

Old and New Challenges for Monetary Policy

Summary of the 2023 BOJ-IMES Conference

by Ken Chikada, Satoshi Kobayashi, Takeshi Shinohara,
and Nao Sudo

I. Introduction

The Institute for Monetary and Economic Studies (IMES) of the Bank of Japan (BOJ) held the 2023 BOJ-IMES Conference, entitled “Old and New Challenges for Monetary Policy,” on May 31–June 1, 2023.¹ This was the 28th conference since its start in 1983, and was the first in-person conference since the pandemic. The participants discussed old challenges that central bankers have been facing and how to use the lessons learned from them in light of the current environment and new challenges.

The conference began with the opening remarks delivered by Kazuo Ueda, Governor of the BOJ. The Mayekawa Lecture, presented by Maurice Obstfeld (University of California, Berkeley) on the distinction between the natural rate \bar{r} and the neutral rate r^* , followed. The keynote speech on the forward guidance trap facing central banks was given by Athanasios Orphanides (Massachusetts Institute of Technology), honorary adviser to the IMES. The paper presentation sessions discussed four papers on the formation of inflation expectations, text analysis using transcripts of policy meetings and price changes and their synchronization, presented by Michael Weber (The University of Chicago), Raphael Schoenle (Brandeis University), Michael McMahon (University of Oxford), and Nao Sudo (BOJ), respectively. The first policy panel discussion, moderated by Athanasios Orphanides, comprised five panelists: David Altig (Federal Reserve Bank of Atlanta), Andrew Bailey (Bank of England), Olli Rehn (Bank of Finland), Frank Smets (European Central Bank: ECB), and Kazuo Ueda. The second

Ken Chikada: Director-General, Institute for Monetary and Economic Studies, Bank of Japan
(E-mail: ken.chikada@boj.or.jp)

Satoshi Kobayashi: Director, Institute for Monetary and Economic Studies, Bank of Japan
(E-mail: satoshi.kobayashi@boj.or.jp)

Takeshi Shinohara: Associate Director, Institute for Monetary and Economic Studies, Bank of Japan
(E-mail: takeshi.shinohara@boj.or.jp)

Nao Sudo: Associate Director-General, Institute for Monetary and Economic Studies, Bank of Japan
(E-mail: nao.sudou@boj.or.jp)

.....
The conference organizers wish to express their sincere gratitude to the two IMES honorary advisers, Markus Brunnermeier and Athanasios Orphanides, and all other conference participants for the thought-provoking presentations and discussions. The views expressed throughout this summary are those of the attendants and do not necessarily reflect those of their respective institutions. All remaining errors are the authors' responsibility.

1. See Appendix 1 for the program. See Appendix 2 for a list of participants; their affiliations are as of May 31–June 1, 2023.

policy panel discussion, moderated by Markus Brunnermeier (Princeton University), honorary adviser to the IMES, comprised five panelists: Aino Bunge (Sveriges Riksbank), Adam Glapiński (Narodowy Bank Polski), Pierre-Olivier Gourinchas (International Monetary Fund: IMF), Pablo Hernández de Cos (Banco de España), and Ryozo Himino (BOJ).

II. Opening Remarks

Ueda recalled that the theme of the last in-person conference, in 2019, was “Central Bank Design under a Continued Low Inflation and Interest Rate Environment,” and pointed out that the economic environment had changed dramatically in the last four years, and inflation in many countries had reached levels not seen in decades. He then reviewed the discussion about the Great Inflation in the 1970s, giving an overview of the new challenges and new opportunities for monetary policy.²

First, **Ueda** pointed out the importance of identifying the causes of inflation as one of the lessons learned from the Great Inflation. He stressed that whether inflation was caused by demand or supply had significant implications for monetary policy making. He also pointed out as another lesson the importance of stabilizing inflation expectations. He mentioned that many countries had developed monetary policy frameworks with a view to stabilizing inflation expectations since the 1980s, though he admitted that there was still much room for further research and many issues that needed to be better understood regarding inflation expectations.

Next, he pointed to the changing inflation and economic environment as a new challenge for monetary policy and said that it was not clear now whether this environment would return to the period of “low for long” interest rates that preceded the outbreak of the pandemic or become the “new normal.” He said that changes in central banks themselves are also new challenges. He argued that in the period of “low for long,” many central banks faced the effective lower bound of policy rates, which was a traditional policy tool, and had created various unconventional monetary policy toolkits. He added that there were, however, issues with unconventional instruments, such as data constraints and limited experience in measuring the effectiveness of these instruments, and further theory building and testing would be required.

Lastly, he noted that one of the new opportunities was that both academics and policymakers had been able to exploit new types of data in their analyses, including highly granular data, high-frequency data, people flow data, and text data, with the help of improvements in computing power. He added that, as an example, the use of these new types of data played a particularly large role in understanding actual economic conditions at the outbreak of the pandemic.

Ueda stressed that there were now “new challenges” and the key was how to use the lessons learned from the past “old challenges” and exploit the “new opportunities.” He concluded his remarks by saying he hoped that the discussions at the conference would deepen the understanding of the current state surrounding central banks and help counter the new challenges.

2. For details, see Ueda (2023).

III. The Mayekawa Lecture: Perspectives on \bar{r} and r^*

Obstfeld began his lecture by recalling the economic and financial developments in 2008, when the first Mayekawa Lecture was given at the BOJ-IMES conference, and pointed out there were some similarities with recent events, such as increasing commodity prices. He then discussed the importance of distinguishing the natural and neutral rates of interest, i.e., \bar{r} and r^* .³ Here, he stated that the natural rate of interest \bar{r} was the real rate of interest prevailing over a long-run equilibrium where price rigidities were absent, and the neutral rate of interest r^* was the real interest rate which was consistent with the neutral monetary policy that eliminated inflationary or deflationary pressures. He argued that the two rates were not necessarily the same in reality because there were several factors that could drive a wedge between the two rates, such as the financial conditions, the credibility of central banks and global factors. After pointing out that most of the debates about the natural rate of interest considered a closed economy, he emphasized the importance of the impact of global factors on real interest rates and explained that the different global factors, such as demographic changes, global liquidity glut, and increasing demand for safe assets, moved real interest rates differently over time.

As for the post-COVID situation, **Obstfeld** predicted that real interest rates would not return to a sustained and substantially higher rate, at least for advanced economies, due in particular to demographic factors, such as declining total population growth and increasing longevity, and other factors. He concluded his lecture by drawing policy implications from his discussions. He argued that the problem of the effective lower bound would remain, which in turn implied that current discussions, such as on eliminating cash or moving to higher inflation targets, needed to continue. He also added that low rates would be desirable for fiscal sustainability but they would not be desirable if caused by low growth, and that low rates could accentuate threats of financial instability, as suggested by the recent U.S. banking troubles.

From the floor, **Chang Yong Rhee** (Bank of Korea) shared the experience of measuring the neutral rate of interest at the Bank of Korea using various approaches including time-series models and semi-structural models, and asked if there is any method to gain more stable and reliable results while incorporating global factors. He also asked what policy options were left for advanced economies, especially Japan, if there was a return to the low for longer environment. **Obstfeld** replied that it was desirable to look at various measures of the neutral rate estimated by different approaches, but with caution regarding measurement errors, and emphasized that there would be no better method than to examine an extensive set of variables in order to find economic responses to policy changes, which was equivalent in some sense to finding the neutral rate of interest. On the question of policy options in advanced countries, he pointed out the importance of structural policies, addressing also the presence of political obstacles. **Brunnermeier** pointed out there were shocks, such as flight-to-safety shocks, that could potentially move both \bar{r} and r^* . **Orphanides** asked what central bankers and other policymakers should do if it were the case that the real interest rate rose and debt burdens became higher. **Obstfeld** replied that a sudden capital inflow caused by

3. For details, see Obstfeld (2023).

flight-to-quality events, for instance, was included in the focus of his talk and pointed out that it could be either expansionary or contractionary, depending on movements in exchange rates. Regarding a potential rise in the interest rate and the implications for financial stability, he noted it was necessary to identify threats correctly as well as to choose the appropriate ex ante and ex post policy tools. **Gourinchas** commented that the Greenspan's conundrum⁴ in the middle of 2000s could be interpreted as an external financial shock of the kind mentioned in the lecture. **Bailey** pointed out that \bar{r} was a structural and long-term measure, while r^* could be interpreted as a cyclical measure subject to short-term shocks. **Obstfeld** agreed with both comments.

Kazumasa Iwata (Japan Center for Economic Research) commented that developments in global imbalances in the early 2000s did not seem to match with what developments in real interest rates in each country would suggest. **Smets** asked about the international role of the U.S. dollar and the Federal Reserve (Fed) and the influence of the heightened geopolitical tensions. **Tsutomu Watanabe** (The University of Tokyo) asked about the impact of the recent pandemic on economies, pointing out that there were typically rises in real wages after pandemics in past episodes, such as the Black Death or Spanish Flu. **Obstfeld** replied that the relationship between the imbalances and differentials in interest rates needed to be studied carefully, taking into consideration, for example, the type of shocks involved. He also noted that the central role of the U.S. dollar and the Fed's policy was critically important to all central bank decisions, besides the Fed, and predicted that these would remain significant in the future due to the network externalities and that geopolitical risks would be negative for investment and positive for saving. He also commented that the impact of the recent pandemic on labor force and wages could be short-lived, relative to past episodes.

IV. Keynote Speech: The Forward Guidance Trap

Orphanides began by pointing out that policy actions were most effective when the public understood how the central bank would respond to changes in the economic outlook and argued that during the current expected surge in inflation, the Fed and the ECB ended up falling behind the curve as their communication strategy regarding forward guidance policies did not work well, calling the current situation a "forward guidance trap."⁵ He stressed that clarification of a central bank's reaction function would mitigate the potential of falling into this forward guidance trap and could improve policy outcomes.

In the case of the Fed, he pointed out the two factors that had contributed to this forward guidance issue: the decision to move from forecast-based to outcomes-based forward guidance, and an implicit commitment to a gradual reduction of asset purchases and to raising policy rates only after asset purchases ended. In the case of the ECB, he argued that the calendar-based forward guidance on balance sheet policy (asset purchase programs: APP) and commitment to not raising policy rates before asset purchase programs end resulted in a delay in reacting to the surge in inflation.

4. While the Federal Reserve had increased the federal funds rate, the long-term interest rate remained essentially unchanged and at a low level in the mid-2000s. Then-Fed Chair Alan Greenspan called it a "conundrum."

5. For details, see Orphanides (2023).

Orphanides asserted that forward guidance has been an effective tool when the economic situation remained in line with the baseline outlook released by central banks, but it created traps that prevented a rapid policy response in the event of an unexpected increase in inflation. Finally, he stressed that in order to avoid the forward guidance trap, central banks should communicate with the central bank's reaction function and that a simple forecast-based policy rule could serve as a benchmark for communicating the systematic and contingent nature of policy to the public, which indeed was the best form of forward guidance.

Peter Kažimír (Národná banka Slovenska) pointed out that the ECB had abandoned forward guidance and switched to the reaction function for communication. From the floor, **Rhee** asked whether it was essential for central banks to release the reaction function when adopting a forecast-based forward guidance policy. **Ueda** commented that theoretically forward guidance policy came with a risk of falling behind the curve, deviating from a simple policy rule such as the Taylor rule. **Orphanides**, after agreeing that the ECB had moved in a desirable direction to some extent, replied that though the central banks were unwilling to disclose the reaction function, the best way of implementing forward guidance was to be clear about the reaction function, which enabled central banks to explain how future policy would evolve as economic shocks hit the economy. He also stated that communication with a simple reaction function did not force central banks to follow the policy reaction function rigorously, and it rather helped them by serving as a benchmark for policy decisions.

Bailey commented that forward guidance could be divided into “Delphic Guidance,” just a statement of words, and “Odyssean Guidance,” in which your hands were strictly tied, and that the latter could become undesirable in practice. He further commented that the forward guidance policy rule was interesting, and **Bailey** noted the difference between “Delphic” and “Odyssean” forward guidance and the difficulties in implementing “Odyssean” commitment policies in practice. He framed the question in terms of possible benefits of a forecast-based policy rule to impose more structure on forward guidance than conditionality. **Orphanides** replied that the ECB was constrained by the forward guidance, and providing only forward guidance about the nominal interest rate without the policy reaction function became a problem. **Rehn**, after commenting that the sequencing problem between interest rate policy and balance sheet policy did constrain the room for manoeuvre in terms of policymaking, noted that there were large uncertainties in the European economy in early 2022, and it was very difficult to know whether the economy was heading towards recession or even deep depression and whether more rapid action should be taken in terms of raising interest rates. **Tao Zhang** (Bank for International Settlements) asked how central banks with forecast-based forward guidance policy could maintain their credibility if their forecasts were repeatedly incorrect. **Orphanides** stated that one way to avoid the sequence problem was for central banks to communicate that they needed to raise interest rates in light of the deterioration in the inflation outlook before the end of the asset purchase program. He mentioned that, though forecasting was particularly useful when made for the short-term – less than a year, it did involve errors, and central banks could benefit from explaining more clearly about forecast errors to the public and to financial market participants.

Iwata pointed out that quantitative easing policy should be utilized only as a financial stability instrument because balance sheet adjustment took so much time to respond to inflation surges and could result in fiscal and financial dominance. **Takatoshi Ito** (Columbia University and National Graduate Institute for Policy Studies) stated that the Fed sometimes recognized their own forecast errors, as mentioned by Chair Jerome Powell, and stated that forecast-based forward guidance could not solve everything, and the importance depended on when errors occurred. **Orphanides** argued that while balance sheet policy was a powerful tool for financial stability, it was also a useful tool for monetary policy, reducing the term premium when a central bank faced the effective lower bound. He agreed that forecast-based policy could not solve everything but emphasized that, according to existing studies, the performance of the economy was worse if the policy was not forward-looking but based on outcomes.

V. Presentation Sessions

A. The Expected, Perceived, and Realized Inflation of U.S. Households before and during the COVID19 Pandemic

Weber reported his analysis of inflation expectations of U.S. households before and during the COVID-19 pandemic.⁶ In this study, he constructed the series of the expected, perceived, and realized inflation for each household and analyzed differences in the series by households' attributes and the relationship between each of the inflation rates, using highly granular data on households.

First, he reviewed recent related studies, discussing, for example, that households paid particular attention to specific items, such as eggs and milk, and their inflation expectations were strongly correlated with the perceived inflation rates of these items, or how much their involvement in shopping influenced the difference in inflation expectations between men and women, and stressed that the current analysis was novel in constructing households' realized inflation and comparing it with two other inflation series of the same household.

The main findings of his analysis are as follows: first, while the dispersion of realized inflation was small between households across race, income level, and education level before the pandemic, the realized inflation tended to be higher among lower-income, less-educated, and black households during the COVID-19 pandemic. Second, two-thirds of this dispersion is attributed to differences in households' consumption bundles and the rest is attributed to differences in the actual prices. Third, inflation expectation and realized inflation are positively and modestly correlated. Fourth, the correlation between the inflation expectation and the perceived inflation is strongly positive, likely because price increases in specific goods to which households pay attention may have a significant impact on the overall inflation expectation. Fifth, both before and during the pandemic, households with a higher inflation expectation tended to have a higher unemployment expectation, and households whose inflation expectation was greater than others tended to raise their unemployment expectation, which is consistent with the literature indicating that households have a supply-side view (i.e.,

6. For details, see Weber, Gorodnichenko, and Coibion (2023).

their inflation expectations tend to be negatively correlated with their expectations of economic activity).

As discussant, **Meredith Beechey Österholm** (Reserve Bank of Australia) expressed appreciation for Weber's valuable analysis with its very granular data, including large amounts of heterogeneity across households. She then noted the following points. First, in order to deepen our understanding of how inflation expectations are formed, it may be useful when regressing inflation expectations on realized inflation and perceived inflation to try other specifications that control factors to which household pay particular attention, such as local fuel prices, or that control the share of households which have rational expectations. Second, a cause of households' tendency to simultaneously expect higher inflation and higher unemployment may not be the supply-side view, but rather heuristics, and households may simply be lumping together all the factors that reduce their real income. Third, given the divergence of inflation expectations by households' characteristics, central banks should communicate carefully with the public regarding economic and inflation developments, depending on the type of audience. Finally, surveys are important for gaining a greater understanding of inflation expectations, and there is a need for surveys of firms, as well as households. **Weber** stated that Beechey's points were illuminating and responded that her interpretation of the correlation between inflation expectations and unemployment rate expectations and the suggestion for central bank communication could be consistent with the results of his other studies.

Altig noted the importance of understanding statistical data, referring to survey results that showed no difference in inflation expectations between men and women when the sample group was limited to those who understood what the consumer price index was. **Schoenle** pointed out that the relationship between shopping and inflation expectations could be seen by looking at how the decrease in frequency of purchases and increase in online consumption affected inflation expectations during the pandemic. **Weber** responded that he was aware of the results of the survey which Altig mentioned, and he also explained about the consumer price to the respondents. He also pointed out the pandemic could reduce the gender differences. **Etsuro Shioji** (Hitotsubashi University) asked if households responded to news about changes in the prices of goods they normally purchase and if the respondent's age affected the results. **Rehn** argued that when central banks worked with people's expectations, it was important to do layered communication, using appropriate expressions for each target audience, following the example of the Bank of England and the Riksbank. He also asked how labor unions and other institutions affected inflation expectations. **Bunge** gave the example of Sweden, where changes in firms' inflation expectations had a significant impact on their pricing decisions and stressed that it was interesting to analyze firms' behavior in detail, as Beechey pointed out. **Weber** agreed on the significance of conducting a detailed study of firms' inflation expectations and the impact of differences in labor unions and other institutions on inflation expectations. Regarding the impact of news on inflation expectations, **Weber** referred to an existing study which found that news of major monetary policy changes had no impact on households' inflation expectations, and another study which found that older workers had somewhat higher inflation expectations.

B. Greater Than the Sum of Its Parts: Aggregate vs. Aggregated Inflation Expectations

Schoenle constructed a new measure of consumers' aggregated inflation expectations by combining category-specific expectations and comparing them with conventional aggregate inflation expectations for which the aggregate value itself is surveyed.⁷ The category-specific expectations are collected as part of the Federal Reserve Bank of Cleveland's daily survey of consumers and cover the full range of items included in the personal consumption expenditures (PCE) price index. The sample period runs from July 2020 to August 2022, consisting of both the low-inflation period during the early part of the COVID-19 pandemic and the period of subsequent inflation surge. He used two types of approaches in aggregating category-level inflation expectations, rational aggregations and behavioral aggregations. The former includes the aggregation that uses expenditure weights of respondents, relative importance of categories for respondents, or official PCE weights, and the latter includes the aggregation that uses equal weight across categories, which imposes nonzero weights only on categories with salient price changes, or nonzero weights only on food and gas.

He then explained two notable characteristics of the new measure. First, there are differences between the aggregated inflation expectations and the conventional aggregate inflation expectations. Compared with the aggregated inflation expectations, the conventional aggregate inflation expectations tend to have a higher mean, as indicated in the title, and have a larger variance. The gap is related to the socio-economic characteristics of the respondents. For example, the difference between the conventional aggregate inflation expectation and the aggregated inflation expectations is negatively correlated with the age and education level of the respondents. Second, regressions of respondents' future spending plans on each of the aggregated inflation expectation and the conventional aggregate inflation expectation show that the former explains the spending plans better than the latter. As monetary and fiscal policies are generally considered to affect the macroeconomy through the intertemporal substitution of consumption, these results imply that the aggregated inflation expectations contain added useful information when considering policy transmission.

As discussant, **Hajime Tomura** (Waseda University) described the paper as path-breaking in showing there were interesting gaps between conventional aggregate inflation expectations and aggregated inflation expectations and provided some possible explanations for these gaps. Regarding the observation that the aggregate inflation expectations have a higher mean than the aggregated ones, he argued that it might be because, for the aggregated expectations, respondents considered a price decline along product cycles of specific goods they had purchased, while, for the aggregate expectations, they considered the entry of new products with higher prices from a more macroeconomic perspective. Regarding the observation that the age of respondents reduces the difference, he argued that this might be because older people have greater financial assets and are more aware of the macroeconomic price environment. **Schoenle** replied that there were several potential explanations for the gaps, but additional empirical analysis was needed to pin down which of the explanations indeed held. One of the co-authors,

7. For details, see Dietrich *et al.* (2023).

Kristian Myrseth (University of York), emphasized that the key implication obtained from the current research was that it was useful to ask the respondents concrete and tangible questions to obtain information about inflation expectations that was relevant to an understanding of the mechanisms of consumers' spending plans. **Kažimír**, the chairperson, suggested aggregating category-specific expectations-based inflation indices other than PCE. **Schoenle** replied that aggregations based on the consumer price index were carried out as a robustness check and yielded no changes in implications.

From the floor, **Brunnermeier** pointed out that how the category-level inflation expectations should be aggregated depends theoretically on a functional form of preference such as constant elasticity of substitution (CES) preference and the aggregation methodologies adopted in this study might not be in line with such an approach. **Schoenle** argued that the linear aggregation adopted in this study was often used as the first order approximation when aggregating subcategories, and exploring other aggregation methodologies such as the second order approximation or those with alternative considerations on elasticity of substitutions would also be useful. **Orphanides** asked for advice for central banks on more effective communication to improve public understanding of past inflation and inflation expectation formation. **Schoenle** replied that communication would not be easy as it could distort the degree of people's attention paid optimally under rational inattention. He also pointed out though further research was needed, it might be worth experimenting with communications that focus on specific products that have caught people's attention. **Shioji** commented that the social security benefit system could play a role in forming the information gap across ages. He asked whether elderly people could have more information on inflation than others because their pensions were adjusted for increases in the cost of living due to inflation. The other co-author, **Weber**, replied that though pensioners were informed of the adjustments, they were not better informed about inflation nor better able to forecast inflation relative to younger people, based on the results of his previous study. **Hibiki Ichiue** (Keio University) commented that there were some interesting patterns in the inflation expectation distribution of respondents' answers, such as the frequent appearance of round numbers such as 0, 5, or 10 percent in the survey data on Japanese households, and asked if such a pattern was observed in this study. **Schoenle** replied that he did not recall observing any specific patterns, and agreed with the importance of examining distribution of answers in detail, since this might provide hints on building the theoretical framework behind respondents' behavior.

C. Policymakers' Uncertainty

McMahon presented an analysis of the effects of policymakers' uncertainty on their monetary policy decisions. The study uses a combination of quantitative and textual analysis of the Federal Open Market Committee (FOMC).⁸ He first constructed two measures from the transcripts of 227 FOMC meetings from 1987 to 2015 using text analysis: The first one was a set of indices to quantify policymakers' perceived uncertainty (PMU), including that of real economic conditions, inflation, financial markets, and economic models, using a word embedding approach. The second one was an "HD

8. For details, see Cieslak *et al.* (2023).

index,” which captures the policy stance based on the difference between the frequency of “hawkish” and “dovish” words. According to this analysis, it was shown that the policy rate tended to be raised when hawkish words were dominant and the HD index was high. Next, he studied the relationship between the PMU and HD indexes in time-series dimensions and reported that a higher PMU index for inflation predicted a more hawkish policy stance, even after controlling for the PMU index for real economic conditions and financial markets, the Greenbook or the Tealbook⁹ economic projections, and other public uncertainty measures. He argued that these results were consistent with the view that policymakers were concerned about losing credibility over inflation by allowing the tail risk of de-anchoring of inflation expectations to occur, and they therefore maintained a hawkish stance when implementing monetary policy. He also argued that, once standardized, the change in the policy rate following an increase in inflation PMU was 34 basis points.

As discussant, **Mototsugu Shintani** (The University of Tokyo) commended the paper for providing new findings on the decision-making process of the FOMC using the simple and transparent toolkit of a word embedding approach, and made three comments. First, after pointing out that the PMU for economic models was small, he asked about the implications of the paper’s results for the Brainard conservatism principle, which argues that policymakers should be more cautious when implementing policy in the face of parameter uncertainty.¹⁰ He added that the degree of model uncertainty facing policymakers might have increased after the introduction of unconventional monetary policy instruments, and this uncertainty could be measured by focusing on new words that started to appear after the introduction of these unconventional instruments. Second, he mentioned that in the text analysis there were both simple and transparent approaches, such as counting the number of words, and sophisticated approaches with sometimes low interpretability, such as large language models (LLMs), and asked about their respective pros and cons. Finally, he pointed out that the paper claimed that the inflation PMU captured the third moment of inflation uncertainty which corresponded to a tail risk of de-anchoring of inflation expectations, rather than the second moment that was typically discussed in existing studies, and asked what was the appropriate methodology to extract information about the distribution including the third moment from the text data. On the first point, **McMahon** replied that in his analytical framework, the economic model PMU could be small when uncertainty words did not appear in the discussion of models, even if they were discussed, and that exploring ways to measure this type of uncertainty was important for the purposes of communication. On the second point, he agreed with Shintani, saying that there were issues such as the opaque nature of training data when using LLMs in economic research. On the final point, he replied that whether text analysis could extract information regarding the distribution depended on the text used in the analysis, referring to his past study using the Bank of England’s Inflation Reports (now called Monetary Policy Reports), which

9. The Greenbook, compiled by staff at the Fed, provided an analysis and outlook for the U.S. and international economy, and it was distributed to FOMC meeting participants before the meeting. The Greenbook was produced from 1964 to 2010. The Greenbook and the Bluebook, which provided the background and context for monetary policy alternatives, were merged in 2010, becoming the Tealbook.

10. For details, see Brainard (1967).

contained detailed quantitative information on the distribution of inflation expectations.

From the floor, **Orphanides** pointed out that the current study was closer to the argument of Söderström (2002), which stressed the need for central banks to take a more tightening response when there was uncertainty about inflation persistence, than to the Brainard conservatism principle. He then asked whether the current analytical framework could distinguish a risk of de-anchoring inflation expectations from uncertainty over the next quarter's inflation rates. **McMahon** agreed that Söderström (2002) was interesting and relevant to his own work, but, importantly, the Söderström (2002) prediction is for more aggression (larger and faster rises and declines in rates) rather than more hawkishness, as their own study found. He replied that the scope of uncertainty addressed in the transcript was more likely to be medium-term rather than short-term, such as that of the following quarter. In the context of perceived uncertainty about economic models, **Bailey** noted that FOMC deliberations generally do not take a form starting from economic models, e.g., the Phillips curve is rarely referred to in transcripts. He then suggested splitting the samples and studying how the transcripts have changed over time depending on who was the chair or on whether the transcripts were assumed to be disclosed. **McMahon** replied that the transcripts in the 1970s were largely different from those nowadays, while there had been no large changes in the transcripts of the 1990s after the introduction of increased transparency. **Altig** asked about the relationship between PMUs and the description of risks in the statements published immediately following the FOMC meetings. **McMahon**, referring to another one of his papers with Anna Cieslak, replied that the PMU was not necessarily reflected in balance-of-risk statements but could be reflected in other communication channels, including speeches.

Smets pointed out that policymakers had concerns about deflation during low inflation periods and suggested conducting subsample analysis depending on the level of the inflation rate. **McMahon** answered that no dependency on the level of inflation was observed and pointed out that there were words that showed concerns about high inflation even when the sample period of the analysis covered mostly a period of low and stable inflation. **Iwata** asked for background as to why sentiments about inflation and the economy had a large effect on the HD index. **McMahon** replied that it should reflect the fact that discussions in the transcripts on inflation and economic conditions were the basis of monetary policy decisions. **Beechey** pointed out that the last part of the sample period coincided with the period of policy responses after the global financial crisis, and therefore asset purchases and balance sheets might be related more to tail risks about economic activity rather than inflation rates, and that the relationship with inflation rates may become apparent only when the new data became available. She also pointed out that the current analysis discussed policy reactions for maintaining credibility, and now was the time central banks needed to communicate that ensuring credibility was of the first order of importance and therefore there were rate hikes. **McMahon** replied that there was an important difference between economic crisis and inflation risks in regard to the time horizon over which they developed, since the former were apparent to everybody while the latter developed only gradually, without drastic change. Regarding communication, he emphasized the need to deploy different strategies for financial market participants and for the general public. He argued that for

market participants, who understood risks, distribution, and the possibility that there might be mistakes, central banks need only to convince them regarding their actions, but for the general public, central banks had to not only explain but to engage their interest in following developments in the macroeconomy and policy.

D. Seasonal Cycles and Synchronization of Price Changes in Japan

Sudo presented the results of his empirical and theoretical analysis of the seasonal cycles of price changes and their synchronization across goods.¹¹ The empirical analysis examined not only the seasonal cycles of inflation rates in Japan but also the frequency and size of price changes, based on scanner data of prices of processed foods and daily commodities from the early 1990s to 2021. The theoretical analysis conducted simulation exercises using a state-dependent price setting model with seasonal cycles in menu costs. He first described four notable observations. First, the frequency of price changes was synchronized across upward and downward price changes for most categories, typically rising in March and September. Second, there was a negative correlation between the seasonal cycles of the frequency of price changes and those of the size of price changes. Third, the seasonal cycles of the inflation rate closely tracked the seasonal cycles of net frequency, defined as the difference between the frequency of price increases and price decreases. Fourth, seasonal cycles of frequency of price changes were stable over the sample period, but they were responsive to changes in the category-level inflation rate. **Sudo** then discussed, based on the results of the theoretical analysis, the important role seasonal cycles in menu costs play in generating seasonal cycles and synchronization of price changes. He pointed out that the seasonal cycles of menu costs represent changes in the degree of coordination among firms and that such seasonal cycles may make the transmission process of shocks, including monetary policy shocks, depend on the month in which the shocks occur.

As discussant, **Mark Wynne** (Federal Reserve Bank of Dallas) began by summarizing the paper as an interesting work using highly granular data. He then pointed out that it would be useful to study how seasonal cycles of quantities sold are related to those of price changes and that there is a need for further study of how substitutability among goods affects the degree of synchronization of price changes. He also asked to what extent the results of the study can be generalized, given that seasonal patterns of price changes changed once the pandemic began and that seasonal cycles of price changes are not seen in some categories in the U.S. **Sudo** replied that he had already examined rough measures of seasonal cycles of quantity and found that they did not synchronize with those of price changes. He also replied that, just as in the U.S., the normal seasonal patterns of price changes collapsed in the crisis period in Japan and there were differences across categories in seasonal patterns of price changes. One of the coauthors of the paper, **Shigenori Shiratsuka** (Keio University), pointed out that the current results indicated that in the long-run, monetary policy implementation should take into consideration these seasonal cycles and synchronizations of prices and wages.

From the floor, **Schoenle** suggested that more facts might be revealed by an exami-

11. For details, see Munakata *et al.* (2023).

nation of prices on a daily basis, in addition to on a monthly basis. **McMahon** proposed extending the analysis to a store-by-store basis for a deeper investigation, for example, by identifying leaders and followers. **Sudo** agreed with the importance of the suggested extensions. **McMahon** also asked to what extent input costs, such as oil prices, could affect the seasonality of price changes. **Sudo** replied that under the premise that their theoretical model is correct, seasonal changes in marginal costs alone could not generate the negative correlation between the frequency and size of price changes observed in the data. **Himino** asked what the current study implied about the month in which monetary policy meetings should be held. **Sudo** replied that if the analysis has such implications, it may be necessary to examine the data more carefully in March and September because price changes in these months could contain more information.

VI. Policy Panel Discussion: Part A

In Part A of the policy panel discussion, moderated by Orphanides, five panelists, Altig, Bailey, Rehn, Smets and Ueda, discussed old challenges of monetary policy.

A. Remarks by Moderator and Panelists

Orphanides first emphasized that for a century or so since modern central banks were established, the old challenge of monetary policy had been to maintain price stability over time so as to facilitate the achievement of high and stable economic growth. Pointing out that the economy was characterized as a dynamic system and monetary policy was a control problem of this system, he argued that successful control required measurements that were often challenging. To assess the current state of the economy, we need to know whether the economy is in expansion or recession, whether in a period of inflation or deflation. This issue raises the question, for example, of how service prices should be measured. To predict the state of the economy, noise and transient elements or supply and demand factors need to be separated. There is also an issue regarding the understanding of economic dynamics, for example how imbalances in current supply and demand will translate to incipient inflationary and disinflationary pressures, as illustrated in the Phillips curve. He pointed out that once these sets of information are available, it is possible to make baseline projections that will help guide policy. He noted that policy making had become more complicated today than before, particularly with multiple policy instruments that work across term structures, and that it was essential to pay close attention to broader indices of financial conditions. He concluded that central banks needed to communicate on these matters in a systematic fashion with the public and financial markets.

Altig discussed challenges associated with assessing whether or not changes in inflation rates are transitory, referring to actual developments in the distribution of inflation rates across disaggregated components of the U.S. consumer price index (CPI) since the outbreak of the pandemic as a case study. He explained that it was only after August 2021 that the distribution changed significantly relative to the pre-pandemic period and that it then became clear that “transitory” was no longer an appropriate description. He discussed how the Fed reacted quickly to the changes, citing the statement

by the Fed in September 2021 that began to embed language suggesting there was a potential shift in monetary policy on the horizon, with the word “transitory” eventually being dropped in December 2021, and the Fed starting to raise the policy rate in March 2022. He also pointed out that the labor force participation rate and employment levels were low at that time, compared to their pre-pandemic levels, and it was not obvious how quickly the Fed had to respond to the price developments. Considering these developments, he further commented that the FOMC did not seem to be constrained by the asset purchase schedules. He concluded his remarks by arguing for the importance of discussions on how data-dependent policymaking should be done and how forecast-dependent policymaking can be done.

Agreeing with Altig, **Bailey** began by stating that policy decisions were not made with hindsight and argued that the current situation of U.K. economy was such that it had been hit by a series of large unprecedented types of supply shocks, such as the pandemic and war, which had deteriorated terms of trade, reduced national income, and boosted inflation, and that the U.K. was now having to deal with these shocks. He then pointed out as challenges non-linearities and asymmetries regarding price dynamics. With regard to nonlinearity, he argued that large shocks could move the economy into a state where the Phillips curve was steeper than normal, yielding a higher inflation than that predicted by a linear model. With regard to asymmetry, he pointed out that once inflation rates reached a certain level, inflation became more salient in people’s minds and wage and price setting behaviors would change, making inflation more persistent and second-round effects longer-lived. Lastly, he argued that there was a significant upside risk regarding the inflation rate, referring to the observation that the mean exceeded the mode in the fan charts published by the Bank of England.

Rehn began by pointing out that the heavy cost of a de-anchoring of inflation expectations was one of the issues most agreed upon among central banks, and that steering inflation towards the target was largely about steering inflation expectations. He also pointed out that persistent high inflation rates were risky and had to be decisively avoided, especially since they could make inflation expectations adaptive. He then argued that the current pace of global monetary tightening was unprecedented, including in the euro area where the ECB’s rate increases had been transmitted forcefully, though the strength of transmission to the real economy remained uncertain. He noted that central banks should never tire of communicating their objectives and outlining the elements of their monetary policy reaction functions, pointing out that the recent decision by the BOJ to conduct a review of monetary policy from a broad perspective would provide an excellent opportunity for such communication. He also noted that the ECB Governing Council had been providing information on the three critical elements of policy decisions: the inflation outlook, the dynamics of underlying inflation, and the strength of their monetary policy transmission. He concluded that the ECB’s monetary policy stance had recently reached restrictive territory and that it was essential to see a steady and sustained decline in underlying inflation before monetary easing started being considered again.

Smets began by arguing that, although developed under a totally different environment, the strategy review conducted by the ECB was well fit for the purpose of addressing the current challenge with high inflation rates, since the review made it

very explicit that the inflation target of 2 percent was symmetric in the sense that upward and downward deviations were both undesirable. He also argued that the review had confirmed the medium-term orientation of monetary policy, which was key in the current context. He pointed out that translating this into a systematic reaction function was a big challenge and currently a “sufficiently restrictive” stance was necessary in order to bring inflation back to 2 percent in the medium term. He then discussed whether monetary policy had been sufficiently restrictive in the euro area, looking at actual nominal interest rates and market participants’ expectations on future nominal interest rates, and pointed out that these rates were above the estimated nominal neutral rate, while emphasizing the need to look at the whole path over the projection horizon when measuring if the stance was sufficiently restrictive. He also pointed out that inflation expectations had remained anchored with some upside risks. Regarding the reaction function, he argued that once a clear reaction function was understood by the public, market forces would do much, giving as an example the fall in the nominal interest rate following problems at a U.S. regional bank.

Ueda began by saying that the challenge for the BOJ had been to raise the rate of underlying inflation to the level consistent with price stability target. He explained that focusing only on the recent inflation rate, the Japanese economy looked more-or-less where the U.S. economy was one and a half to two years ago, and pointed out that this raised the concern whether the Japanese economy would go into a sustained period of inflation rates above 2 percent. He also noted, however, that the distribution of cross-sectional price changes in Japan indicated that the mode of the distribution was at around 0 percent, and inflation expectations of many economic agents were still subdued, therefore the situation regarding underlying inflation is in stark contrast to that in the U.S. He stated that given these points, Japan’s inflation, which was caused by a series of global supply shocks, would go down when the effects of the shocks faded away. With regard to the labor market, on the other hand, he explained that the wage growth rate was somewhat below the level consistent with the 2 percent inflation target at the moment, but the labor market would remain tight due to the aging of the population, and this tightness was more likely to affect wages. He concluded by saying that there was hope that underlying inflation would continue to go up and that it is appropriate for the BOJ to keep monetary policy as easy as it has been, at least for now, in order to support such a development.

B. Discussion among the Moderator, Panelists and Floor Participants

Orphanides summarized the issues raised in the remarks by the panelists and asked them to make comments. **Altig** commented on the data-dependent policy, saying that the normal order of policy process was that policymakers made forecasts, set the policy path conditional on the forecast and the reaction function, and waited for the incoming data to see whether they were on track or off track. He argued that the role of forward guidance is to tell the public when the central bank is deviating from this normal order of policymaking. **Bailey** pointed out that more attention had been paid to labor-market variables since the outbreak of the pandemic and there were negative labor supply shocks in the U.K. He argued that there were three candidate explanations for these negative labor supply shocks: early retirement of workers due to the accumula-

tion of household savings during the pandemic, long-term sickness due to COVID-19, and changes in the public attitude towards post-retirement spending, in addition to the effects arising from the population aging. Regarding policy implementation, he stated that there was no magic policy that could offset large negative terms of trade shocks, and tightening policies could not have been implemented when the economy was in a downturn due to the pandemic. He concluded that keeping the nominal anchor was important for stabilizing prices. **Rehn** commented regarding measurement issues that when there were major uncertainties in the economy, monetary policy would rely on both the science based on economic theory and models and the art of using judgments based on comprehensive assessment and various economic indicators. He noted that the recent wage growth rate in the eurozone was significant and that he was monitoring the rate closely due to concerns about second-round effects. **Smets** responded that nonlinear forecasting models were useful but not always robust. He then argued that a robust approach to economic forecasting was comparing a suite of models from non-structural to structural and dependent on the specific policy issue to be addressed. Also, he pointed out that quasi-linear models were very useful as a starting point. He continued by saying that it was always better to have state-dependent rather than time-dependent forward guidance, that there was an Odyssean element in the ECB's policy conduct, and that monetary policy always needs to be forward-looking given the lags with which it works, but the outlook will necessarily be driven by current and past information. He also added that policy sequencing was an important issue that should attract further consideration. **Ueda** responded that the BOJ's current forward guidance was forecast-dependent because it would continue with yield curve control until the inflation outlook implied inflation was at the price stability target in a sustainable and stable manner, but it was also data-dependent because forecasts are a function of incoming data. On the issue of nonlinearity, he also mentioned that nonlinearity would appear as structural changes in parameters, but identifying those changes in real time was always difficult.

Next, **Orphanides** opened the floor for questions. **Obstfeld** pointed out there were two views on the Phillips curve: one view was that there was a stable Phillips curve between the unemployment rate and inflation rate, with some nonlinearities depending on the unemployment rate; and another view was that the curve itself had shifted due to changes in how people's inflation expectations respond to supply shocks, given the experience of the pandemic and the war, and that the latter might warrant more attention. **Hernández de Cos** remarked that most of the forecast errors in the inflation forecasting models could be attributed to unexpected increases in exogenous variables such as energy prices and argued that there was no clear evidence of nonlinearity in inflation dynamics or missing important elements for inflation. **Gourinchas** argued that it was important for monetary policymakers to understand what might be captured by measures of labor market tightness and nonlinearity. He also commented that policymakers should invest more time in developing granular nonlinear models, as linear models could go wrong when things became nonlinear. **Altig** agreed with Orphanides that there were possible shifts in the Phillips curve due to changes in inflation expectations but identifying changes in inflation expectations in the data had been difficult, partly because of the issue of whose inflation expectations should be included. **Ueda**

commented that, while changes in inflation expectations may have led to a shift in the Phillips curve, it was difficult to identify these changes from the data because the actual inflation expectation formation was more complex than what macroeconomic models suggested. **Bailey** pointed out that the issue in analyzing the labor market was labor participation rather than unemployment, and approximating the former from the latter did not lead us in the right direction. **Rehn** noted that in 2021, the situation in the labor market had been quite different between the eurozone and the U.S. **Altig** added that there should be a focus not only on the supply side of the labor market, but also on the demand side, such as hiring intensity against vacancies. **Orphanides** agreed with both Smets and Gourinchas that linear models were robust benchmarks, but at the same time, it was very important to consider a suite of models. **Rehn** added that it is important to have an interest in a broader range of subjects, including economic history and political science. **Smets** agreed with the importance of developing models that are structural with nonlinearities.

McMahon asked how monetary policy struck the appropriate balance between achieving the inflation target and financial stability after the global financial crisis. **Ito** raised a question about revision patterns of the central bank's inflation forecast. **Iwata** discussed the relative impact on inflation of monetary tightening and fiscal expansion and how financial stability issues affected future developments. **Rehn** replied that financial stability was an important policy objective of central banks, but their primary mission was price stability. With regard to the separation principle between price stability and financial stability, he pointed out that tighter financial regulation and improved supervision were essential to safeguard financial stability. He also emphasized that coordination between monetary policy and fiscal policy was important. **Bailey** followed up Rehn's discussion on the separation principle and argued that the important task for central banks was to explain to the public the difference between financial stability tools and monetary policy tools and to have both tools in the central bank's toolbox. **Ueda** responded to Ito's question explaining that errors in the BOJ's inflation forecast were due to the occurrence of unexpected supply shocks and firms' more aggressive wage and price-setting behavior.

VII. Policy Panel Discussion: Part B

In Part B of the policy panel discussion, moderated by Brunnermeier, five panelists, Bunge, Himino, Glapiński, Gourinchas, and Hernández de Cos, discussed the new challenges for monetary policy.

A. Remarks by Moderator and Panelists

Brunnermeier gave the opening remarks, raising three topics for the panel discussion. First, he discussed the interaction between financial stability and price stability. He argued that in a low-inflation environment they go hand-in-hand, but in a high-inflation environment a trade-off can emerge between the two, stressing the importance of the role played by the market power of private banks. He argued that when interest rates increased, it had positive implications for financial stability as lending rates tended to

rise more than deposit rates and interest rate margins widened. He also argued that monetary policy transmission could become asymmetric in the sense that the effects become different depending on whether the agents are borrowers or lenders, undermining the effects of monetary policy tightening. Second, he discussed the issue of sequencing among quantitative easing (QE), quantitative tightening (QT) and interest rate hikes. He argued that the issue of sequencing was essentially about which entities should incur losses when interest rates increased, since it would be private banks' loss when banks were holding long-term bonds and would be the central bank's loss when it was holding the bonds. Third, he discussed the inflation anchor and r^* . He argued that one reason why the inflation anchor was still strong in Europe and in the U.S. was because the war acted as a good excuse, strengthening the inflation anchor. He also mentioned r^* , saying that while the current increased uncertainty could reduce r^* , r^* could stay stable if there was confidence in the resilience of the economy and its ability to bounce back.

Bunge discussed the trade-off between price stability and financial stability, taking the Swedish economy as an example. She first pointed out that, due to sharp increases in the inflation rate last year and the risk of de-anchoring of inflation expectations, the weight of inflation targeting as the primary objective was increasing. She also added that things were however more complex in reality and it was uncertain how much monetary policy should be tightened to achieve the desired effect on inflation while at the same time securing the development of the economy, given current economic circumstances, including thirty years of rising house prices, the long-term low interest rate environment for households, high levels of household and corporate sector debt, and accumulated household savings made during the pandemic.

Himino laid out two issues on the separation principle between prudential policy and monetary policy. First, he explained that the effectiveness of both prudential policy and monetary policy could change and become limited depending on circumstances, such as prudential policies after financial imbalances have already materialized and monetary policies facing an effective lower bound. Second, he discussed how each of the two policies could have spillover effects on the objectives of the other, pointing out that tight prudential policy could compromise the effect of monetary easing, and monetary easing could lead to financial imbalances. He further argued that, because of these two issues, central banks sometimes needed to use one tool for two goals, with central bank asset purchases being called QE when used for price stability and being called market maker of the last resort when used for financial stability. He also noted the central banks could have killed two birds with one stone after the global financial crisis and during the pandemic, but recently they had to expand their balance sheets for financial stability purposes, while tightening was needed for price stability purposes.

Glapiński, after commenting on the difficulties of having one's own currency and one's own monetary policy, explained developments in the domestic economy and monetary policy in Poland, before, during, and after the COVID-19 pandemic. He started by explaining that before the pandemic, the Polish economy had been fully balanced, with a high economic growth rate, low inflation rate, and low government debt. He then discussed how, in response to the pandemic, active fiscal policy and accommodative monetary policy, including massive bond purchases, were undertaken, suc-

cessfully avoiding recession and increased unemployment. Regarding the subsequent inflation, he argued that the inflation rate in Poland was higher than other countries partly due to characteristics of the consumers' basket and pointed out that the interest rate was raised each month for eleven months to a historical level, until the central bank stopped raising the rate in September 2022. He concluded that while it was still set at a high rate, there were discussions regarding when to cut the rate of interest due to concerns about recession.

Gourinchas argued first that the degree of trade-off between price and financial stability varied depending on economic conditions, as there were times of no apparent trade-off, such as during the global financial crisis, and times when it was clear that a trade-off was being made, such as during periods of high and persistent inflation. He also argued that no apparent trade-off differed from no trade-off, indicating that under a prolonged period of low interest rates, the financial sector could become acclimatized to an environment of low interest rates, becoming unprepared for interest rate hikes. Second, he said that the complementarity between price and financial stability held in the long-run, but a clean separation was just a benchmark, and he proposed a three-bucket taxonomy regarding interactions between financial and price stability. Each of the three buckets represents a different situation: no or modest levels of financial stress, substantial levels of financial stress though not yet a financial crisis, and financial crisis. He argued that a de facto separation held for the first bucket since tensions in financial institutions' balance sheets due to monetary tightening could be handled by well-designed financial regulations, supervision, and a set of financial instruments. Likewise, there was no trade-off between financial and price stability for the third bucket as the crisis dampened output and prices. For the second bucket, he argued that as financial stress changed from liquidity to solvency issues, there might be an argument for adjusting the course of monetary policy, though maintaining the nominal anchor and price-stability objective, due to financial stability considerations, stressing that the bar was however considered extremely high.

Hernández de Cos started his remarks by discussing the second topic of policy sequencing, taking the recent monetary policy decision by the ECB as an example, pointing out there were three reasons behind the decision that the reduction in the balance sheet would start only after the rate increased to a certain level. First, he argued that central banks did not have much experience in reducing balance sheets, and it was safer to start with interest rate hikes, of which it had better knowledge of the effectiveness and transmission mechanism. Next, he argued that the financing of firms and households in the euro area was mainly through bank loans that were influenced by short- and medium-term interest rates and the effect of reducing the balance sheet might be limited as it affected mainly medium- and long-term interest rates. Finally, he argued there was a risk of financial fragmentation in the euro area as a potential consequence of balance sheet reduction. Regarding the trade-off between financial stability and monetary policy, he argued that if financial stress emerged in the current context, the important thing for central banks was to convince the markets that they had the tools to tackle the financial stress, though these tools could differ depending on whether the stress was liquidity- or solvency-related and general or focused. Regarding banks' market power and monetary policy transmission, after agreeing with Brunner-

meier that deposit rates had increased only by a limited range in the current episode, based on a study of banks in the euro area, he explained that most dispersions in deposit rates were attributed to excess liquidity rather than concentration. He added that there had been structural changes, such as an increase in the proportion of market financing in the euro area, and these changes could heighten the monetary policy spillover effects as the link between market finance and the policy rate became greater. Regarding the outlook for r^* , he pointed out that it might be too early to say that the factors that had been emphasized before the pandemic to justify low r^* would vanish, at least in the medium term.

B. Discussion among the Moderator, Panelists and Floor Participants

Orphanides mentioned that estimated equilibrium real interest rates had been declining over the past twenty years, reducing pressure on governments, and creating more fiscal space. He then asked how central banks and governments should prepare, from the perspective of monetary policy implementation and financial stability, for a scenario in which the global economy saw a 200 basis points increase in interest rates with a possible impact on monetary policy and financial stability. **McMahon** pointed out that, as the flip side of Orphanides's comment, fiscal policy and public debt levels could affect r^* , noting there were questions regarding what the appropriate level of public debt was and what impact it would have on r^* . He further argued that where the economy was regarding the three buckets proposed by Gourinchas also depended on the fiscal space. Noting that the topics covered in the panel could be global problems in the sense that all of the responses had global consequences, **Schoenle** asked whether the global nature of the problems could change the panelists' assessment of how serious the problems were and how far central banks should respond.

Hernández de Cos replied to Orphanides's question on the potential consequence of a higher r^* by pointing out that it depended on the causes of the higher r^* . He noted that there would be no issues if the higher r^* was due to higher productivity, but fiscal consolidation might become more important if the higher r^* was mainly due to higher public debt. **Himino** followed up the discussion by pointing out that it was necessary to separate the issue of short-term transitory adjustment of fiscal policy and longer-term sustainability of public debt. He then argued that regarding the former, any change in the interest rate would have a significant impact, whereas what mattered for the latter would be whether the potential growth rate was higher than the r^* . He also stressed that there were issues surrounding r^* , in that it was very difficult to estimate, and the concept was diverse. **Gourinchas** commented that even if the economy were currently in an environment of low r^* , it was not clear if this would generate an enormous fiscal space because the medium-term growth rate of the global economy was expected to decline. He then argued, based on the recent World Economic Outlook (IMF [2023]), that fiscal consolidation worked better when the economy was growing. Regarding the role of fiscal space on the buckets, he said he was not particularly concerned about issues of fiscal dominance, but that what had happened in the U.S. and Europe this March called into question the resolution frameworks, implemented after the global financial crisis, which stipulated that the financial sector should take care of itself and tax payers' money should not be involved. **Bunge** commented that Sweden was in

the first bucket of Gourinchas's taxonomy mainly due to the resilience of the banking sector, which was taking precautionary measures. She added that Riksbank recently started QT purely on monetary policy grounds, which also indicated that Sweden was in the first bucket. **Glapiński** clarified that in Poland there was no problem of the trade-off and cooperation between monetary and fiscal policy while the debt level was low. He also mentioned that the banking system in Poland was stable due to strict regulations.

Iwata mentioned that while a rise in the interest rate affected the franchise value of banks, digitalization had helped the very rapid outflow of deposits in the case of Silicon Valley Bank, and he argued that additional instruments were needed to cope with such rapid outflows. **Brunnermeier** commented that when the interest rate rose, banks' net interest margins typically increased but capital losses occurred, too, and the balance between the two effects mattered. **Bailey** commented on resolutions of small banks, indicating there was an issue of whether plans that imposed losses onto depositors should be employed from the perspective of money as a store of value, and there was a great reluctance to do so, in contrast to large banks to which different plans were applied. He also commented on issues of the separation principle discussed by Himino, arguing that QE/QT was a longer-term adjustment to the yield curve, whereas asset purchases as financial stability interventions should be temporary and targeted. On the issue of deposit runs and digitalization, **Gourinchas** argued that there were features in the U.S. that differed from other parts of the world, in that the deposit outflows from smaller regional banks went to large banks as large banks were considered unable to fail due to implicit subsidy, and there were inflows to money market funds (MMF) which were considered free from maturity risk due to access to the Fed's balance sheet. **Himino** agreed with Bailey's comments. He added that during the zero or negative interest rate period, there was no or negative incentive for banks to maintain a stable deposit base, but with the recovery of interest rates, banks could again make a profit by gathering deposits, a function unique to the banks, and those banks with stable deposit networks had recently achieved record profits in the U.S.

Brunnermeier said that, though everybody thought there was no danger of the inflation anchor being broken, he would like to ask the panelists what would happen to the connection between financial and price stability if there was a crisis of confidence and the inflation anchor was broken. **Glapiński** replied that Poland had a high inflation rate due to both the demand increase after the end of the pandemic and cost-push inflation caused by the war, but the central bank would do whatever it could to stabilize the banking system, including the purchase of government bonds and debt. **Gourinchas** commented that if the nominal anchor was lost and financial stability issues arose at the same time, then it would become a problem of fiscal policy rather than monetary policy. He further argued that if fiscal support could not be guaranteed, it might require the help of some international organizations. **Hernández de Cos** replied that losing the nominal anchor would mean that the central bank had lost credibility, and the problem would be how to restore that credibility. He further pointed out that, though the economy would need the help of fiscal policy if monetary policy were to lose credibility, or the help of international organizations if even fiscal policy was not in good shape, the independence of the central bank is absolutely crucial to regaining credibility.

References

- Brainard, William C., “Uncertainty and the Effectiveness of Policy,” *American Economic Review*, 57 (2), 1967, pp. 411–425.
- Cieslak, Anna, Stephen Hansen, Michael McMahon, and Song Xiao, “Policymakers’ Uncertainty,” paper presented at the 2023 BOJ-IMES Conference on “Old and New Challenges for Monetary Policy” held by the Institute for Monetary and Economic Studies, Bank of Japan, 2023.
- Dietrich, Alexander M., Edward S. Knotek II, Kristian Ove R. Myrseth, Robert W. Rich, Raphael S. Schoenle, and Michael Weber, “Greater than the Sum of Its Parts: Aggregate vs. Aggregated Inflation Expectations,” paper presented at the 2023 BOJ-IMES Conference on “Old and New Challenges for Monetary Policy” held by the Institute for Monetary and Economic Studies, Bank of Japan, 2023.
- International Monetary Fund (IMF), “Chapter 3: Coming Down to Earth: How to Tackle Soaring Public Debt,” *World Economic Outlook: A Rocky Recovery*, Washington, D.C.: International Monetary Fund, 2023.
- Munakata, Ko, Takeshi Shinohara, Shigenori Shiratsuka, Nao Sudo, and Tsutomu Watanabe, “On the Source of Seasonality in Price Changes: The Role of Seasonality in Menu Costs,” IMES Discussion Paper No. 2023-E-7, Institute for Monetary and Economic Studies, Bank of Japan, 2023.
- Obstfeld, Maurice, “Perspectives on \bar{r} and r^* ,” *Monetary and Economic Studies*, 41, Institute for Monetary and Economic Studies, Bank of Japan, 2023, pp. 31–48 (this issue).
- Orphanides, Athanasios, “The Forward Guidance Trap,” IMES Discussion Paper No. 2023-E-6, Institute for Monetary and Economic Studies, Bank of Japan, 2023.
- Söderström, Ulf, “Monetary Policy with Uncertain Parameters,” *Scandinavian Journal of Economics*, 104(1), 2002, pp. 125–145.
- Ueda, Kazuo, “Opening Remarks,” *Monetary and Economic Studies*, 41, Institute for Monetary and Economic Studies, Bank of Japan, 2023, pp. 27–30 (this issue).
- Weber, Michael, Yuriy Gorodnichenko, and Olivier Coibion, “The Expected, Perceived, and Realized Inflation of US Households before and during the COVID19 Pandemic,” *IMF Economic Review*, 71(1), 2023, pp. 326–368.

APPENDIX 1: PROGRAM

Wednesday, May 31, 2023

Opening Remarks

Speaker: **Kazuo Ueda**, Bank of Japan

Mayekawa Lecture: Perspectives on \bar{r} and r^*

Chairperson: **Chang Yong Rhee**, Bank of Korea

Lecturer: **Maurice Obstfeld**, University of California, Berkeley

Session 1: The Expected, Perceived, and Realized Inflation of U.S. Households before and during the COVID19 Pandemic

Chairperson: **Masaaki Kaizuka**, Bank of Japan

Paper Presenter: **Michael Weber**, The University of Chicago

Discussant: **Meredith Beechey Österholm**, Reserve Bank of Australia

Keynote Speech: The Forward Guidance Trap

Chairperson: **Peter Kažimír**, Národná banka Slovenska

Speaker: **Athanasios Orphanides**, Massachusetts Institute of Technology

Session 2: Greater Than the Sum of Its Parts: Aggregate vs. Aggregated Inflation Expectations

Chairperson: **Peter Kažimír**, Národná banka Slovenska

Paper Presenter: **Raphael Schoenle**, Brandeis University

Discussant: **Hajime Tomura**, Waseda University

Session 3: Policymakers' Uncertainty

Chairperson: **Tao Zhang**, Bank for International Settlements

Paper Presenter: **Michael McMahon**, University of Oxford

Discussant: **Mototsugu Shintani**, The University of Tokyo

Session 4: Seasonal Cycles and Synchronization of Price Changes in Japan

Chairperson: **Tao Zhang**, Bank for International Settlements

Paper Presenter: **Nao Sudo**, Bank of Japan

Discussant: **Mark Wynne**, Federal Reserve Bank of Dallas

Thursday, June 1, 2023

Policy Panel Discussion: Part A

Moderator: **Athanasios Orphanides**, Massachusetts Institute of Technology

Panelists: **David Altig**, Federal Reserve Bank of Atlanta
Andrew Bailey, Bank of England
Olli Rehn, Bank of Finland
Frank Smets, European Central Bank
Kazuo Ueda, Bank of Japan

Policy Panel Discussion: Part B

Moderator: **Markus Brunnermeier**, Princeton University

Panelists: **Aino Bunge**, Sveriges Riksbank
Adam Glapiński, Narodowy Bank Polski
Pierre-Olivier Gourinchas, International Monetary Fund
Pablo Hernández de Cos, Banco de España
Ryozo Himino, Bank of Japan

APPENDIX 2: LIST OF PARTICIPANTS

David Altig	Federal Reserve Bank of Atlanta
Andrew Bailey	Bank of England
Meredith Beechey Österholm	Reserve Bank of Australia
Markus Brunnermeier	Princeton University
Aino Bunge	Sveriges Riksbank
Paul Conway	Reserve Bank of New Zealand
Hiroshi Fujiki	Chuo University
Shin-ichi Fukuda	The University of Tokyo
Andrea Gerali	Banca d'Italia
Adam Glapiński	Narodowy Bank Polski
Pierre-Olivier Gourinchas	International Monetary Fund
Hideo Hayakawa	Tokyo Foundation for Policy Research
Pablo Hernández de Cos	Banco de España
Ryozo Himino	Bank of Japan
Kazuhiro Hiraki	Bank of Japan
Johannes Hoffmann	Deutsche Bundesbank
Takeo Hoshi	The University of Tokyo
Hibiki Ichiue	Keio University

Takatoshi Ito	Columbia University and National Graduate Institute for Policy Studies
Kazumasa Iwata	Japan Center for Economic Research
Harriet Jackson	Bank of Canada
Masaaki Kaizuka	Bank of Japan
Takeshi Kato	Bank of Japan
Peter Kažimír	Národná banka Slovenska
Bokeong Kim	Bank of Korea
Yukinobu Kitamura	Rissho University
Keiichiro Kobayashi	Keio University
Satoshi Kobayashi	Bank of Japan
Vincent Koen	Organisation for Economic Co-operation and Development
Hirohide Kouguchi	Bank of Japan
Changyong Kwak	Bank of Korea
Krzysztof Mackiewicz	Narodowy Bank Polski
Takako Masai	SBI Financial and Economic Research Institute Co., Ltd.
Michael McMahon	University of Oxford
Kazuo Momma	Mizuho Research & Technologies
Kristian Myrseth	University of York
Taisuke Nakata	The University of Tokyo
Asahi Noguchi	Bank of Japan
Nuwat Nookhwun	Bank of Thailand
Maurice Obstfeld	University of California, Berkeley
Yasutaka Ogawa	Bank of Japan
Yoji Onozawa	Bank of Japan
Athanasios Orphanides	Massachusetts Institute of Technology
Julio Ortiz	Board of Governors of the Federal Reserve System
Hong Ou	The People's Bank of China
Frank Packer	Bank for International Settlements
Irfan Ahmad Qureshi	Asian Development Bank
Olli Rehn	Bank of Finland
Chang Yong Rhee	Bank of Korea
Hyunjoo Ryou	Bank of Korea
Hiroki Sakaji	The University of Tokyo
Tetsuya Sakamoto	Bank of Japan
Martin Šanta	Národná banka Slovenska
Raphael Schoenle	Brandeis University
Toshitaka Sekine	Hitotsubashi University

Martin Seneca	Bank of England
Seiichi Shimizu	Bank of Japan
Tokiko Shimizu	Bank of Japan
Mototsugu Shintani	The University of Tokyo
Etsuro Shioji	Hitotsubashi University
Shigenori Shiratsuka	Keio University
Frank Smets	European Central Bank
Yutaka Soejima	Bank of Japan
Nao Sudo	Bank of Japan
Atsuto Suzuki	Bank of Japan
Hajime Takata	Bank of Japan
Naoki Tamura	Bank of Japan
Hajime Tomura	Waseda University
Karim Triki	Embassy of France and Banque de France
Tin Ho Tsang	Hong Kong Monetary Authority
Suh Ping Tu	Monetary Authority of Singapore
Shinichi Uchida	Bank of Japan
Kazuo Ueda	Bank of Japan
Toshiaki Watanabe	Hitotsubashi University
Tsutomu Watanabe	The University of Tokyo
Yasutora Watanabe	The University of Tokyo
Michael Weber	The University of Chicago
Mark Wynne	Federal Reserve Bank of Dallas
Hirohide Yamaguchi	Nikko Research Center, Inc.
Shunichi Yoneyama	Bank of Japan
Naoyuki Yoshino	Keio University
Tao Zhang	Bank for International Settlements