenarios may be useful for internal deliberations but less so for communicating with the public. In contrast, when extreme uncertainty is involved, the central scenario may become more scrutinised by the public and, therefore, more important as economic agents pay greater attention to it when making decisions. In this case, the central scenario serves as a critical anchor for economic agents who seek stability and predictability.

Among different types of uncertainty, known unknowns followed by statistical uncertainty have been the most frequently discussed types of uncertainty in recent years. Fundamental uncertainty, or unknown unknowns, has usually been rarely discussed. Some central banks indicated that climate-related issues, terms of trade or behavioural assumptions regarding inflation (eg expectations are forward-looking or backward-looking) had been frequently discussed by the monetary policy board. This exemplifies how the thematic nature of uncertainty varies from country to country.

Among various types of indicators for measuring uncertainty, financial market volatility is the most important (Graph 1). The second and third most important types are forecast errors and qualitative judgment by staff or an internal committee. Close to these two is confidence indices (eg measures of consumer or producer confidence). One central bank pointed out that it relies on a wide range of economic and financial indicators as well as information from businesses and community contacts. Another central bank highlighted the importance of observing depositors' behaviour. [2] Moreover, some respondents noted that having different measures of uncertainty is advisable, as they are complementary and do not necessarily co-move.

---

[2] These responses align with the evidence presented in Bloom (2014) that the volatility of stock markets, bond markets and exchange rates, as well as that of GDP growth forecasts, rises steeply during recessions – periods in which uncertainty is also "fractal", meaning it increases whether viewed through macro or micro data. For a list of empirical measures of uncertainty, risk and volatility, as well as a discussion on their construction and relative advantages, see Cascaldi-Garcia et al (2023).

How important is each of the following criteria or indicators for your institution in identifying periods of heightened uncertainty?

As a percentage of respondents
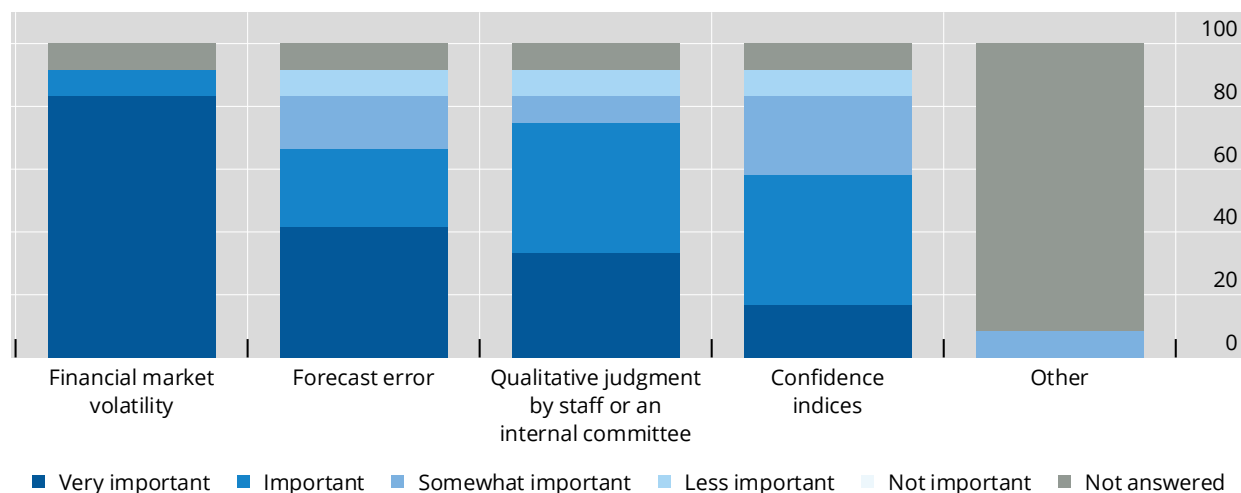
Source: CGMP survey on central bank monetary policy decision-making and communication under heightened uncertainty in 2025.

Finally, among different types of tools to quantify uncertainty, the most used tool is macro-at-risk models. Fan charts, conditional probability distributions and scenario analysis were each mentioned by eight central banks. Next, there are confidence intervals, subjective probability distributions, objective probability distributions and conditional forecasts. One central bank noted that it uses predictive densities that include aspects of many of the alternative tools.

4. Incorporating uncertainty into models and tools

Central banks employ a variety of tools and models to incorporate uncertainty into their analyses. Central bank responses, however, also suggest that dealing with unprecedented or asymmetric risks as well as structural changes goes beyond mathematical models. Hence, several central banks highlighted the importance of expert judgment and historical analogy in their assessments. Most central bank staff have incorporated scenario-building as a tool for analysing uncertainty and presenting it to the board (Lane (2024); see also the next section). The survey responses also suggest that central banks sometimes expand their toolbox of underlying inflation measures in case of exceptional shocks. Currently, many central banks are exploring ways of incorporating AI/ML and neural networks into their economic analyses and forecasting process.

Many central banks emphasised the use of alternative scenarios, incorporating asymmetries, tail risks and non-linear effects to capture a broader range of potential outcomes beyond what standard models or historical data might suggest. In that sense, scenario analysis emerged as a common tool, with some central banks focusing on risks with meaningful macroeconomic implications even if under only subjective probabilities, often employing predictive density analysis to account for skewness and asymmetric shocks. Others noted the role of alternative models and simulations in constructing ranges for their outlooks, ensuring that the most relevant risks are

explicitly considered in their deliberations. Overall, qualitative evaluation and careful interpretation of economic models, acknowledging their limitations, were consistently underscored as key elements in navigating uncertainty.

Central banks employ a variety of tools and frameworks to address the challenge of distinguishing between structural and cyclical sources of uncertainty, as well as of determining whether shocks are supply-driven, demand-driven or a combination of both. Many institutions rely on a mix of several structural economic models, statistical methods and expert judgment. Common approaches include the use of time series models, such as vector autoregressions (VARs) with sign restrictions, Kalman filters and Bayesian VAR methods, to decompose shocks and assess their origins.

Several central banks highlighted the importance of structural assumptions and shock decomposition techniques, often integrating data on prices and real activity or conducting inflation decompositions by goods and services. These methods help to evaluate transmission channels and distinguish between supply and demand shocks.[3] Some institutions also mentioned sectoral indicators, stochastic volatility models and growth/inflation-at-risk frameworks to inform their assessments. While statistical methods and models are central to these exercises, many central banks noted the critical role of expert judgment and qualitative evaluation, particularly when real-time identification of structural breaks or policy changes are required.

Among the potential sources of uncertainty in modelling choices for the monetary policy transmission mechanism, most central banks pointed to the relationship between the output gap and prices. The second most cited sources were exchange rate pass-through and monetary policy power followed by the wage-price relationship. Other than these four sources, two central banks mentioned expectations formation, one central bank mentioned how firms set prices, one pointed to the degree of indexation in the economy and one central bank pointed to spillovers from the foreign sector to the domestic output gap and inflation.

Roughly half of central banks provide probability distributions when presenting forecasts to the board, with the other half presenting only point forecasts. One central bank clarified that the presentations are backed up by uncertainty qualifications as long as they are deemed relevant for the messages and the robustness of the forecasts.

Most central banks compute fan charts using objective probabilities recovered from econometric models. A few central banks calculate fan charts with subjective probabilities, ie based on expert judgment. Two central banks mentioned that they combine both objective and subjective probabilities. Of these two, one central bank said that it relies objectively on adjusted historical forecast errors and uses a two-piece normal distribution, while it calculates the probability of deviations in key forecast determinants by subjectively adjusting the variability assumed for each factor. These two strategies are then aggregated to estimate the overall skewness of inflation forecasts and compute the confidence bands accordingly.[4]

---

[3]   For a list of transmission mechanisms of uncertainty and how they can be incorporated into structural models, see Fernández-Villaverde and Guerrón-Quintana (2020).

[4]   The Central Bank of Colombia combines both types of probabilities to generate predictive density distributions. The methodology is explained in a box published in its July 2021 Monetary Policy Report. For details, see https://repositorio.banrep.gov.co/server/api/core/bitstreams/811e6b17-3874-4ba8-aa59-8476bed602e4/content.

Regarding the frequency of using scenario analysis, all central banks but two conduct scenario analysis on a regular basis. One central bank does it occasionally and the other does it rarely.

Central banks may want to adjust measures of underlying inflation to account for exceptional shocks that increase uncertainty (eg supply bottlenecks, energy price surges due to geopolitical conflicts). Three central banks responded that when they faced exceptional shocks, they adjusted underlying inflation measures to account for them. Another three said that they did not adjust, and yet three other central banks answered that they did in some cases. One central bank said that it monitors several indicators of underlying inflation which account for exceptional shocks in different ways. During the Covid-19 pandemic period, it built a dedicated supply bottleneck indicator to control for that factor. Another central bank mentioned that in the same period, it produced measures of core inflation that excluded the effects of some relief measures that had affected prices. One central bank mentioned that it complements traditional measures of inflation with indicators that focus on certain sectors or types of goods to provide more insights. Finally, one central bank stated that its preferred measures of core inflation are statistical in nature – median and trimmed consumer price index (CPI) measures.

To detect turning points in the economy using high-frequency data, most central banks are currently exploring the use of AI/ML or neural networks. Two central banks have already integrated them into their monitoring frameworks, while two do not rely on these types of tools. Most central banks perceive AI/ML and neural networks as possibly enhancing nowcasting of the business cycle and inflation forecasting. However, they pointed out that there are challenges in how to interpret these classes of models.

All central banks evaluate the uncertainty of both assumptions and modelling. In doing so, central banks rely on expert judgment to complement model-based outputs, especially during uncertain periods. Judgment is usually implemented through conditioning variables and sensitivity analysis, either as proposed by staff or at the request of the board. But judgment can also be made on modelling shocks to specific variables and designing risk scenarios that may be the focus of uncertainty at some point. Additionally, judgment applies to picking the most adequate model for a specific type of analysis. One central bank pointed out that during periods of elevated uncertainty, judgment-driven adjustments played a more prominent role.

Some situations in which expert judgment is expected to support analysis are when interpreting model limitations, adjusting for data anomalies and incorporating relevant information not captured by models. Central banks highlighted the limitations of traditional models in capturing uncertainty, particularly in the post-pandemic era. The need to address non-linearities, integrate alternative scenarios and communicate baseline forecasts effectively was emphasised in their responses.

5. The role of scenario analysis

Scenario analysis is a critical tool for central banks, enabling them to explore a range of potential outcomes and prioritise scenarios based on their severity and macroeconomic impact (Hunter (2024)). Key sources of uncertainty include exchange rates, oil prices and geopolitical events.

Among the most cited scenarios currently being analysed are those involving exchange rate shocks and tariff/trade shocks (Graph 2). Next comes oil price shocks, followed by a tie between inflation shocks and geopolitical risk shocks. Then we have a tie between fiscal shocks and other non-oil commodity shocks. Some central banks also mentioned shocks related to capital flows, the financial sector, consumer demand and labour supply. One central bank mentioned monetary policy transmission shocks, and another mentioned the availability of natural resources.[5]

Types of scenarios currently considered by central banks

As a percentage of respondents   Graph 2
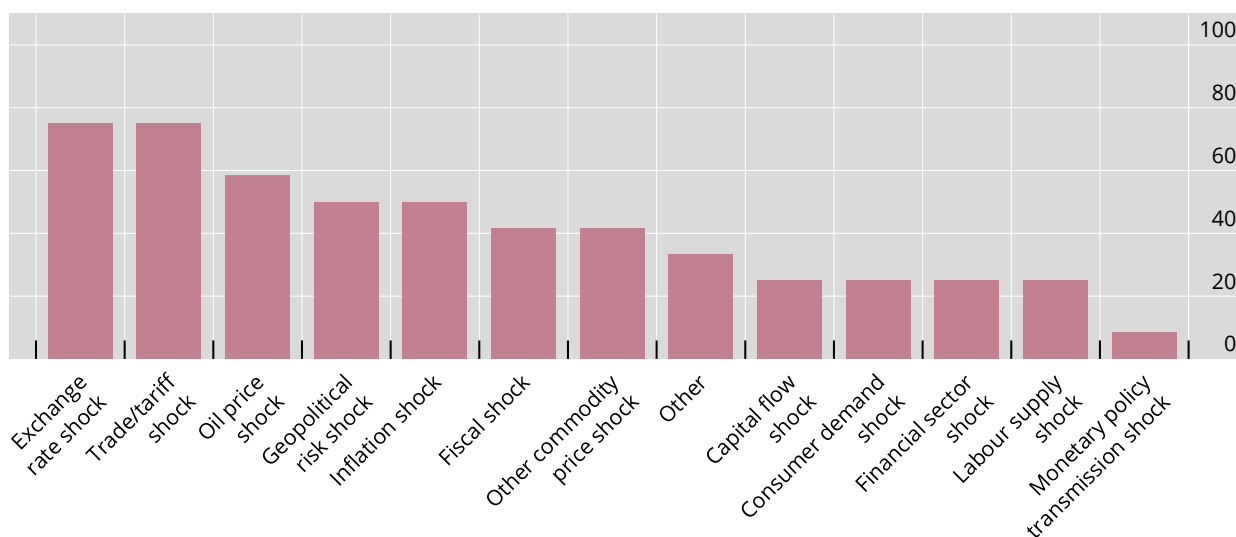
Source: CGMP survey on central bank monetary policy decision-making and communication under heightened uncertainty in 2025.

Central banks prioritise different scenarios, first based on the preferences of the board and the macroeconomic impact, and second based on the likelihood of the shock or its potential severity. In addition, central banks put less emphasis on the scenarios raised by market agents or the media than on the more tailored scenarios prepared by the central banks themselves.

The survey also contained questions about the sources of current uncertainty for constructing scenarios (eg levels of variables and their elasticities to shocks). Among nine potential sources, the most important one is inflation, followed by exchange rates. Next important are trade/tariffs and the output gap (Graph 3). Then come oil prices, geopolitical events, other commodities excluding oil, and the neutral rate. Migration and remittances is the least important source of uncertainty, appearing to affect only a few central banks in the sample.
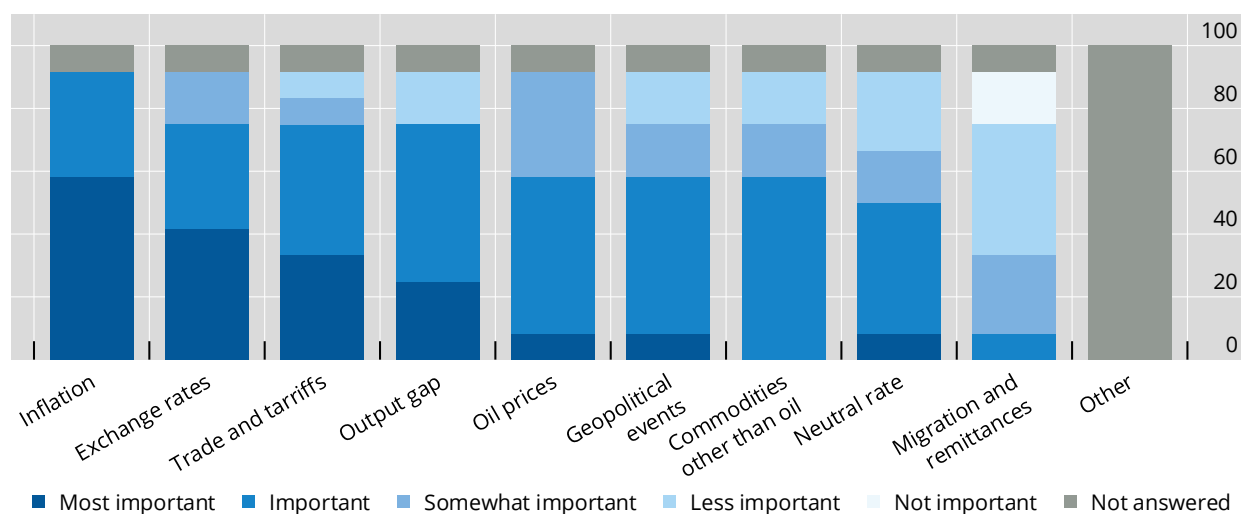
Finally, when using scenario analysis, most central banks use market-based assumptions (eg option-implied densities for commodity prices) to build scenarios.

---

[5] The Federal Reserve releases its quantitative scenarios used for monetary policy discussions to the public after five calendar years in the Federal Reserve's Tealbook.

Sources of current uncertainty for constructing different scenarios

As a percentage of respondents

Graph 3

Legend: ■ Most important ■ Important ■ Somewhat important ■ Less important □ Not important ■ Not answered

Source: CGMP survey on central bank monetary policy decision-making and communication under heightened uncertainty in 2025.

6. Uncertainty and the monetary policy reaction function

This section explores how uncertainty influences monetary policy decisions, including the calibration of policy rates. The survey responses clearly show that uncertainty plays a significant role in shaping monetary policy decisions, even though it does not explicitly feature in the monetary policy reaction function. Instead, it affects decision-making processes indirectly, as central banks often adopt cautious approaches. Adjusting policy rates in small, incremental steps allows central banks to provide a degree of predictability and maintain financial stability during uncertain times. These cautious strategies are also a reaction to the uncertainty surrounding future events or the transmission of monetary policy itself. Furthermore, central banks adjust their strategies to enhance robustness against adverse outcomes, tailoring their approaches to the unique economic contexts, institutional frameworks and inflationary histories of their jurisdictions.

A closer look at the survey responses reveals that central banks adopt various approaches to address uncertainty in the transmission of monetary policy, balancing caution, agility and the lag in the effects of policy actions. A commonality across responses is the recognition of uncertainty as a critical factor in decision-making, with most institutions employing tools or strategies to manage it effectively. For instance, many central banks rely on scenario analysis, forecasting models and risk assessments to evaluate the strength and timing of transmission channels. These tools allow policymakers to simulate alternative scenarios, weigh responses based on likelihoods and adjust their strategies as new information becomes available.

Caution is another shared theme, with several institutions explicitly acknowledging the need for prudence in the face of uncertainty. Some central banks communicate pauses in policy adjustments to assess transmission effects, while others adopt a slower pace of action to maintain room for manoeuvre. One central

bank emphasised that uncertainty is considered when it directly affects the central bank's goals, balancing responsiveness to clear directional signals with caution when data are ambiguous or noisy.

Differences emerge in the specific methods and institutional frameworks used to manage uncertainty. Some central banks highlight the diverse views within their decision-making boards, which can lead to varied approaches, including the use of alternative scenarios to address parameter uncertainty. Others incorporate periodic studies to reassess transmission mechanisms, leveraging tools like structural VAR models and sectoral indicators. Meanwhile, some institutions emphasise longer-term goals and risks to the financial system, integrating these considerations into their policy decisions.

In the face of uncertainty, central banks tend to adjust the policy rate in small steps. The two most important reasons mentioned to explain this behaviour were: (1) guaranteeing some predictability for economic agents; and (2) financial stability (Graph 4). Next, most central banks picked: (3) uncertainty about future events; and (4) uncertainty about the transmission of monetary policy. These answers suggest that central banks deliberately smooth policy rate changes.[6]

Reasons for adjusting the policy rate in small steps

As a percentage of respondents   Graph 4
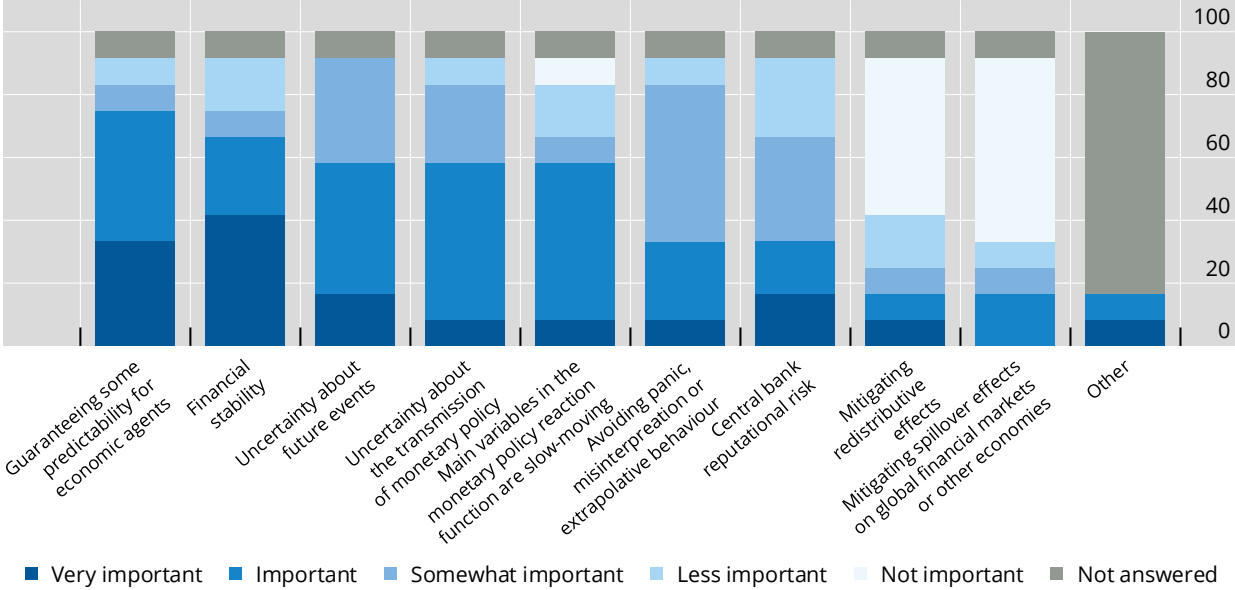
Source: CGMP survey on central bank monetary policy decision-making and communication under heightened uncertainty in 2025.

Reasons considered somewhat important to central banks are: (5) main variables in the monetary policy reaction function are slow-moving;[7] (6) avoiding panic, misinterpretation or extrapolative behaviour; and (7) central bank reputational risk.

---

[6] This behaviour is theoretically justified by Brainard (1967), Goodfriend (1987), Sack and Wieland (2000) and Woodford (2003).

[7] Rudebusch (2006) and Carrillo et al (2007) point to the fact that some of the variables which monetary policy reacts to change slowly as explanation for the apparent smoothing of the policy rate.

Reasons viewed of little importance for explaining the smoothing behaviour of rate changes were: (8) mitigating redistributive effects; and (9) mitigating spillover effects on global financial markets or other economies. This shows that gradualism in central banks has not been justified in terms of the redistributive effects of monetary policy or a potential spillover to other economies, where the latter can be explained by the fact that most surveyed economies are not large enough to be systemic from a global perspective.

Central banks adopt varying strategies to make their monetary policy more robust during periods of heightened uncertainty, but common themes include cautious calibration, reliance on alternative models or scenarios, and gradual adjustments. A shared approach among many institutions is to proceed cautiously, often emphasising smaller, more gradual policy adjustments to avoid overreacting to transitory shocks or misjudging evolving conditions. This cautious stance is often communicated publicly, reinforcing transparency and anchoring expectations.

Some central banks use specific tools or adjustments to enhance robustness. For instance, wider ranges in published policy rate paths allow for flexibility in response to uncertain conditions, while alternative models – such as those incorporating endogenous monetary policy credibility – are used to better align policies with data. Similarly, adjustments to the speed and horizon of policy responses are optimised to manage inflation expectations when they deviate persistently from targets.

Differences emerge in how central banks respond to their unique economic contexts. For example, in 2024 the Bank of Mexico adopted a gradual approach to reducing the reference rate, taking into account disinflationary trends, weak economic activity and financial market volatility. In contrast, Argentina's history of high inflation requires a more contractionary stance under uncertainty to avoid inflationary surges and spiralling nominal variables. Meanwhile, Canada's response to unexpectedly strong inflation in 2022 included exploring alternative models to better capture economic dynamics.

Central banks recognise the value of high-frequency data (HFD), such as credit/debit card transactions, port activity and real-time employment indicators, in providing timely and granular insights into the economy. These data are particularly useful for nowcasting and monitoring short-term dynamics of economic activity and inflation and for detecting early signs of vulnerabilities. For instance, at the Central Bank of Chile, high-frequency indicators are constructed from granular, up-to-date administrative records on firm-level sales, consumer purchases and other variables to detect turning points and evaluate the impact of different shocks and policies.[8] However, central banks also acknowledge several limitations associated with HFD, such as volatility, noise, representativeness issues and methodological inconsistencies, which necessitate careful use to ensure robust decision-making.

A common challenge highlighted by many central banks is the high level of noise and volatility in HFD, which can obscure underlying economic trends and lead to overreaction if not managed carefully. To address this challenge, central banks use complementary techniques such as smoothing, filtering and cross-checking with more stable, lower-frequency data sets. For example, some institutions focus on identifying systematic co-movements or robust patterns within HFD to distinguish

---

[8]   For more details, see https://www.bcentral.cl/en/w/uso-microdatos-politica-monetaria.

meaningful signals from noise. Additionally, HFD are often used as a complementary tool rather than as a replacement for traditional macroeconomic indicators.

Another limitation is the lack of coverage, representativeness and/or historical depth of HFD. This can make it difficult to assess their predictive value or determine their appropriate weight in decision-making. Central banks address these challenges by integrating HFD into broader models, such as nowcasting or short-term forecasting frameworks, and by contextualising HFD within macroeconomic trends to avoid overemphasising any single data series. Advanced technological infrastructure and skilled personnel are also necessary to process and integrate large and complex HFD data sets effectively (Bernanke (2024)).

Specific use cases of HFD vary across countries based on their economic contexts. For instance, the Central Bank of Argentina relies heavily on high-frequency inflation data, which primarily reflect goods prices rather than services prices, and complements them with forecasts and wage data to gain a fuller picture of CPI movements. Meanwhile, other central banks (eg Brazil) monitor HFD for real activity and financial flows to understand contagion channels or assess the impact of government policies.

While HFD provide valuable real-time insights, their limitations — such as volatility, representativeness issues and methodological challenges — require central banks to use them cautiously and in conjunction with traditional indicators. By employing statistical techniques, leveraging complementary data sets and integrating HFD into broader models, central banks enhance their ability to extract meaningful signals while mitigating the risks of overreaction or misinterpretation.

In summary, heightened uncertainty compels central banks to adopt a cautious and adaptive approach to monetary policy. While common strategies include gradual adjustments to policy rates, reliance on alternative models and the use of scenario analysis, differences emerge based on each central bank's specific economic circumstances and institutional structure. HFD are increasingly valued for their ability to provide real-time insights into economic dynamics, though their volatility and methodological challenges require careful interpretation. Ultimately, the survey responses highlight the importance of balancing caution and agility in monetary policy, ensuring that central banks maintain credibility and flexibility while addressing the unique challenges posed by uncertainty.

7. Forward guidance under uncertainty

The use of forward guidance as a non-interest rate policy tool in uncertain environments is seen by survey respondents as valuable; however, its effectiveness diminishes as uncertainty increases. As a result, central banks often adjust their forward guidance strategies during uncertain periods, shortening time horizons or using ranges to reflect the heightened risks.

Central banks see an increased risk in providing forward guidance under heightened uncertainty, leading some to avoid offering it during such periods. One central bank highlighted that under heightened uncertainty, forward guidance might shift towards signalling a longer period of inaction. Another central bank reported adjusting the width of published forecast ranges to account for the increased uncertainty. Similarly, one institution reduced the precision of its forward guidance in response to greater uncertainty. However, the source of uncertainty plays a critical

role, as forward guidance may also be used as a tool to mitigate uncertainty specifically related to the central bank's reaction function.

Overall, central banks view forward guidance as most effective in low-uncertainty environments and least effective in high-uncertainty contexts, with several central banks mentioning that it is not effective in the latter case (Graph 5). When there is uncertainty related to the monetary policy reaction function (eg neutral rates), forward guidance may help the central bank to fulfil its mandate.[9] When the source of uncertainty is not in the hands of the central bank, providing forward guidance is riskier and may lock the central bank in a bad position. Alternatively, the central bank may signal a longer period of inaction or reduce the precision of the guidance.

How effective is forward guidance in an environment of uncertainty?

As a percentage of respondents   Graph 5
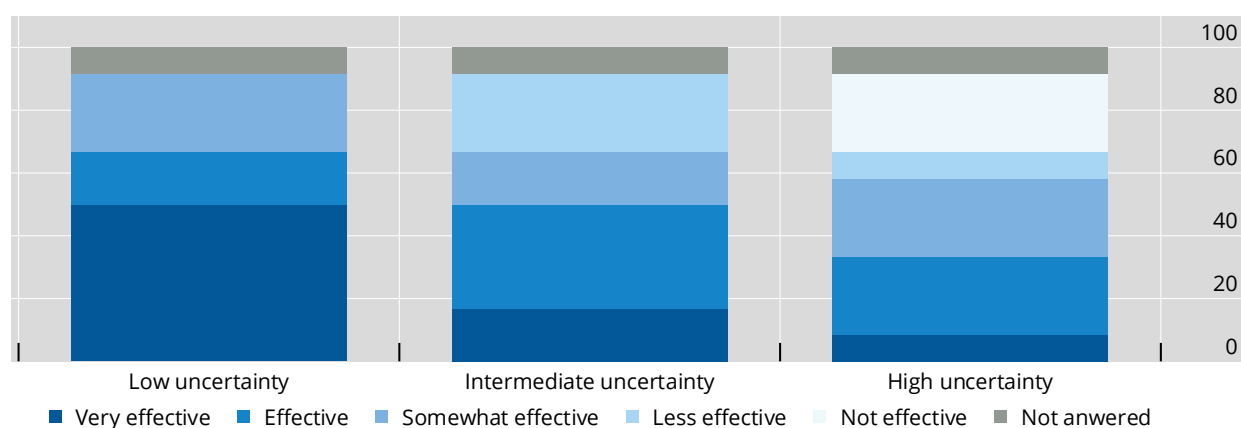
Source: CGMP survey on central bank monetary policy decision-making and communication under heightened uncertainty in 2025.

8. Central bank communication with the public under uncertainty

Central banks have continued to develop their communication as is evident from the press conferences some of them hold to explain their monetary policy decisions, as well as the regular monetary policy and inflation reports they publish. A key takeaway from the survey responses, however, is that communicating uncertainty is challenging (Bernanke (2024)). More frequent communication may not necessarily achieve clearer guidance. The survey responses show that many central banks have adapted their communication tools and channels in response to heightened uncertainty to increase the effectiveness of communication. These adjustments also reflect lessons learned from the Covid-19 pandemic, which was a forced laboratory for how central banks deal with heightened and fundamental uncertainty.

As part of their communication with markets and the broader public, all 12 central banks regularly publish monetary policy or inflation reports, with most doing

---

[9]   For a perspective on how a central bank can publish alternative future scenarios alongside signalled paths for the policy rate, see Seim (2025).

so quarterly.[10] How uncertainty around possible outcomes is reflected, however, varies. Tools such as fan charts, scenario analysis, conditional forecasts and subjective probability distribution are widely used to communicate uncertainty (Graph 6). Challenges persist in making these concepts accessible to market participants and, even more so, to the general public. While visualisation tools are considered somewhat effective, many central banks reported that audiences tend to focus on point forecasts and often neglect the uncertainty around these point forecasts.

In the context of inflation forecasts, eight out of the 12 surveyed central banks publish inflation forecasts, either quantitative or qualitative, by staff in their monetary policy report, inflation report or monetary policy meeting minutes. Of these eight, six provide not only point forecasts but also confidence intervals to communicate the degree of uncertainty around these forecasts. This, however, does not mean that forecasts are made without board oversight or advice. Notably, at the Central Bank of Chile, inflation forecasts are prepared by the staff but formally endorsed and owned by the monetary policy board.

A different picture emerges for policy rate forecasts. Only three of the surveyed central banks publish policy rate forecasts made by the staff. The South African Reserve Bank and Central Bank of Uruguay both provide point forecasts, but only the Central Bank of Uruguay includes confidence intervals around them as well. The Central Bank of Colombia provides a brief qualitative description of the forecast rate path in relation to analysts' forecasts (eg greater or lower on average).

While staff forecasts are an important means to convey uncertainty around projections that feed into monetary policy decisions, the views of board or monetary policy committee members can provide another complementary perspective. Seven central banks, however, do not publish inflation forecasts prepared by board or monetary policy committee members. The central banks of Brazil, Canada, Chile and South Africa do, but only one average/consensus forecast. The Federal Reserve publishes the quarterly Summary of Economic Projections (SEP), which shows anonymous distributions of Federal Open Market Committee (FOMC) participants' individual projections on Personal Consumption Expenditures (PCE) and core PCE inflation.

Similar to inflation forecasts, nine out of 12 central banks do not publish policy rate forecasts by board or monetary policy committee members. The Central Bank of Chile publishes a policy rate corridor that reflects the consensus view of its board members on possible future trajectories for the policy rate, which incorporates the central forecast scenario as well as sensitivity scenarios capturing different types of uncertainty (initial state of the economy, future shocks, neutral rate). The South African Reserve Bank provides regular guidance on the trajectory of the policy rate by communicating post-judgment projections from its Quarterly Projection Model. The Federal Reserve publishes in its SEP the dot plot of anonymous individual projections on the federal funds rate by board members.

In communicating uncertainty in central banks' projections, fan charts are the most widely used tool, followed by scenario analysis, conditional forecasts and subjective probability distributions (Graph 6). The Central Bank of Brazil maintains in some of its regular communication a permanent section on the balance of qualitative

---

[10]   The Central Bank of Argentina publishes a Monthly Monetary Report and the Federal Reserve a semi-annual Monetary Policy Report to Congress.

risks to inflation. The Central Bank of Chile publishes fan charts for indicators of inflation and economic activity, and for the policy rate it provides a combined fan chart and sensitivity scenario-based corridor.[11] The Federal Reserve publishes in its SEP a distribution of the FOMC members' assessments of uncertainty embedded in forecasts compared with the level observed in the past 20 years. The Central Bank of the Republic of Türkiye holds face-to-face meetings with firms and publishes graphical analyses based on these interviews. Some central banks also rely on other instruments in times of heightened uncertainty, such as qualitative assessments and macro-at-risk models. In addition, most central banks publish scenarios to convey uncertainty. These scenarios are generally based on quantitative characteristics – only one central bank focuses on qualitative scenarios. All central banks find these tools somewhat effective in communicating uncertainty to non-technical audiences.

Visualisation tools to communicate uncertainty projections in central bank reports

As a percentage of respondents   Graph 6
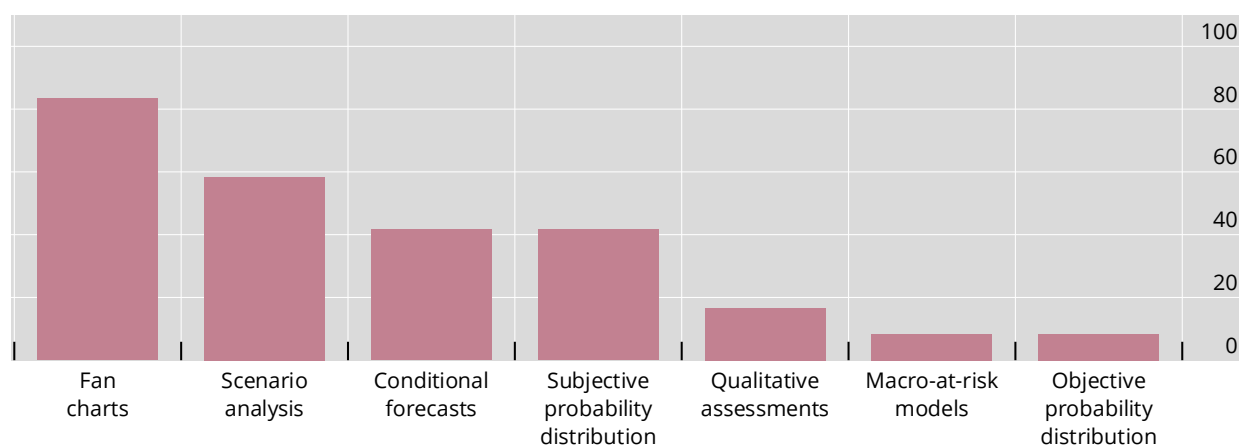
Source: CGMP survey on central bank monetary policy decision-making and communication under heightened uncertainty in 2025.

Despite the various visual and other tools available, all central banks find it challenging to communicate uncertainty. While most central banks see communicating uncertainty to market participants as somewhat challenging, with a few describing it as very challenging, they view communicating uncertainty to the public as even more challenging. The importance of tailoring messages to specific audiences was highlighted, alongside concerns about misinterpretation (eg market participants misreading median forecasts or focusing on worst-case scenarios).

The survey responses clearly show that central banks have changed their communication strategies and tools in periods of heightened uncertainty. Most central banks have taken measures such as broadening the size of fan chart bands or publishing alternative scenarios during periods of heightened uncertainty. Alternatively, one central bank has adjusted its forward guidance by limiting or modulating the language used, thereby providing more qualitative signals about the

---

[11]   To communicate tail risks that are hard to quantify, the Central Bank of Chile explicitly identifies such scenarios as having lower probability and suggests that they may imply a significantly different monetary policy reaction. For details, see
https://www.bcentral.cl/documents/33528/2246274/Uso_de_modelos_en_el_BCCh_2020.pdf.

future path of the policy rate. Another central bank reflected that its public projections inherently incorporate the uncertainty and asymmetry of the prevailing scenario.

In some cases, qualitative assessments have been employed to address uncertainty. During the Covid-19 pandemic, one central bank took the unusual step of halting the publication of a "central" (most likely) scenario within its fan chart. Instead, it acknowledged operating under "Knightian" (fundamental) uncertainty and provided ranges for key endogenous and exogenous macroeconomic variables based on broad assumptions about exogenous factors. Similarly, during the pandemic, another central bank published output and inflation forecasts under alternative scenarios, a strategy explicitly reserved for the extraordinary circumstances. In addition, one central bank communicates uncertainty by publishing histograms that reflect its monetary policy committee participants' assessments of risks and uncertainty.

One prominent concern about communicating uncertainty is whether it gets "lost in translation". Many central banks reported that economic agents often focus on point forecasts, overlooking the broader context of uncertainty depicted in a distribution of forecasts. To address this, one central bank features a balance of risks section in its monetary policy post-meeting communication and minutes – a segment closely scrutinised by market participants – as a key communication tool for conveying uncertainty. Similarly, another central bank observed that, during recent periods of heightened volatility, economic agents and market participants have tended to prioritise the specific quarter when projected inflation is expected to align with the target, rather than examining the underlying drivers or assumptions behind these projections. In contrast, one central bank noted that while analysts often concentrate on point forecasts, some do pay attention to probability distributions (predictive densities) for inflation and the output gap. To enhance understanding, this central bank actively emphasises the risks associated with forecasts and their implications for inflation and policy interest rates. Meanwhile, another central bank observed that external audiences may not fully grasp the broader implications of heightened uncertainty, particularly its influence on monetary policy beyond complicating the central bank's forecasting task. It is worth noting, however, that not all central banks publish forecasts.

In press conferences, speeches or minutes published after monetary policy decisions, most central banks explicitly communicate aspects of uncertainty in their decisions, while others do so only occasionally. One central bank provides qualitative descriptions in press conference remarks, speeches, testimonies, post-meeting statements and minutes. Another central bank mentioned that this happens in special circumstances of heightened uncertainty.

Regarding how often central banks communicate with the public, four central banks indicated that heightened uncertainty did not affect the frequency of their communication with the public. However, two central banks reported communicating more frequently than usual, while three noted that the frequency depends on the nature of the uncertainty. For example, during the Covid-19 pandemic, one central bank increased the number of its policy meetings and public statements from eight to 12 annually, before eventually returning to eight. Another central bank also reported more frequent communication during this period. One central bank highlighted that it issues a press release every month for each monetary policy meeting, detailing the decision and its rationale, followed by a press conference for further clarification. The only exception was March 2020, when it issued an additional

press release in response to the pandemic. Notably, no central bank reported a reduction in communication frequency during heightened uncertainty.

Finally, central banks monitor economic news related to central bank communication, market reactions within a time window around a central bank publication or announcement, and information from institutional communication channels with market participants. One central bank pays attention to its expectations surveys, while another one reaches out directly to contacts spread across its country.

9. Conclusion

The survey results provide new insights into how central banks navigate the complexities of monetary policy decision-making and communication under heightened uncertainty. These findings underscore the significant impact of uncertainty on shaping central banks' strategies, particularly in their efforts to maintain financial stability and guide economic agents through unpredictable environments.

High levels of uncertainty naturally present challenges for monetary policy decision-making, as financial market dynamics, including FX market developments, and the macroeconomic backdrop can change fundamentally in a short period of time. To address these challenges, central banks are increasingly leveraging advanced tools such as scenario analysis, high-frequency data and AI/ML techniques to enhance their understanding of rapidly evolving economic dynamics and improve the timeliness of their assessments. Despite these advancements, expert judgment remains critical, as it allows policymakers to interpret model outputs, account for limitations and incorporate qualitative insights when making decisions in uncertain environments.

Moreover, the survey results imply that central banks cope with this complex situation by taking a cautious approach of adjusting policy rates in small, incremental steps. This gradualism reflects the need to maintain financial stability and to provide a degree of predictability for economic agents in uncertain times. Predictability has its limits in times of uncertainty, however, as the more restricted use of forward guidance shows.

Central banks are also divided on the importance of the central scenario during periods of extreme uncertainty. While some institutions prioritise alternative scenarios to address large, realised shocks such as the Covid-19 pandemic, others view the central scenario as a crucial anchor for providing stability and predictability to economic agents.

While central banks have made progress in communicating uncertainty, the survey results underscore that challenges remain in ensuring that market participants and the public fully understand its implications for monetary policy, for both related decisions and projections. Sophisticated visualisation tools, including fan charts and probability distributions, are being integrated into regular monetary policy and inflation reports to better communicate uncertainty. This points to the need for continued improvement in communication strategies, with an emphasis on tailoring messages to diverse audiences and raising awareness of the broad role that uncertainty plays in shaping the economy.

The findings in the chapter emphasise the need for robust analytical frameworks, cautious yet flexible policymaking and clear communication strategies. By presenting

the results of a direct survey of 12 central banks, this chapter contributes to a deeper understanding of how central banks manage uncertainty and can offer options for the central banking community on how to deal with uncertainty. The following chapters in this volume contributed by 10 central banks provide a more detailed view of individual institutions and their specific challenges and solutions.

References

Bernanke, B (2024): *Forecasting for monetary policy making and communication at the Bank of England: a review*, Bank of England Independent Evaluation Office, April.

Bloom, N (2014): "Fluctuations in uncertainty", *Journal of Economic Perspectives*, vol 28, no 2, pp 153–76.

Brainard, W (1967): "Uncertainty and the effectiveness of policy", *American Economic Review*, vol 57, no 2, pp 411–25.

Carrillo, J, P Fève and J Matheron (2007): "Monetary policy inertia or persistent shocks: a DSGE analysis", *International Journal of Central Banking*, vol 3, no 2, pp 1–38.

Cascaldi-Garcia, D, C Sarisoy, J Londono, B Sun, D Datta, T Ferreira, O Grishchenko, M Jahan-Parvar, F Loria, S Ma, M Rodriguez, I Zer and J Rogers (2023): "What is certain about uncertainty?" *Journal of Economic Literature*, vol 61, no 2, pp 624–54.

Fernández-Villaverde, J and P Guerrón-Quintana (2020): "Uncertainty shocks and business cycle research", *Review of Economic Dynamics*, vol 37, supplement 1, pp S118–46.

Goodfriend, M (1987): "Interest rate smoothing and price level trend-stationarity", *Journal of Monetary Economics*, vol 19, no 3, pp 335–48.

Hunter, S (2024): "Shedding light on uncertainty: using scenarios in forecasting and policy", speech at University of Adelaide South Australian Centre for Economics Studies, Adelaide, 13 December, www.rba.gov.au/speeches/2024/sp-ag-2024-12-13.html.

Lane, P (2024): "Monetary policy under uncertainty", keynote speech at the Bank of England Watchers' Conference 2024, London, 25 November, www.ecb.europa.eu/press/key/date/2024/html/ecb.sp241125~df4c5a69c7.en.html.

Rudebusch, G (2006): "Monetary policy inertia: fact or fiction?" *International Journal of Central Banking*, vol 2, no 4, pp 85–135.

Sack, B and V Wieland (2000): "Interest-rate smoothing and optimal monetary policy: a review of recent empirical evidence", *Journal of Economics and Business*, vol 52, nos 1–2, pp 205–228.

Seim, A (2025): "The role of alternative scenarios in monetary policy communication", keynote speech at European Central Bank Forum on Central Banking, Sintra, 2 July, www.ecb.europa.eu/press/key/date/2024/html/ecb.sp241125~df4c5a69c7.en.html.

Woodford, M (2003): "Optimal interest rate smoothing", *Review of Economic Studies*, vol 70, no 4, pp 861–86.

Appendix A – survey questions

Section 1: Central bank publications and communication with the public under uncertainty

This section focuses on how central banks communicate uncertainty to the public through their publications, press releases and press conferences. Which tools are used (eg scenarios) and how is uncertainty reflected in communicating the monetary policy stance (eg forward guidance)? What are the challenges in making complex concepts accessible to diverse audiences?

1. Does your institution regularly publish monetary policy/inflation reports prepared by staff?

   - ○ (   ) No
   - ○ (   ) Yes, on a regular basis but not with every monetary policy meeting
       - ➢ At which frequency?

         _____
   - ○ (   ) Yes, with every monetary policy meeting
   - ○ (   ) Other:

     _____

2. Does your institution publish *inflation forecasts* by staff in monetary policy/inflation reports?

   - ○ (   ) No
   - ○ (   ) Yes, but only point forecasts
   - ○ (   ) Yes, both point forecasts and confidence intervals around the point forecasts
   - ○ (   ) Other:

     _____

3. Does your institution publish *policy rate forecasts* by staff in monetary policy/inflation reports?

   - ○ (   ) No
   - ○ (   ) Yes, but only point forecasts
   - ○ (   ) Yes, both point forecasts and confidence intervals around the point forecasts
   - ○ (   ) Other:

     _____

4. Does your institution publish *inflation* forecasts by *board or monetary policy committee* members?

   - ○ (   ) No
   - ○ (   ) Yes, but only one average/consensus forecast
   - ○ (   ) Yes, forecasts of individual members or forecast intervals
   - ○ (   ) Other:

     _____

5. Does your institution publish *policy rate* forecasts by *board or monetary policy committee* members?

  - o ( ) No
  - o ( ) Yes, but only one average/consensus forecast
  - o ( ) Yes, forecasts of individual members or forecast intervals
  - o ( ) Other:
    _____

6. What visualisation tools are used by your institution to communicate uncertainty in your projections published in relevant reports? (Select all that apply)

  - o ( ) Fan charts (probability/confidence intervals)

  - o ( ) Objective probability distributions (eg based on mathematical models)

  - o ( ) Subjective probability distributions (eg based on surveys)

  - o ( ) Conditional forecasts (eg conditioning on assumptions about the trajectory of other variables)

  - o ( ) Scenario analysis

  - o ( ) Macro-at-risk models (eg inflation-at-risk, growth-at-risk)

  - o ( ) Qualitative assessments (additional or stand-alone)

  - o ( ) Other (please specify):
    _____

7. Does your institution find it challenging to communicate uncertainty to <u>market participants</u>?

  - o ( ) Very challenging

  - o ( ) Somewhat challenging

  - o ( ) Not challenging

  - o ( ) Not applicable

8. Does your institution find it challenging to communicate uncertainty to the <u>general audience</u>?

  - o ( ) Very challenging

  - o ( ) Somewhat challenging

  - o ( ) Not challenging

  - o ( ) Not applicable

9. Does your institution find visualisation tools to be effective in conveying uncertainty to non-technical audiences?

  - o ( ) Very effective

  - o ( ) Somewhat effective

- o ( ) Not effective
- o ( ) Not used

10. If your institution publishes scenarios, are qualitative scenarios used alongside quantitative ones in its communication strategy to convey uncertainty?

- o ( ) It does not publish scenarios
- o ( ) It publishes only quantitative scenarios
- o ( ) It publishes only qualitative scenarios
- o ( ) It publishes both qualitative and quantitative scenarios
- o ( ) Other (please elaborate):

_____

_____
_____
_____
_____

11. Has your institution made changes to the presentation of projections and scenarios during periods of heightened uncertainty? (Select all that apply)
- o ( ) Broadened the size of fan chart bands
- o ( ) Published alternative scenarios
- o ( ) Other (please specify)

_____

_____
_____
_____

12. Does uncertainty get lost in translation? For example, do economic agents or market participants focus only on point forecasts instead of understanding the broader context of uncertainty or the distribution of potential outcomes?

- o ( ) Yes
- o ( ) No
- o ( ) Sometimes (please elaborate):

_____

_____
_____
_____
_____

13. In press conferences, speeches or minutes published after the monetary policy decision, does your institution communicate the level and nature of uncertainty and how it affected the decision?

- o ( ) Yes

- o ( ) No

- o ( ) Sometimes (please elaborate):

  _____

  _____
  _____
  _____
  _____

14. At times of heightened uncertainty, how often has your central bank communicated with the public? (Select one)

    - o ( ) More often than usual
    - o ( ) Less often than usual
    - o ( ) About the same as usual
    - o ( ) It depends on the nature of the uncertainty (please elaborate):

      _____
      _____
      _____
      _____
      _____

15. Which type of data/information from markets, firms or other economic agents does your institution consider when it announces changes in its perception of uncertainty? (Select all that apply)

    - o ( ) Economic news/statements related to central bank communication
    - o ( ) Direct/real-time observation of market reactions within a time window around a central bank publication or announcement
    - o ( ) Market participants' information collected from institutional communication channels
    - o ( ) Other (please describe):

      _____

Section 2: Uncertainty and monetary policy reaction function

This section explores how uncertainty influences monetary policy decisions, including the calibration of the policy rate and the trade-offs between gradual and forceful adjustments.

16. Does your monetary policy reaction function explicitly account for uncertainty in the transmission of monetary policy?

    - o ( ) Yes

    - o ( ) No

    - o ( ) Not explicitly, but indirectly

    (optional) In particular, how do you calibrate monetary policy in the face of uncertainty about the strength and lags of monetary policy

transmission? How does your institution reconcile the tension between monetary policy agility and the lagged effects of monetary policy on the economy?

_____
_____
_____
_____

17. Central banks tend to adjust the policy rate in small steps. Rank the most important reasons for this behaviour in the following order (1 = most important, 5 = least important, there can be more than one reason with the same ranking position):

   o   (   ) Financial stability

   o   (   ) Guaranteeing predictability for economic agents

   o   (   ) Uncertainty about the transmission of monetary policy

   o   (   ) Uncertainty about future events

   o   (   ) Main variables in the monetary policy reaction function are slow-moving

   o   (   ) Other
       _____

(optional) In particular, how does this behaviour change during periods of heightened uncertainty?

_____
_____
_____
_____

18. Does your institution change its monetary policy strategy to make it more robust when under heightened uncertainty? If so, could you describe instances where your decisions were influenced by this strategy?

   o   (   ) Yes (please elaborate):
       _____

       _____
       _____

   o   (   ) No

19. What are the limitations of using high-frequency data (eg credit/debit card transactions, port activity, real-time employment data) in monetary policy decision-making, and how do you address these challenges?

Section 3: Forward guidance under uncertainty

This section examines how central banks adapt their use of non-interest rate policy tools, such as forward guidance, in the face of heightened uncertainty. It

also evaluates the effectiveness of these tools under different conditions.

20. How does heightened uncertainty affect the use of forward guidance in your central bank?

    o ( ) We avoid providing forward guidance in such periods
    o ( ) We use ranges rather than point guidance
    o ( ) We shorten the horizon of the guidance
    o ( ) We do not change our forward guidance strategy
    o ( ) Other (please specify):

    _____
    _____
    _____

21. How effective is forward guidance in an environment of <u>high</u> uncertainty? (Rate on a scale of 1–5, where 1 = not effective and 5 = very effective)

22. How effective is forward guidance in an environment of <u>intermediate</u> uncertainty? (Rate on a scale of 1–5, where 1 = not effective and 5 = very effective)

23. How effective is forward guidance in an environment of <u>low</u> uncertainty? (Rate on a scale of 1–5, where 1 = not effective and 5 = very effective)

Section 4: Capturing and quantifying uncertainty in economic analysis by central banks

This section examines the tools, techniques and frameworks central banks use to measure and incorporate uncertainty in their economic analysis. It also considers how uncertainty is presented in internal discussions.

24. Do you find that the central scenario becomes less relevant during periods of extreme uncertainty, leading to greater reliance on alternative scenarios?

    o ( ) Yes

    o ( ) No

    o ( ) Sometimes (please elaborate):

    _____
    _____

25. Rank the following types of uncertainty from most frequently discussed (1) to least frequently discussed (4) recently on average in your board meetings. (List only those that apply.)

    o ( ) Statistical uncertainty (eg measurement errors, data revisions)

    o ( ) Known unknowns (eg risks from geopolitical events, policy changes)

- o (   ) Unknown unknowns (eg unforeseen shocks like the pandemic)
- o (   ) Other (please specify): _____

26. On a scale from 1 to 5, how important is each of the following criteria or indicators for your institution in identifying periods of heightened uncertainty? (1 = not important, 5 = very important)

- o (   ) Financial market volatility (including exchange rate)
- o (   ) Forecast errors
- o (   ) Confidence indices
- o (   ) Qualitative judgment by staff or an internal committee
- o (   ) Other (please specify): _____

27. Does your institution use any of the following tools <u>to quantify uncertainty</u>? (Select all that apply.)

- o (   ) Confidence intervals
- o (   ) Fan charts
- o (   ) Objective probability distributions (eg based on mathematical models)
- o (   ) Subjective probability distributions (eg based on surveys)
- o (   ) Conditional forecasts (eg conditioning on assumptions about the trajectory of other variables)
- o (   ) Macro-at-risk models (eg inflation-at-risk, growth-at-risk)
- o (   ) Scenario analysis
- o (   ) Qualitative assessments
- o (   ) Other (please specify): _____

28. How does your institution account for atypical or asymmetric risks that may not be captured by historical data?

29. How does your institution address the challenge of distinguishing between structural and cyclical sources of uncertainty? How does your institution determine whether shocks are supply-driven, demand-driven, or a combination of both? What tools or frameworks do you find particularly useful in such contexts?

Section 5: Incorporating uncertainty into models and tools

This section focuses on how central banks integrate uncertainty into their economic models and analytical tools, including the use of high-frequency data and advanced techniques like scenario analysis.

30. Choose the most relevant sources of uncertainty in modelling choices for the monetary policy transmission mechanism (select all that apply):

- o ( ) Wage-price relationship
- o ( ) Output gap to prices
- o ( ) FX pass-through
- o ( ) Monetary policy power
- o ( ) Other (please specify):
  _____

31. Does your institution provide probability distributions around mean or mode predictions in economic forecasts made to the board?

- o ( ) Yes
- o ( ) No
- o ( ) Sometimes (please elaborate):
  _____
  _____
  _____
  _____

32. If you use fan charts, please describe how you compute their bands. Are they:

- o ( ) Objective (eg based on past forecast errors or estimated model standard errors)?
- o ( ) Subjective (eg based on a survey among senior staff)?
- o ( ) A combination of both? (please explain):
  _____

33. How frequently does your institution use scenario analysis to evaluate alternative economic scenarios or trajectories?

- o ( ) Regularly (eg every projection round)
- o ( ) Occasionally (eg during times of heightened uncertainty)
- o ( ) Rarely
- o ( ) Never

34. Do you adjust measures of underlying inflation to account for exceptional shocks that increase uncertainty (eg supply bottlenecks, energy price surges due to geopolitical conflicts)?

- o ( ) Yes
- o ( ) No
- o ( ) Sometimes (please elaborate):
  _____

35. Does your institution use artificial intelligence (AI) or neural network models to analyse high-frequency data for detecting turning points in the economy?

- o ( ) Yes
- o ( ) No
- o ( ) Currently exploring (please elaborate):

  _____

  _____

  _____

  _____

  _____

36. Does your institution evaluate the uncertainty over assumptions and the uncertainty over modelling?

- o ( ) Only uncertainty over assumptions
- o ( ) Only uncertainty over modelling
- o ( ) Both uncertainties
- o ( ) None of them

37. How do you incorporate judgment-based adjustments to complement model-based outputs in times of elevated uncertainty?

Section 6: The role of scenario analysis (staff analysis)

This section investigates the role of scenario analysis for internal purposes, including the development and prioritisation of scenarios. It seeks to understand how central banks use scenarios to explore potential economic outcomes.

38. If your institution uses scenario analysis, what type of scenarios are you currently looking at (please mark all that apply)?

- o ( ) geopolitical risk shock
- o ( ) trade/tariff shock
- o ( ) capital flow shock
- o ( ) FX rate shock
- o ( ) oil price shock
- o ( ) other commodity price shock
- o ( ) consumer demand shock
- o ( ) labour supply shock (eg migration, pandemic)
- o ( ) fiscal shock
- o ( ) inflation shock

- o   (   ) monetary policy transmission shock
- o   (   ) financial sector shock
- o   (   ) Other (please specify):
  _____

39. How do you prioritise between the scenarios you analyse?
- o   (   ) likelihood of a given shock
- o   (   ) potential severity of a shock
- o   (   ) potential macroeconomic impact
- o   (   ) by request of the board
- o   (   ) scenarios viewed as important by market participants
- o   (   ) scenarios viewed as important by the media
- o   (   ) Other (please specify):
  _____

40. Rank the most important sources of current uncertainty for constructing different scenarios in the following order (1 = most important, 5 = not important, there can be more than one source with the same ranking position):
- o   (   ) Exchange rates (FX)
- o   (   ) Oil prices
- o   (   ) Commodities other than oil
- o   (   ) Trade and tariffs
- o   (   ) Migration and remittances
- o   (   ) Geopolitical events
- o   (   ) Neutral rate
- o   (   ) Inflation
- o   (   ) Output gap
- o   (   ) Other (please specify):
  _____

41. If your institution uses scenario analysis, do you incorporate market-based conditioning assumptions (eg option-implied densities for commodity prices) in constructing your scenarios?
- o   (   ) Yes
- o   (   ) No