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Contents

Price Dynamics and Monetary Policy Challenges
—Lessons Learned and Going Forward—
Summary of the 2024 BOJ-IMES Conference
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I. Introduction

The Institute for Monetary and Economic Studies (IMES) of the Bank of Japan (BOJ) held the 2024 BOJ-IMES Conference, entitled "Price Dynamics and Monetary Policy Challenges—Lessons Learned and Going Forward," on May 27–28, 2024.[1] This was the 29th conference since its start in 1983 and was held as part of events for the BOJ's "Broad Perspective Review" of monetary policy. Participants engaged in lively discussions on price dynamics and conventional and unconventional monetary policy.

The conference began with the opening remarks delivered by Kazuo Ueda, Governor of the BOJ. Next, John B. Taylor (Stanford University) gave the Mayekawa Lecture on inflation and monetary policy in the U.S. and other countries. Shinichi Uchida (BOJ) gave a keynote speech on price dynamics in Japan over the past 25 years. Markus Brunnermeier (Princeton University), honorary adviser to the IMES, delivered another keynote speech on resilience-based monetary policy. In the paper presentation sessions, four papers were presented on the theoretical and empirical analyses of inflation dynamics and monetary policies, by John H. Cochrane (Stanford University), Yoshihiko Hogen (BOJ), Sophocles Mavroeidis (University of Oxford), and Ricardo Reis (London School of Economics and Political Science).

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1. See Appendix 1 for the program. See Appendix 2 for a list of participants; their affiliations are as of May 27–28, 2024.

The first policy panel discussion was moderated by Athanasios Orphanides (Massachusetts Institute of Technology), honorary adviser to the IMES, and the five panelists, Charles L. Evans (formerly of Federal Reserve Bank of Chicago), Pierre-Olivier Gourinchas (International Monetary Fund: IMF), Olli Rehn (Bank of Finland), Eli M. Remolona, Jr. (Bangko Sentral ng Pilipinas), and Boštjan Vasle (Banka Slovenije), discussed price dynamics. The second policy panel discussion was moderated by Brunnermeier, and the five panelists, Michelle W. Bowman (Board of Governors of the Federal Reserve System), Thomas J. Jordan (Swiss National Bank), Loretta J. Mester (Federal Reserve Bank of Cleveland), Isabel Schnabel (European Central Bank: ECB), and Ryozo Himino (BOJ), discussed the effects of conventional and unconventional policy instruments.

II. Opening Remarks

To set the stage for the conference, **Ueda** started his remarks with the changes in the BOJ's monetary policy framework in March, followed by his reflections on the past 25 years.[2] He posed the perennial question of Japan's struggle to escape a long period of zero-to-low inflation, also known as the zero-inflation trap, despite extensive unconventional monetary policy interventions by the BOJ, and he said that the primary explanation for the prolonged struggle was the zero lower bound (ZLB). He pointed out that the overnight call rate fell below 0.5% by late 1995, and by the onset of the zero-inflation trap, the BOJ had exhausted its leverage over short-term interest rates as a means of stimulating the economy.

On the other hand, he pointed out that during the initial years of the zero-inflation trap, there had been no explicit inflation target, and that there had been no significant increase in the BOJ's holdings of Japanese government bonds (JGBs) until 2013, and its active acquisition of long-term JGBs had happened relatively late. Thus, he noted that some might argue that the evolving policy framework adopted by the BOJ had not been at certain points optimal.

He also pointed out that a second possible explanation for the BOJ's difficulties was that the entrenched nature of low inflation expectations had led to changes in economic agents' behavior, especially the strategic pricing behavior of firms, and, in turn, prolonged the period of the zero-inflation trap. He added that there was evidence of changes after 2014, however: first, wages had started to rise modestly and then rose sharply in 2023–2024, probably in response to the recent global inflation and the continuation of the easing framework put in effect from the pre-inflation period.

Lastly, he said that the BOJ had made progress in moving inflation expectations away from 0%. He concluded his opening remarks by noting that the BOJ must now re-anchor expectations, this time at the 2% target, and would proceed cautiously.

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2. For details, see Ueda (2024).

III. The Mayekawa Lecture: The Way to Stability and Growth in the World Economy

Taylor reflected on the first Mayekawa Lecture,[3] which he gave at the 2008 BOJ-IMES Conference.[4] He mentioned that one of the major concerns at that time had been high inflation, which was also a recent major issue. He added that many current economic issues, including inflation, had been strongly interconnected given today's economic, political, and geopolitical conjuncture. Furthermore, when considering economic difficulties such as global high inflation seen in the recent years, he emphasized the importance of a comprehensive "Mayekawan" approach, in which policy is formulated from comprehensive and international perspectives while recognizing the important interactions of economic problems instead of approaching them separately.

He then discussed inflation and monetary policy in the U.S. and other countries. He pointed out that the timing of the policy rate hikes in the U.S. and other countries in recent years had been late, relative to that implied by the Taylor rule, and that interest rates had been kept low for too long. He noted that, as a consequence, central banks had fallen behind the curve, causing high inflation. Furthermore, he pointed out that (1) the Federal Reserve (Fed) had subsequently raised the federal funds rate to a level above 5%, which was well above the level of about 4% implied by a simple version of the Taylor Rule, and (2) Latin American countries had also fallen behind the curve. He added that this phenomenon was observed globally, and high inflation had become a global issue.

He posed the question of whether we were entering a new era of high inflation. He said that the answer would definitely be "yes," unless central banks continued to adjust their policies appropriately. He concluded by arguing that rule-based monetary policy would help central banks avoid falling behind the curve and making unnecessary rapid rate hikes that could cause significant damage to the economy.

From the floor, **Peter Kažimír** (Národná banka Slovenska), the chair of this session, first asked about the importance of central banks coordinating their policies in an increasingly interconnected global economy and about preemptive policy responses to mitigate the effects of future economic shocks. **Taylor** replied that, as the world was getting more integrated, it was more important to have some notion of policy coordination. He also said that it would be possible to become ready to make right policy responses by continuously discussing various and broad themes such as inflation targets, the state of the economy, exchange rate considerations, and the coefficient on the inflation rate in a policy reaction function.

Several questions and comments were made about how to use a rule-based strategy for monetary policy in practice. **Orphanides** noted that in the U.S., the public had perceived high inflation from 2021 onward as an exceptional circumstance and that their inflation expectations had been incredibly well anchored. On top of that, he asked about the view that the Fed fell behind the curve by not rushing to raise interest rates due to the anchoring inflation expectations and later continued raising the policy rate above the level implied by the Taylor Rule. **Jordan** said that, given economic uncertainties,

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3. For details, see Taylor (2008).
4. For details, see Taylor (2024).

there is a view that it is better for central banks to make discretionary policy decisions in some circumstances, rather than always making rule-based policy decisions, and asked for Taylor's view on that. **Mester** commented that it would be hard for central banks to give up their discretion and stick to rules because of many conflicting things. **Kosuke Aoki** (The University of Tokyo) pointed out that the optimal monetary policy under the ZLB was to allow inflation to overshoot and asked whether, in the light of recent discussions about being behind the curve, we had overstated the benefits of such a history-dependent monetary policy before the global inflation. **Taylor** responded that in his experience, rule-based policy management worked well, but it did not mean that policy rules were perfect, and that there was room to discuss discretionary policy decisions in terms of which variables and factors should be considered in the policy rules. He also argued against stressing only the benefits of the overshooting policies and that it would be important to evaluate policy using various models rather than sticking to a single perspective.

There were diverse discussions about the specification and application of a policy rule. **Rehn** mentioned that the ECB had changed its inflation target from "below, but close to, two percent" to "symmetric two percent" after concluding its strategy review and that this change had contributed to stabilizing inflation. **Kazumasa Iwata** (Japan Center for Economic Research) asked for Taylor's opinion on the U.S. neutral rate. **Masazumi Wakatabe** (Waseda University) asked for opinions on whether the Taylor rule should be strictly applied and interest rates raised even if, as in Japan, inflation expectations were not yet anchored at the 2% level but were on their way to being so. **Remolona** mentioned that forward guidance could be interpreted as a discretion for a smoothing parameter in terms of how much the rule-based policy rate should be reflected in the actual interest rate at each particular time, and that such discretion would increase the possibility of falling behind the curve. **Naoyuki Yoshino** (Keio University) asked whether a policy rule could change depending on the source of inflation such as a demand factor or a supply factor. **Evans** argued that it was important to consider some alternative scenarios rather than to get caught up on a single precise rule as the baseline. **Taylor** replied that estimating potential growth and identifying the level of the neutral interest rate and internationally interrelated supply factors was not easy, making monetary policy management more difficult, and therefore he recognized that it was important to have constant discussions between academics and policymakers about those issues. He continued that, as can be seen from the issues presented so far, there was no need to define a single policy rule, and that it was important for policy-makers to model various policy rules and evaluate them while deepening the discussion toward better rule-based policy management.

IV. Keynote Speech I: Price Dynamics in Japan over the Past 25 Years

Uchida reflected on price dynamics in Japan over the past 25 years and stated that the BOJ's monetary policy during the period had been a battle against persistent de-

flation and a battle with the ZLB.[5] He then discussed whether the current change in Japan's inflation picture means an irreversible structural change from deflation, or just a temporary phenomenon.

He first pointed out two things as background to Japan's deflation: a decline in the growth trend, and chronic shortages of demand. He added that the potential growth rate had declined, decreasing the natural rate of interest over time. He mentioned that the bursting of the asset bubble in the early 1990s appeared to be an important factor, which had triggered financial system turmoil and painful balance sheet adjustments in the corporate sector. In addition, he said that companies had had to address excess capacity, excess labor, and debt-overhang, and against this backdrop, they had become more and more reluctant to take risks and had been slow to adjust their operations to the globalization trend brought about by the rise of emerging economies. As a result, he added that the natural rate of interest in Japan had declined earlier and to a greater extent than in other countries.

Uchida also noted that BOJ's monetary policy did not have enough power to lift the actual and expected inflation under the ZLB constraint in the 1990s and 2000s. He explained that there had been a strong consensus in society that employment should be maintained, which had generated excess labor and excess numbers of companies. He continued that, as a consequence, on the price front, companies had continued to face harsh competition, as their rivals were still there, and as for wages, employees had started to accept reduced wages in exchange for job security. He said that in Japan, the price-setting behavior based on the belief that there would be no change in prices and wages had spread widely among companies, giving rise to a kind of social norm. He argued that under this norm, inflation expectations had appeared to be anchored at 0%.

Then, he said that from 2013 onward, the BOJ had continued to provide high pressure to the economy by Quantitative and Qualitative Monetary Easing (QQE) and Yield Curve Control (YCC) and, together with various government measures, this pressure had resolved the original causes of deflation, namely demand shortages and consequent excess labor supply. As to the prospect of overcoming the deflationary norm, he noted that the answer was not so clear, but added that it was set to be dissolved by the final pressure exerted by the recent global inflation and continued labor shortages.

Lastly, he concluded his speech by saying that while the BOJ still had a challenge to anchor inflation expectations to 2%, the end of the battle was in sight.

From the floor, **Takatoshi Ito** (Columbia University) pointed out the difference in price dynamics between goods and services and questioned whether the norm had been dissolved for service prices, including utility bills. **Brunnermeier** mentioned that in Japan, many companies had survived the financial crisis, employment levels had been maintained, and workers had remained in low-productivity firms, which had resulted in a decline in the potential growth rate and the natural rate of interest, and he asked what the optimal growth rate of real wages and the optimal bankruptcy rate would have been. **Iwata** pointed out that given, developments in the real interest rate and the real economy, the natural rate of interest in Japan could have been much lower than everyone expected. In response to these comments and questions, **Uchida** agreed with

5. For details, see Uchida (2024).

the view that it is not clear whether the norm in service pricing has been resolved yet. He then replied that although uncertainties remained, if the change in the labor market was an irreversible structural change, then the norm in service prices would be likely set to be dissolved. He added that, if labor shortages continued to drive changes in firms' wage-setting and price-setting behavior, then eventually, labor shortages would possibly result in an increase in the natural rate of interest. He stressed the difficulty of estimating the natural rate of interest and agreed with Iwata's comment that the level could have been significantly low.

Reis mentioned the gap between the BOJ's inflation target rate of 2% and the actual inflation rate and asked whether the gap had damaged the BOJ's credibility as a central bank. He also noted that it might not have been problematic to have less than 1% average inflation over the past 25 years in light of the existence of menu costs. **Kažimír** asked about the consequences of the interaction between monetary policy and fiscal policy under the low interest rate environment over the last 25 years. **Uchida** replied that there were several views on why the BOJ had been unable to achieve the 2% target in the past, and that it was not so clear how these views had affected the BOJ's credibility. He continued that average inflation had risen slowly but steadily for the 10 years after the BOJ introduced the price stability target, and stated that the BOJ had succeeded in achieving a situation without deflation. Furthermore, he noted that during those 10 years, the BOJ had implemented monetary policies to make careful considerations in achieving a balance between the effects of the policy and negative side-effects. He also expressed the view that central banks should adopt policies to pursue their own price stability target, and they would not leave policy rates at low levels for the purpose of fiscal support after achieving the price stability target.

Jordan asked if there were any risks that the wages could rise sharply and inflation suddenly spike under the continued highly accommodative monetary policy. **Åsa Olli Segendorf** (Sveriges Riksbank) referred to a paper arguing that wage negotiations tended to be backward-looking in Japan, which was one of the causes of prolonged low inflation in Japan. She then asked how changes in wage negotiations could affect Japan's price dynamics in the future. **Uchida** replied that the BOJ was not so worried about upside risks such as wages and prices spiraling out of control at this moment because nominal wage growth had not yet caught up with past inflation. He also said that he would continue to pay close attention to the effect on price dynamics of the big changes in spring wage negotiations in the past two years.

V. Keynote Speech II: (Un)conventional Monetary Policy and Resilience

Brunnermeier discussed the conduct of conventional and unconventional monetary policy, focusing on resilience, or the ability of the economy to bounce back from a trough (a "resilience approach"). First, he explained the resilience approach by comparing it with two other well-known approaches: the risk management approach, which minimizes risk by taking into account economic forecasts and correlations among its variables; and the robustness approach, which aims at minimizing the damage when

a risk is materialized. He said that the resilience approach emphasized adaptability, which is the ability to adapt to new environments, and agility, which takes effective countermeasures promptly when a shock actually occurs. He argued that the resilience approach could achieve higher economic growth in the long run than the other approaches.

To further explain the resilience approach, he first added that macro-level resilience did not necessarily imply micro-level resilience. He pointed out that, for example, it had been important during the Japanese financial crisis in the late 1990s to encourage exit and entry of firms by allowing unproductive firms to go bankrupt. Secondly, he stressed that the nature of risk, rather than its magnitude, should be considered, and in order to maintain resilience it was essential to identify "traps" that prevent the economy from bouncing back and "tipping points" that could lead to a negative feedback loop. He mentioned financial crisis as an example of a trap that weakened resilience, adding that after a financial crisis GDP tended not to bounce back to the previous growth trend.

Next, he shifted his focus to monetary policy. He first argued that forward guidance faced a trade-off between commitment and resilience: when commitment is weak, the effect of forward guidance is limited, but when commitment is strong, the inability to adapt to changes in the external environment can undermine resilience, which may result in falling into a trap. He next discussed quantitative easing (QE), arguing that a large central bank balance sheet resulting from QE might invite fiscal dominance under which the government restricts the central bank's actions, such as rate hikes, because of the negative impact on the revenue of the central bank. Moreover, he noted that these considerations might give rise to "implicit forward guidance" by facilitating market participants to form specific expectations that the central bank would not raise interest rates rapidly.

In view of these possibilities, to enhance resilience, he proposed the idea of preparatory QE, in preparation for an interest rate hike. He argued that when financial institutions were exposed to large interest rate risk, a rate hike could undermine financial stability, and therefore QE that absorbs financial institutions' interest rate risk in advance could enhance resilience by providing room for the central bank to raise interest rates without ramifications. Moreover, he continued, if central banks had losses or negative equity, they could fall into the trap of credibility loss, depending on how this was perceived by the public. He then argued that it might be an option for central banks to consider changing the allocation of legally required reserves and excess reserves in order to bring down interest paid on excess reserves. He concluded his speech by mentioning a floating exchange rate system as an international mechanism to strengthen resilience.

During the Q&A session with the floor, **Schnabel** asked about the relationship between resilience and the anchoring of inflation expectations. She commented that if central banks were to change reserve requirement ratios, it should be discussed as part of monetary policy. She continued that financial institutions might avoid holding excess reserves in expectation of changes in reserve requirement ratios, which could weaken the effects of QE and generate redistributive effects. **Brunnermeier** replied that the anchoring of inflation expectations was paramount to resilience, and that changing reserve requirement ratios essentially changed the average interest rate faced by financial

institutions and thus could be viewed as a monetary policy tool. He agreed with Schnabel and added that changing reserve requirement ratios could generate redistributive effects, not only among banks but also from banks to non-banks and the government.

While agreeing that a floating exchange rate system increased resilience, **Uchida** mentioned that in response to the Fed's QE after the global financial crisis, it seemed that other central banks had had no choice but to follow suit. He argued that monetary policy approaches that increase global resilience should also be discussed within the central bank community. **Brunnermeier** responded that the current international monetary system allowed for some mitigation of negative shocks that occur in one country through the depreciation of home currency as an informal agreement, but he argued that it must not be allowed to go beyond that as a "beggar-thy-neighbor policy" and that policy coordination among central banks was important to build consensus.

Jordan commented that in response to preparatory QE, the banking sector could build up central bank reserves, but it would be subject to stress if there were an increase in legally required reserves that pay a zero interest rate. **Brunnermeier** responded that it was not necessary to absorb all the interest rate risk held by banks, but only to manage it to the extent that the impact of a rate hike does not undermine the stability of the financial system, and that in this case banks would be able to absorb the impact of an increase in the legally required reserve ratio. He stressed that QE should be seen as a policy to strengthen resilience to crises. **Gourinchas** asked whether QE as a preparatory tool would offer put options to banks, by promising to buy government bonds at a high price. **Brunnermeier** pointed out the importance of recognizing the possibility that interest rate risk in the banking sector could limit the pace of future rate hikes, adding that central banks did not necessarily have to purchase government bonds at a high price.

Ueda mentioned that the BOJ allocated some of its profits to provisions and asked whether this could be regarded as a measure to increase the adaptability for a future policy exit. He also asked how to think of the BOJ's purchases of risky assets such as ETFs in light of resilience. **Brunnermeier** responded that increasing the net asset value in the balance sheet was a prudent decision in terms of preparing for future losses. He added that the purchases of risky assets could be seen as a tool to increase the overall resilience of the economy in the sense that these purchases would ease the balance sheet constraint of financial institutions.

Evans asked about the consistency between the long-run neutrality of monetary policy and the assertion that the monetary policy in the resilience approach can achieve a better outcome in the long run than the other approaches. **Brunnermeier** replied that while monetary policy was neutral in the long run in a simple New Keynesian model, monetary policy could have long-term effects in a more complex model, such as a model in which monetary policy affects private investment.

Cochrane acknowledged the importance of the resilience approach, but asked whether it was really possible to know which state we were in and where the tipping point was. He also pointed out that if the reserve requirement ratio were raised but no interest paid on legally required reserves, financial institutions would find it difficult to pay interest to private depositors, as in the case of financial repression in the past. He also questioned the appropriateness of central banks taking on interest rate risk from

the market through QE, noting that the management of interest rate risk should be supervised by regulators and that such interest rate risk should essentially be absorbed by private bank capital. **Brunnermeier** replied that we should not give up identifying tipping points, etc. just because it was difficult, and that continued efforts would lead to some solutions. He continued that zero interest on legally required reserves could be seen as financial repression, but if the banking sector, due to its oligopolistic power in the deposit market, did not sufficiently pass on the interest rate on reserves to the interest rate on private deposits in the first place, it would act as a corrective force on banks to reduce the gap between the interest rate on reserves and the interest rate on deposits.

VI. Paper Presentation Sessions

A. Inflation, Monetary and Fiscal Policy, and Japan

Cochrane reviewed economic and price developments in Japan over the last 30 years and discussed the role of fiscal policy in explaining inflation.[6] First, he provided a novel view that during the last 30 years, Japan had seen the best monetary policy outcome, namely a steady price level, the zero interest rate that comes together with no opportunity cost of holding money, and satiation of liquidity demand. He then argued that because monetary policy was neutral to the real economy in the long run, 30 years of stagnation was not the consequence of monetary policy but was due to other problems. He continued that, in the past, Japan had had a rapid period of catch-up growth and reached close to the technological frontier, represented for example by the U.S., and since then the economy has been growing roughly parallel to the technological frontier in terms of GDP per working-age population. He further noted that the bursting of the asset bubble could also be interpreted as part of the transition process to the frontier.

Next, he introduced the Fiscal Theory of the Price Level (FTPL) and pointed out that expectations on long-term fiscal sustainability played a key role in determining inflation. He explained that under the FTPL, inflation did not occur in response to an increase in outstanding government debt if people expected that the government bonds issued would be repaid by raising taxes or offset by cutting government spending in the future. On the other hand, he continued, inflation occurred when people believed that a part of the increased debt would not be repaid. He then pointed out that Japan's experience had provided decisive tests to tell which inflation theories are correct, and he emphasized that during the zero interest rate period, Japan's economy had experienced neither a deflation spiral nor price fluctuations due to multiple-equilibria. He argued that these observations were therefore more consistent with the FTPL than with the standard New Keynesian model. He also argued that the monetarism argument did not necessarily hold because inflation had not picked up even though a large amount of debt had been exchanged for money under QE.

Finally, regarding the post-pandemic inflation, he referred to the cross-country study by Barro and Bianchi (2023), pointing out that inflation was correlated with the ratio of fiscal deficit to public debt, which was consistent with the implications of the

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6. For details, see Cochrane (2024).

FTPL. He added that the fact that the inflation rate had declined without a recession was also consistent with the FTPL's prediction. Turning to Japan, he argued that the reasons why Japan's inflation had been lower than other countries were threefold: an already high level of existing debt, a smaller relative size of fiscal expenditure, and a greater trust in the Japanese government.

As a discussant, **Nao Sudo** (BOJ) began by pointing out that the output gap in Japan had tended to be negative over many years since the early 1990s, and that observation suggested that the persistent demand shortage had kept inflation low. Regarding the FTPL, he noted that it was important for policymakers to identify the prevailing policy regime, i.e., whether the current regime was a combination of active monetary policy and passive fiscal policy or other combinations, because the policy implications differed greatly depending on the regime. Referring to Sunakawa (2024), he argued that the expectations of Japanese households on future government debt management and fiscal policy stance could be different from those of U.S. households, which possibly accounted for the difference in the inflation rate across two countries. **Cochrane** said that it was difficult to identify the regime, but insights into the regime would be obtained by examining what had happened during the zero interest rate environment that had continued for almost 30 years.

From the floor, **Schnabel** asked whether the effects of QE on broad money and inflation depended on economic circumstances such as the strength of the banking sector's balance sheet. **Cochrane** agreed and replied that central banks could not control the quantity of broad money such as M2. **Remolona** asked how international holdings of the U.S. dollar and U.S. Treasury securities would affect the FTPL discussions. **Cochrane** commented that demand for the U.S. dollar from foreign entities would lower the yield on the U.S. Treasury securities, but it did not affect the implications of the FTPL.

Ueda pointed out that in the late-1990s Japan's fiscal deficit had been growing, but the inflation rate had been negative, and asked, given that the FTPL holds, whether the observation could be evidence that people had viewed the increase in fiscal deficit as funded deficits. **Cochrane** argued that it was difficult to test the FTPL statistically, and that the credibility of the government should be tested from an economic history perspective rather than an econometric perspective.

Referring to high inflation in 2022, **Evans** said that it was natural to think of the cause of the high inflation as supply shocks at that time, such as disruptions in supply chains. He then asked how fiscal policy had contributed to rises in inflation. **Cochrane** replied that supply shocks themselves had caused only relative price changes, and that for the whole price level to rise, it was important to have some accommodative responses of monetary policy and/or fiscal policy. **Etsuro Shioji** (Chuo University) asked whether, contrary to the original intention of the policy, the BOJ's YCC had helped alleviate inflationary pressure through the mechanism of the FTPL by compressing the term premiums of JGB yields. **Jordan** asked what the results would have been if Japanese monetary policy had been more restrictive, and what policies would have made it possible to achieve 2% inflation earlier. **Mavroeidis** mentioned that the relationship between public debt and the inflation rate was just a correlation and not a causality. **Cochrane** admitted that it was a correlation but stressed that it was an inter-

esting observation. **Iwata** asked if persistent deflation should arise under Friedman's rule. **Cochrane** explained that inflation rate had not become negative in Japan because both nominal and real interest rates had been close to zero.

B. On the Zero-Inflation Norm of Japanese Firms

Hogen presented an analysis on the "zero-inflation norm" of Japanese firms, i.e., the observation that firms kept their prices unchanged for a prolonged period.[7] He first explained empirical observations on retail prices such as the frequency of price changes from the 1990s using the item-level and municipality-level microdata of Japan's official Retail Price Survey, which is the base statistics for the Consumer Price Index (CPI). In particular, dividing the sample period into three phases, Phase I, the high inflation period from 1990 to 1994, Phase II, the low inflation and deflation period from 1995 to 2020, and Phase III, the recent high inflation period from 2021 to 2023, he pointed out that the zero-inflation norm had been more prevalent during Phase II and more pronounced in the services sector than in the goods sector. He also pointed out that, from Phase I to II, in the services sector the frequency of price increases had declined noticeably while that of price decreases had risen modestly, giving rise to a zero-inflation norm in Phase II.

He then introduced a simple menu cost model and discussed how the zero-inflation norm was formed. Based on the simulation analysis using the model, he argued that at most roughly half of the emergence of the norm was explained by a decline in the actual inflation rate from Phase I to II, and that in order for the model to fully account for the emergence of the norm, there must have been additional changes from Phase I to II, such as increases in menu costs and increases in the degree of strategic complementarity in price setting. He stressed that in Phase II, firms had become less active and more cautious regarding price changes than the model suggests.

As a discussant, **Paolo Pesenti** (Federal Reserve Bank of New York) raised three questions: Was the emergence of the zero-inflation norm specific to Japan?; What were the relevant narratives that explain the timing and persistence of the zero-inflation norm?; Was the norm over by now, or could it be repeated? **Hogen** replied that the zero-inflation norm was not necessarily specific to Japan because it was observed in the past in other countries, and the standard menu cost model at least partly explained the emergence of the norm. Regarding the narratives, he argued that under a secular decline in the neutral rate and the binding ZLB constraint since the early 1990s, firms had faced harsh price competition, and thus they had become less active and more cautious regarding price changes. Finally, he commented that thus far, the norm was set to be dissolved, but whether or not the norm would emerge again was uncertain, since the observations about changes in the menu cost and the degree of strategic complementarities in the past implied that they could change in the future.

From the floor, **Cochrane** asked if the model exercise tried to explain the zero-inflation norm or tried to show the limitations of a menu cost model. He also asked how the paper dealt with seasonality and temporary sales in the price data analysis. **Hogen** replied that the emergence of the zero-inflation norm could be attributable to

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7. For details, see Furukawa *et al.* (2024).

various factors, such as increases in menu costs and increases in the degree of strategic complementarity, so that it was difficult to fully explain it with a single factor. He added that the price data analysis focused on regular prices. **Orphanides** asked if households' perceptions about unfairness in price changes were captured in the model. **Hogen** replied that though the model did not capture perceptions regarding unfairness in price changes explicitly, some aspects of unfairness could be implicitly reflected in changes in the strategic complementarity. **Olli Segendorf** asked how sectoral differences in wage setting and corporate profits had affected the zero-inflation norm. **Hogen** replied that the wage setting mattered significantly and pointed out that since the early 2000s many firms had been trying to secure profits under the pressure of declining price markups by reducing their labor costs through the hiring of part-time workers, especially in the non-manufacturing sector. **Iwata** asked how the aging in society had affected the zero-inflation norm. **Hogen** replied that aging could have indirectly affected the zero-inflation norm; for example, firms might have shifted their economic activities such as investment from Japan to abroad due to the decline in domestic demand.

C. Testing the Effectiveness of Unconventional Monetary Policy in Japan and the United States

Mavroeidis discussed the effectiveness of unconventional monetary policy, and presented empirical analyses for Japan and the U.S.[8] First, he introduced two opposing views about the effective lower bound (ELB) on the short-term interest rate–a conventional monetary policy instrument: one view is that the ELB limits the effectiveness of monetary policy, and another is that the ELB does not constrain the effectiveness if unconventional monetary policy is powerful enough. He added that the latter view is called the "irrelevance hypothesis," in the sense that the ELB is irrelevant to the effectiveness of monetary policy. He explained that a dynamic stochastic general equilibrium (DSGE) model was developed to explain the hypothesis, and that the statistical tests of the hypothesis were derived from the micro-founded DSGE model.

He said that the irrelevance hypothesis was firmly rejected by the tests that use data for Japan and the U.S. He stressed that the economic dynamics depended on whether the ELB constraint was binding or not, and that the hypothesis that the ELB is irrelevant to the conduct of monetary policy was strongly rejected by the data. He then raised the question of to what extent unconventional monetary policy has been effective under the ELB, and he explained the estimation results of the structural VAR that accounts for the ELB. He explained that, as suggested by the rejection of the irrelevance hypothesis, the effects of an unconventional monetary policy shock were smaller than those of a conventional monetary policy shock on the impact of the shocks. However, he added that the effects of unconventional monetary policy were greater with a lag in some cases. He pointed out that, for Japan especially, an unconventional monetary policy shock had a stronger positive effect on inflation and output gap with one-and two-year lags than a conventional monetary policy shock. He concluded that in evaluating the effectiveness of unconventional monetary policy it was essential to take into account

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8. For details, see Ikeda *et al.* (2024).

the ELB and the time horizon of its effects.

As a discussant, **Olli Segendorf** said that the paper had valuable policy implications for monetary policy in practice. Regarding the state-dependent effects of unconventional monetary policy, she asked whether the effects could be different during a financial crisis and in normal times as well as in the ELB and non-ELB regimes. She also asked whether the effects of QE could be different depending on the maturity of the bonds purchased. **Mavroeidis** agreed with the view that the policy effects are state-dependent, and that it was possible to analyze differences in the effects of monetary policy in various states by extending the model.

From the floor, **Reis** asked whether the results of the paper remained unchanged if a two-year interest rate is used instead of the ten-year interest rate as the long-term interest rate. He also pointed out that changing inflation expectations was important for policy implementation under the ELB, and asked if the paper's framework could include such a mechanism. **Mavroeidis** replied that the results of the paper remained unchanged even if a two-year interest rate is used, and agreed with the importance of the analysis focusing on inflation expectations. **Orphanides** questioned whether the analytical framework of this paper could capture changes in the central bank's policy reaction function. He also asked how the authors had dealt with measurement errors for output gaps used in the estimation. **Mavroeidis** replied that the analytical framework of the paper could capture changes in the central bank's policy reaction function by using a regime-switching model, and that measurement errors might affect the estimation results, but this problem could be addressed by estimating the model where the output gap is included in the model as an unobservable variable. **Uchida** asked about the mechanism behind the empirical results that show unconventional monetary policy has had small effects at short horizons but large effects with a lag. **Mavroeidis** replied that the results were based solely on empirical analyses, and it was an important research agenda for theory to explain the mechanism behind the empirical results.

Shioji and **Mototsugu Shintani** (The University of Tokyo) asked whether it is possible to empirically analyze the effects of different unconventional monetary policies separately, considering that Japan's unconventional monetary policy framework had changed several times in the past, such as the introduction of QQE and YCC, and so on. **Mavroeidis** answered that when calculating the impulse response functions, the effects of unconventional monetary policy were captured basically by the shadow rate in the current model, and it was possible to analyze the specific effects of different policies by extending the model. **Hibiki Ichiue** (Keio University) asked how the authors determined the specific level of the ELB, and how much a change in the level of the ELB would affect the estimation results. **Mavroeidis** replied that the level of the ELB was determined in line with previous studies, and the robustness of the estimation results had been checked regarding the level of the ELB.

D. Conventional and Unconventional Monetary Policies - Inflation and Resources

Reis systematically reviewed conventional and unconventional monetary policy tools, and the interest rate paid on reserves, using a simple model that consists of an arbitrage

condition regarding safe assets.[9] He then discussed the effectiveness of each policy tool in achieving the target rate of inflation.

First, he explained the control of the short-term nominal interest rate (policy rate)—a conventional monetary policy tool. He said that the real interest rate was equal to the policy rate minus inflation expectations in the absence of non-interest benefits of holding safe assets (i.e., convenience yields). He explained that, in this case, the inflation rate was determined by a feedback rule, widely known as the Taylor rule, where the policy rate was adjusted more than changes in the inflation rate. He pointed out that the effectiveness of conventional monetary policy also depended on private sector expectations, and thus the conduct of monetary policy called for transparency and clear communication, in addition to grasping the state of the economy, including the natural rate of interest.

He then mentioned that the economy could fall into a deflationary equilibrium due to the ELB on the policy rate when hit by large negative shocks, and that unconventional monetary policy had been deployed to avoid such a situation. He said, however, that forward guidance would not work if the commitment of central banks is not trusted by economic agents. He mentioned that QE worked by influencing convenience yields in a simple model, but, in practice, the problem was that QE could not affect the inflation rate without purchasing a huge amount of bonds. He argued that, for these reasons, unconventional monetary policy was less effective than conventional monetary policy, except for some special circumstances where the economy falls into the deflationary equilibrium, and he stressed that unconventional monetary policy could not be a substitute for conventional monetary policy.

Finally, in addition to achieving the inflation target, he discussed reserve policy from the perspective of liquidity provision and seigniorage. He argued that by paying interest on reserves, central banks could manipulate both the policy rate and the reserve volume separately, allowing them both to achieve the inflation target by manipulating the policy rate and to provide liquidity by controlling the reserve volume. In addition, he mentioned that introducing a tiered structure in reserves could solve issues regarding the heterogeneity of banks, including oligopoly, and a decrease in central bank profits due to interest paid on reserves.

As a discussant, **Masazumi Hattori** (Hitotsubashi University) provided an overview of the change of the BOJ's policy tools from conventional to unconventional monetary policy. He then explained that the unconventional monetary policy had been supposed to be transmitted to the economy by lowering the cost of financing, by lifting up inflation expectations, and by the resulting decline in the real interest rate. He also pointed out that the banking sector played an essential role in these transmission mechanisms. **Reis** agreed with the importance of the banking sector, and he replied that monetary policy transmission mechanisms called for proportional changes in private banks' lending rates and deposit rates in response to changes in the interest rate on reserves.

From the floor, **Brunnermeier** asked how the model's assumption on the timing of exogenous shocks affected the results, and whether there might be other benefits

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9. For details, see Castillo-Martinez and Reis (2024).

to liquidity in addition to convenience yields. **Reis** replied that the assumption itself does not significantly affect the results, and that liquidity benefits in the form of convenience yield were sufficient when it came to controlling inflation. **Jordan** pointed out that policy effects of interest paid on reserves could be different in the case of an increase in the reserve demand, for instance, when private financial institutions run into funding difficulties. **Reis** replied that the problem could be avoided by controlling the amount of reserves and the interest rate on reserves separately. **Evans** commented that Reis's presentation suggested that there would be no benefit in implementing QE unless the policy rate was constrained by the ELB, and **Reis** agreed with his comments. **Gourinchas** pointed out that controlling seigniorage as a policy tool may be better understood as fiscal policy rather than monetary policy, given that central banks take into account the transfer to the government. He also asked what the primary role of commercial banks would be if central banks were to begin to provide reserves directly to individuals, such as the retail Central Bank Digital Currency (CBDC). **Reis** replied that controlling seigniorage could be understood as fiscal policy, but added that it was not appropriate to call it fiscal policy in the context of this research because of its focus on the efficient provision of liquidity as opposed to the maximization of central bank profits. In addition, he said that it would be possible for central banks to set different interest rates on central bank liabilities such as those provided directly to individuals, e.g., the retail CBDC, and those held by private banks.

Carlos Garriga (Federal Reserve Bank of St. Louis) asked about the implications of this research for the easing effect of QE on financial conditions. **Reis** pointed out that QE was inferior to conventional monetary policy in achieving an inflation goal because QE could have different effects on the real economy, including the easing effect on financial conditions, but central banks cannot precisely control the magnitude of those effects. **Rehn** pointed out that the reason why there had been only a limited effect in raising inflation despite the implementations of various types of unconventional monetary policy in Japan might be that economic agents had not recognized newly introduced unconventional policy measures as a "meaningful change." **Reis** replied that it was always hard to steer expectations too finely, but that in relative terms it was less hard to anchor them with conventional monetary policy than it was with unconventional monetary policy.

VII. Policy Panel Discussion I

In the Policy Panel Discussion I, moderated by Orphanides, five panelists, Evans, Gourinchas, Rehn, Remolona and Vasle, discussed price dynamics.

A. Remarks by Moderator and Panelists
Orphanides kicked off the discussion by raising two issues: the dynamics of inflation had yet to be fully understood; and the Phillips curve, which plays a central role in the standard inflation forecasting model used by many central banks, had not worked well. He then asked the panelists what direction central banks should take going forward.

Evans reviewed the inflation performance during his tenure as the president of the Chicago Fed (from September 2007 to January 2023), showing that, while inflation had been below the 2% price stability target for most of the pre-pandemic period, the surge in inflation since the pandemic had pushed up the average inflation rate since 2007 to around 2%. He noted, however, that "bygones were bygones" under inflation targeting policy, meaning that inflation undershooting the target was something that did not need to be compensated for, and that we had learned the lesson that households and firms were extremely disgruntled with high inflation and large changes in relative prices. Next, he mentioned that central banks had been slow in switching to a tightening policy stance during the period of high inflation, and then presented a former Fed researcher's analysis on counterfactual simulations. He continued and explained that if the Fed had started raising rates in 2021 instead of 2022, inflation would have fallen to 2% somewhat faster, however, the peak inflation rate would have remained the same.

Rehn assessed that the main causes of high inflation in the euro area were the supply shocks caused by the pandemic and the surge in energy prices after the Russian invasion of Ukraine, and that wage inflation had been moderate during this period, contributing to a reduction in inflationary pressure. He noted that recently the principal driver of inflation had shifted from rising energy prices to wage inflation, reflecting the high inflation of recent years and the strong demand for labor, but added that inflation expectations had been anchored. He called for deeper analyses of structural changes in the labor market, such as immigration trends, to understand the ongoing dynamics of inflation. Finally, he stated that while inflation was approaching the ECB's medium-term objective, the ECB would not pre-commit to any interest rate path and would continue to conduct monetary policy by assessing the incoming data at each meeting.

Remolona reviewed inflation developments in the Philippines since the pandemic and acknowledged that the policy response had been behind the curve. He then noted that supply shocks had been judged to be disregarded during the initial phase, but subsequent analysis showed that supply shocks had a second-round effect from inflation expectations. In particular, he presented survey evidence indicating that recent increases in the price of rice, which is an important commodity in the Philippines, had had a significant impact not only on actual inflation but also on households' inflation expectations. He also presented the results of an analysis regarding the response of inflation expectations to rice and oil price shocks, showing that inflation expectations were more responsive to positive shocks than to negative ones. He then explained that this asymmetric response might explain why the second-round effect was persistent.

Vasle noted that the inflation rate in the euro area had begun to decline due to the significant interest rate hikes by the ECB during the period when supply shocks had receded. Turning to differences between the euro area and the U.S., he pointed out that on the supply side, the euro area had been affected more by the rise in energy prices because of its geographic proximity to Russia and high energy dependence on Russia, and on the demand side, the pace of post-pandemic demand recovery had been relatively slower in the euro area than in the U.S. He also laid out concerns in grasping future inflation dynamics as follows: (1) labor market developments and wage formation mechanisms across the 20 euro area countries are quite heterogeneous; (2) there is great uncertainty about the relationship between services price developments, wages,

and corporate profit margins; (3) fiscal tightening in individual countries has been lagging behind the ECB's monetary tightening; and (4) the monetary policy stance in the U.S. and in the euro area started to diverge.

Gourinchas presented an analysis of the evolution of headline inflation in major advanced and emerging economies since the pandemic, studying the contribution of each factor to the run-up to the peak and to the subsequent decline in the inflation rate. He explained that the analysis decomposed changes in headline inflation into (1) headline shocks caused directly by price shocks such as an energy price shock, and (2) the effects on core inflation exerted by economic slack and the pass-through. He pointed to the findings that in most major countries, a large part of inflation fluctuations can be explained by price shocks from energy and food prices and their pass-through to core inflation, and that the factor related to labor market slack had a limited contribution to pushing up the inflation rate. He then showed that the degree of pass-through to core inflation of energy price changes varied considerably across countries, and he pointed out that in addition to energy price movements, the individual factors that determine the degree of pass-through to core inflation of energy price were also important. He stressed that inflation expectations had been anchored throughout this episode, which had played an important role in inflation dynamics, and noted that synchronized tightening of monetary policy across most major economies might have contributed to a faster decline in energy prices and inflation by suppressing aggregate demand.

B. Discussion between the Moderator, Panelists and Floor Participants

Referring to Gourinchas's estimation result that slack factors had a limited impact on inflation, **Orphanides** reiterated the difficulty of forecasting inflation using the Phillips curve. He then asked what lessons had been learned about inflation dynamics from the experience of the past few years. He noted that there had been signs of a de-anchoring of inflation expectations, which could have contributed to the rapid rate hikes since 2022. He then asked for the panelists' views on the role of inflation expectations and their anchoring.

Evans argued that the explanatory power of the Phillips curve had declined as a result of a combination of different supply shocks, and that the slack factor remained important. He said that the lesson was that central banks had followed the standard approach of ignoring transitory supply shocks in spite of an atypical situation in the current episode. He added that the Fed's policy actions since the start of the rate hike had been swift, and that importantly long-term inflation expectation had remained stable. Referring to Gourinchas's analysis, **Rehn** asked whether there had been a relationship between the degree of pass-through of energy prices to core inflation and the degree of anchoring of inflation expectations. He noted that the situation in Europe in the first half of 2022 had been very uncertain following the situation surrounding Ukraine, which had led the ECB to take a wait-and-see approach. However, he assessed that subsequent rate hikes had been quick, contributing to keeping inflation expectations anchored. **Remolona** mentioned that monetary policy management during this period had been difficult due to the problem of measuring the degree of anchoring of inflation expectations, the output gap, and the neutral rate. **Vasle** said that there had been periods of high inflation in the past comparable to the current one, and that the credibility

built by the ECB over time and strong policy responses had helped to keep inflation expectations anchored this time.

Orphanides asked Gourinchas whether taking into account pass-through effects of price shocks could be a lesson for improving inflation forecasting models. Gourinchas replied that the standard Phillips curve framework remained sufficiently useful, and it had become clear that if central banks disregard overheating of the economy or large fluctuations in relative prices, core inflation could be significantly affected. In addition, he noted that it was an intriguing observation that the price-cap policy implemented by many countries to prevent increases in energy prices had led to a reduction in the pass-through of energy prices to core inflation, which in turn suppressed rising headline inflation. Regarding inflation dynamics, he replied that the analysis suggested that short-term inflation expectations affected actual inflation more than previously believed. He assessed that although there might have been signs of a temporary de-anchoring of inflation expectations, central banks had been able to successfully re-anchor inflation expectations during this period.

Orphanides then asked about the lessons learned for the conduct of monetary policy from the experience of the past four years. Evans said that it was important for central banks to take aggressive policy measures when the real economy and inflation were not on the right trajectory. Rehn said that one of the reasons why central banks in both advanced economies and developing economies had prevented stagflation in the current episode was that they had secured independence and built credibility about the price stability goal. Remolona pointed out that if the degree of anchoring of inflation expectations could be measured, the conduct of monetary policy could be implemented systematically by incorporating such information into the policy rule. He added that it was conceivable that central banks would become more aggressive in fighting inflation if the de-anchoring of inflation expectations becomes more likely. Vasle noted that policy instruments that had once been regarded as unconventional could now be regarded conventional. Gourinchas said that the current policy framework had worked to suppress high inflation without causing a major recession so far, but he argued that the effectiveness of this framework had yet to be tested in a severe environment where both persistent inflationary pressures and recessions occur simultaneously.

From the floor, Taylor said that more discussion and analyses would be needed to verify whether central banks had been behind the curve. Jordan asked about the implications of Gourinchas's analysis for central banks' appropriate policy responses to supply shocks. He also asked how the recent episode in the euro area should be understood, where the argument against quick rate hikes had been dominant in 2021 due to well-anchored inflation expectations, but large rate hikes had been required thereafter. Schnabel asked for views on service price inflation becoming persistent around the world. Referring to research showing that individual past inflation experience influences inflation expectations, she asked whether the experience of inflation in the current episode would make monetary policy more difficult in the future by making expectations more fragile to new shocks.

In response to Taylor's comment, Rehn said that one of the lessons from the ECB's monetary policy in the current episode was that forward guidance on the sequence of monetary tightening had reduced the flexibility of policy management. Remolona re-

sponded that central banks had indeed fallen behind the curve and pointed to evidence that they had to raise rates by 75 basis points. **Gourinchas** said that the lessons learned were two-fold: forward guidance should be reconsidered, and persistent supply shocks should not be ignored. Regarding Schnabel's first question, he replied that he was reasonably confident that services inflation would moderate in the future, as the relative prices of services and goods had returned to their pre-2019 trends. Turning to Schnabel's second question, he noted that in the current period, central banks had consumed some of the capital, i.e., credibility, that they had built up, and, therefore, their ability to respond to inflationary pressures caused by supply shocks in the future might be weaker. **Vasle** said that in retrospect, it was clear that central banks had fallen behind the curve, but he mentioned that in assessing the appropriateness of policy actions at the time, it was necessary to take into account the special circumstances in which severe shocks had occurred one after another. He then said that the destabilization of short-term inflation expectations was one of the factors that led the ECB to take its policy responses. **Evans** said that various scenario analyses of monetary policy had been conducted, and that robust conclusions had been reached regarding whether central banks had fallen behind the curve. He added that a more difficult question was whether it had been premature to stop raising rates at 5.3% (on a reverse repo rate basis), saying that he personally did not think so.

Brunnermeier expressed concern that market participants may have interpreted forecasts as more optimistic and accommodative than policymakers intended. He also asked how changes in working styles, including working from home, had affected inflation dynamics. Highlighting the fact that inflation around the world had been well above the 2% price stability target, **Cochrane** wondered why there was no systematic study of exactly what mistakes central banks had made. **Himino** asked how to interpret the simulation results in Evans's presentation, given that the results were similar despite the major differences in policy responses. In response to Himino's question, **Evans** agreed with the view that there are several interpretations of the assumptions and the results of the counterfactual simulation using models. He then commented that these sorts of counterfactual simulations were often conducted by the Fed, and the Fed might have been trying to stockpile the lessons learned from the post-pandemic episode. **Garriga** asked how central banks, in the conduct of monetary policy, took into account the fact that a rise in interest rates can have a significant effect on households with large mortgages with floating interest rates.

Remolona agreed with Cochrane's point and replied that he thought central banks should conduct more ex post policy reviews. In response to Brunnermeier's question about the formation of market participants' expectations, **Rehn** said that he thought it was important to communicate clearly and consistently about policy board decisions. Turning to changes in the labor market, he said that while he had yet to have a concrete answer, a recent characteristic was that working hours had not increased as much as the labor force participation rate. As related examples, he noted that Friday in Finland was now part of the "long weekend" because of the widespread use of working from home, and that in Germany, labor unions demanded shorter working hours rather than higher wages. He also mentioned that he was fully aware of the existence of fixed and floating rate loans as a complicating factor in the transmission of the effects of monetary pol-

icy. **Vasle** also responded that considerable resources had been devoted to analyzing structural changes in the labor market, and that large differences in mortgage contract practices across euro area countries complicated the conduct of monetary policy. **Evans** looked back on the recent episode, and he said that a recession would have been necessary to achieve the 2% inflation target in the recent situation where large changes in relative prices of goods and services had occurred. He argued that the most important thing during this period had been to limit the damage of the recession while preventing a permanent change in inflation expectations. **Gourinchas** noted that many forecasting models used by central banks, etc., were linear, which made them good at capturing responses to small shocks, and that more accurate nonlinear models would be needed for economic forecasting with large shocks, such as those in the recent episode. **Rehn** noted that even if advances in economics allow for deeper understanding of the dynamics of the macroeconomy, expert judgment by humans would continue to be necessary in times of high uncertainty.

Orphanides concluded the panel discussion by saying that it was a welcome change that central banks had become more open about regular policy reviews, and that recent experience offered valuable opportunities to improve the monetary policy framework and policy management.

VIII. Policy Panel Discussion II

In the Policy Panel Discussion II, moderated by Brunnermeier, five panelists, Bowman, Jordan, Mester, Schnabel, and Himino, discussed the effects of conventional and unconventional monetary policy.

A. Remarks by Moderator and Panelists

Brunnermeier first introduced the theme of the panel discussion, "the effects of conventional and unconventional policy instruments." He said that he expected all panelists to express their views and participants to have lively discussions from the floor especially on forward guidance, communication, asset purchases, QE, and foreign exchange interventions. He then moved on to remarks from each of the panelists.

Mester discussed forward guidance and communications. She first stated that forward guidance about the future path of the policy rate could be effective under the ELB by affecting long-term interest rates, and assessed that forward guidance was a useful policy tool. However, she pointed out that forward guidance faced two challenges. She argued that the first challenge was about communications on commitment. She continued that since the effectiveness of forward guidance depended on the strength of the commitment to the future policy path, policymakers often faced time inconsistency problems. Next, she argued that the second challenge was about communications on policy reaction functions. She acknowledged that building public understanding of forward guidance was challenging in practice because forward guidance was a policy that promises temporary deviations from normal behavior. To address these issues, she made two recommendations: "use their own words" and "connect the dot plots with economic projections." Regarding the former recommendation, she pointed out that in-

stead of focusing on short and concise communications, policymakers should use their own words to manage narratives. With regard to the latter, she recommended that the FOMC connect the participants' dots, i.e., their projections of the federal funds rate, to their economic projections in the Summary of Economic Projections (SEP), rather than keeping them separate, so that people could more easily understand their reaction function.

Bowman focused on the use of the central bank balance sheet as an unconventional monetary policy tool.[10] She first assessed that the Fed's QE (Large-Scale Asset Purchases: LSAPs) following the global financial crisis (GFC) contributed to the decline in long-term interest rates, by reducing term premia. She argued that the QE after the GFC could be considered a success, with the unemployment rate having fallen and the inflation rate having remained close to 2 percent during the period of QE. She then mentioned balance sheet policy during the COVID-19 pandemic. She stated that the FOMC had deployed large-scale asset purchases starting in March 2020 to restore the functioning of financial markets, to support financial stability, and to provide monetary policy accommodation, and that the pace of such purchases during the pandemic period had been much greater than during the previous QE episodes. However, she wondered whether the FOMC should have conducted such large purchases of agency MBS (Mortgage Backed Securities) into late 2021, given the underlying strength of the housing market relative to the GFC. Moreover, given the high level of fiscal support to household and businesses, she raised the question of whether the FOMC should have made such large purchases of Treasury securities over such a long period of time. She pointed out that because the effects of QE could depend on the economic and financial system conditions, policymakers had to balance the risk of "doing too little" against the risk of "doing too much" depending on the situation.

Schnabel argued that asset purchases could be a powerful tool when financial markets were in turmoil, but outside these periods, central banks needed to carefully assess whether the benefits of asset purchases outweigh the costs.[11] With respect to how asset purchases work, she said that there were three main transmission channels: (i) the signaling channel, (ii) the liquidity channel, and (iii) the portfolio rebalancing channel. She then argued that the experience after this great inflation was likely to have significantly weakened the role of the signaling channel as the response by central banks worldwide to the surge in inflation was a forceful reminder that policymakers cannot tie themselves to the mast of a ship as Odysseus did in Greek mythology. She continued that central banks can only credibly communicate about the likely future direction of monetary policy in a "Delphic" way – that is conditional on how the economy evolves. Regarding the liquidity channel, she stated that the experience of the past 15 years suggested that this channel had been effective in stabilizing the financial markets, for example, during the COVID-19 pandemic and the "dash for cash" in the U.S. Finally, she mentioned that the portfolio rebalancing channel was a primary part of the stimulus effect on aggregate demand in the vicinity of the ELB. She noted, however, that the evidence since the GFC suggested that the effects of QE on yields, activity and prices were state-dependent and have been found to be smaller outside crisis periods, when

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10. For details, see Bowman (2024).
11. For details, see Schnabel (2024).

balance sheet constraints and limits to arbitrage are less binding (For details, see Schnabel (2024)). She argued that asset purchases come with side effects and these effects might be higher than those of the other conventional monetary policies.

Jordan shared the experience of the unconventional monetary policy implemented by the Swiss National Bank (SNB) to ensure price stability, namely the foreign exchange interventions and the negative interest rate policy. He stated that since the Swiss franc was regarded as a safe haven currency and the foreign interest rate cuts had compressed interest rate differentials, Switzerland had experienced a massive inflow of funds and appreciation of the Swiss franc after the GFC. He said that this overvaluation of the Swiss Franc had made financial conditions substantially tight because the Swiss economy was closely linked to the exchange rate. He explained that QE had not been considered as a viable option to deal with the situation. The SNB had instead decided to adopt foreign exchange interventions and the negative interest rate policy. He stated that while those policies had helped to protect the Swiss economy from deflation, there had been several negative side effects, such as rapid expansion of the central bank balance sheet, the impact of the negative interest rate on financial institutions, and the impact on asset prices, especially real estate prices. He emphasized that although unconventional measures were beneficial, there were also negative side effects, and he pointed out the importance of a cost-benefit analysis when making a judgment about the usefulness of unconventional measures.

Himino shared the BOJ's experience of using the widest range of unconventional instruments for the longest period of time. He stated that forward guidance had better be conducted based on the state of the economy rather than the calendar, and on outlook than on outcome. He added that QE was particularly effective when the financial markets were under stress, and that the transmission of the negative interest rate policy depended significantly on the competitive structure of the banking sector. He stated that although there was some concern that exiting the YCC might cause disruptions, the BOJ's experience suggested that it was possible to make a seamless transition from the YCC to regular QE, at least under certain circumstances. He raised the question of the appropriateness of using unconventional policy instruments for a long time in non-crisis periods while recognizing some of the unconventional policies are already in the standard toolkit of many central banks. He also mentioned that the transmission channels of unconventional monetary policies include changes in asset prices, such as real estate and stock prices, or foreign exchange rates, and he raised the question of how we should incorporate the asset price context in which unconventional instruments operate into the analysis of the roles they play.

B. Discussion between the Moderator, Panelists and Floor Participants

Brunnermeier asked the panelists about the side effects of prolonged unconventional monetary policy and whether central banks should simultaneously design an exit strategy when launching unconventional monetary policy in the future. He also asked what kind of guiding principle should be provided regarding the size of central bank balance sheets.

Mester argued that having an exit strategy when central banks start the unconventional monetary policy, or at least having an idea of the criteria and the timing for an

exit, would be helpful and a good way to discipline central banks. She also mentioned that central banks needed to consider the optimal maturity composition of their balance sheets in case QE was utilized again in the future. **Bowman** agreed with Mester and argued that it was important to reduce the balance sheet size as much as possible. She continued that, in deploying asset purchases, central banks would need to distinguish whether it is in response to a severe economic crisis or in response to an increase in volatility in particular markets. **Schnabel** agreed with the previous discussions on the necessity of an exit strategy. Regarding the persistence of QE, she stated that the ECB's Targeted Longer-Term Refinancing Operations (TLTROs) could effectively ease financial conditions, avoiding the side effect inherent in QE whereby it takes longer to reduce balance sheets, because the size shrank automatically as private banks began to repay their outstanding loans. In addition, she explained that the eventual size of the balance sheet depended on the framework of market operations. In the process of reducing balance sheet size, she noted that central banks had to choose either to maintain (i) the "supply-driven floor system" that had been adopted as a result of QE, or alternatively, to make a transition to either (ii) a "demand-driven system," where the marginal unit of reserves is provided on demand through regular refinancing operations, or (iii) the "corridor system" that was widespread before the GFC. She explained that the ECB had chosen a demand-driven system because it allowed the ECB to reduce the balance sheet size while avoiding disruptions in the money markets. She also pointed out that a cost-benefit analysis should be conducted from a long-term perspective, as most of the side effects of unconventional monetary policy may materialize only with a considerable time lag.

Jordan first pointed out that central banks should use foreign exchange interventions only as long as needed, and negative interest rate policies should be maintained for as long as necessary. He assessed that it was difficult to clearly define exit strategies for unconventional monetary policy soon after its introduction. He also stated that when the SNB had been trying to reduce the size of its balance sheet, it also aimed at minimizing the impact on financial conditions. He agreed with Schnabel's remark on the importance of a cost-benefit analysis, but he also stated that such an analysis might be difficult to conduct during the crisis. **Himino** mentioned that the BOJ had to be more patient about the policy exit than in other jurisdictions because inflation expectations in Japan needed to be anchored at 2% in contrast to other jurisdictions where inflation expectations were well anchored. He also stated that, given the size of its current balance sheet, the BOJ still had lots of time to think about the eventual size of its balance sheet.

From the floor, **Cochrane** asked whether it was possible to argue that the benefits and costs of QE had been small, given that such a large-scale QE as that conducted in Japan, which had been larger than in other jurisdictions, had had a limited effect on inflation. He also asked, especially with respect to the U.S., whether the low interest rate environment had been prolonged by flexible average inflation targeting or whether commitment to maintaining the low interest rate environment had been violated. Regarding the cost of QE, for example, **Himino** mentioned that market price discovery functions in the government bond market had deteriorated in the sense that pricing does not fully reflect changes in the real economy and financial conditions due to the BOJ's

significant presence in the secondary market of government bonds. **Mester** replied that there was great uncertainty about making the appropriate policy decision at the appropriate time, adding that, in some circumstances, central banks might abandon forward guidance and might give up time consistency. **Schnabel** commented that forward guidance had certainly limited the central bank's policy flexibility, though the ECB did not adopt flexible average inflation targeting.

Reis asked about the role of lending facilities as an unconventional policy tool, mentioned by Schnabel, and asked about how to deal with the problem that demand of reserve is volatile when reducing the balance sheet size. **Schnabel** replied that if central banks could revive the interbank market function that absorbs daily local liquidity shocks, central banks did not have to worry very much about large fluctuations in the size of their balance sheet. **Bowman** shared the experience of when the FOMC resumed balance sheet growth in October 2019 to ensure that the level of reserves remained ample against the background of high market volatility, such as the spike in repo rates, and added that this type of policy should only be used when absolutely necessary.

Remolona mentioned that forward guidance tended to be seen as a standard policy tool, and he asked whether we needed to distinguish clearly between unconventional monetary policy and forward guidance. **Jordan** replied that it was hard to distinguish clearly between the two since forward guidance did not have an exact definition; it could, for example, include a broader meaning such as an explanation of the transmission mechanism and the policy reaction function. **Orphanides** asked why policymakers could not provide guidance on the exit strategy, while acknowledging some degree of discretion as the exit depends on actual and expected inflation. **Jordan** replied that the reason policymakers are reluctant to announce the exit from unconventional policies at an early stage is the relatively high risk of being misunderstood when the exit is in the distant future. **Bowman** agreed with Jordan's reply.

Uchida mentioned that it could be argued that the effect of QE and quantitative tightening (QT) is asymmetric and the effect of QE is greater than that of QT, due to the announcement effects associated with government bond purchases for monetary easing, and asked why the empirical results in the study mentioned by Schnabel suggest that the stock effect is almost the same during QT and during QE in the euro area. **Schnabel** responded that the stock effect during QE and during QT could be almost symmetrical since QT was also associated with the announcement effect through the central bank's communication to the public but noted that the effects may be weaker as QT is implemented more gradually.

Regarding communications on policy reaction functions mentioned by Mester, **Pesenti** asked whether it was possible to improve communications by publishing communication tools such as a consensus forecast. **Mester** agreed that it was an option, but added that there was room for improvement in the SEP. She continued that, to improve communication, the SEP had actually started to show confidence bands around the median of projection. **Schnabel** commented that it would be better for effective communication to show several scenarios based on different assumptions than to show only one realistic scenario. In contrast, **Jordan** noted that the SNB was distinct in the sense that foreign exchange market interventions were used to fulfill its monetary policy

mandate, and therefore, unlike other central banks, the SNB had tried to have homogeneous communication because heterogeneous communications would have a negative impact on the effectiveness of foreign exchange interventions. Regarding communication, **Himino** added that speaking to various economic agents and listening to them were equally important, and that such two-way communication would help build public confidence in central banks' policies.

Taylor mentioned that monetary policy rules were sometimes shown as a table that covers various rules other than the standard Taylor rule, and he asked how the Fed would use such a table in its communication strategy. **Mester** replied that the Fed sometimes showed several monetary policy rules as a benchmark for communication, but the Fed would never use a single specific policy rule. **Bowman** stated that economic data, such as job growth and inflation rates, were eventually revised up from their initial estimates, sometimes significantly, so that it was difficult to simply apply these data in real time to monetary policy rules or economic models. She added that, nevertheless, the Fed had not completely ignored the rules, as the implications of various monetary policy rules were included as one element among the vast amount of information used to make policy decisions.

Iwata asked whether there was a more appropriate order for the introduction of QT and rate hikes. He also asked whether QT should be an autopilot based on a predetermined amount of reduction or should be flexibly adjusted while monitoring reactions in money markets. **Jordan** argued that policy priority might differ depending on the situation, and it would be difficult to come up with a general rule that was applicable to all circumstances. **Himino** stated that if central banks specified the order for the introduction of QT and rate hikes in advance, they might increase the risk of falling behind the curve as a result, as Orphanides argued in his speech last year at this conference, and that such a situation would not be favorable.

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APPENDIX 1: PROGRAM

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

Mayekawa Lecture: The Way to Stability and Growth in the World Economy
Chairperson: **Peter Kažimír**, Národná banka Slovenska
Lecturer: **John B. Taylor**, Stanford University

Theme A: Price Dynamics

Keynote Speech I: Price Dynamics in Japan over the Past 25 Years
Chairperson: **Shin-ichi Fukuda**, The University of Tokyo
Speaker: **Shinichi Uchida**, Bank of Japan

Session 1: Inflation, Monetary and Fiscal Policy, and Japan
Chairperson: **Shin-ichi Fukuda**, The University of Tokyo
Paper Presenter: **John H. Cochrane**, Stanford University
Discussant: **Nao Sudo**, Bank of Japan

Session 2: On the Zero-Inflation Norm of Japanese Firms
Chairperson: **Shin-ichi Fukuda**, The University of Tokyo
Paper Presenter: **Yoshihiko Hogen**, Bank of Japan
Discussant: **Paolo Pesenti**, Federal Reserve Bank of New York

Policy Panel Discussion I
Moderator: **Athanasios Orphanides**, Massachusetts Institute of Technology
Panelists: **Charles L. Evans**, formerly of Federal Reserve Bank of Chicago
Pierre-Olivier Gourinchas, International Monetary Fund
Olli Rehn, Bank of Finland
Eli M. Remolona, Jr., Bangko Sentral ng Pilipinas
Boštjan Vasle, Banka Slovenije

Theme B: Effects of Conventional and Unconventional Policy Instruments

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Keynote Speech II: (Un)conventional Monetary Policy and Resilience

Chairperson:	**Takeo Hoshi**, The University of Tokyo
Speaker:	**Markus Brunnermeier**, Princeton University

Session 3: Testing the Effectiveness of Unconventional Monetary Policy in Japan and the United States

Chairperson:	**Takeo Hoshi**, The University of Tokyo
Paper Presenter:	**Sophocles Mavroeidis**, University of Oxford
Discussant:	**Åsa Olli Segendorf**, Sveriges Riksbank

Session 4: Conventional and Unconventional Monetary Policies - Inflation and Resources

Chairperson:	**Takeo Hoshi**, The University of Tokyo
Paper Presenter:	**Ricardo Reis**, London School of Economics and Political Science
Discussant:	**Masazumi Hattori**, Hitotsubashi University

Policy Panel Discussion II

Moderator:	**Markus Brunnermeier**, Princeton University
Panelists:	**Michelle W. Bowman**, Board of Governors of the Federal Reserve System
	Thomas J. Jordan, Swiss National Bank
	Loretta J. Mester, Federal Reserve Bank of Cleveland
	Isabel Schnabel, European Central Bank
	Ryozo Himino, Bank of Japan

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Kosuke Aoki	The University of Tokyo
Jan Marc Berk	De Nederlandsche Bank
Tobias Blattner	European Central Bank
Michelle W. Bowman	Board of Governors of the Federal Reserve System
Markus Brunnermeier	Princeton University
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Kazuki Otaka	Bank of Japan
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Hajime Takata	Bank of Japan

Naoki Tamura	Bank of Japan
Fumikazu Taniguchi	Bank of Japan
Eva Taylor	European Central Bank
John B. Taylor	Stanford University
Shinichi Uchida	Bank of Japan
Kazuo Ueda	Bank of Japan
Boštjan Vasle	Banka Slovenije
Masazumi Wakatabe	Waseda University
Tsutomu Watanabe	The University of Tokyo
Naoyuki Yoshino	Keio University
Rebecca Zarutskie	Board of Governors of the Federal Reserve System

Opening Remarks

by Kazuo Ueda,
Governor of the Bank of Japan

I. Introduction

It is our great pleasure to welcome distinguished speakers and guests to our 29th BOJ-IMES Conference. We would like to thank you all for your participation. I would also like to thank my old friend, John Taylor, who was the very first Mayekawa Lecturer in 2008, for coming back to our conference to deliver his second Mayekawa Lecture later.

While we hold our research conference almost every year, this year's conference is unique in that it is held as part of our "Broad Perspective Review" of monetary policy. The review aims to further deepen our understanding of various unconventional monetary policy measures over the past 25 years and to gain insights that will be useful for future policy conduct. This conference will cover two main themes: "Price dynamics" and "Effects of conventional and unconventional monetary policy instruments." We very much look forward to lively discussions with you today and tomorrow to gain further insight into these themes. To set the stage, let me start my remarks with the recent changes in our monetary policy framework, followed by my reflection on the past 25 years condensed into 20 minutes.

II. Japan's Zero-Inflation Trap and the BOJ's Large-Scale Monetary Easing

Changes in the Monetary Policy Framework

The Bank of Japan (BOJ) decided on the termination of most of its non-traditional monetary easing measures at its March 19 meeting, in response to the improving inflation outlook. Discontinued measures included: the yield curve control (YCC) involving a negative short-term policy rate and control of the 10-year JGB yield, and purchases of risky assets such as equity-linked ETFs and J-REITs. Additionally, two types of forward guidance were ended: one stating that the BOJ would continue with Quantitative and Qualitative Monetary Easing (QQE) with YCC as long as it was necessary for maintaining the price stability target in a stable manner, and the other indicating that the BOJ would continue expanding the monetary base until inflation exceeded 2% and stayed above the target in a stable manner. For further insights into this decision, please refer to my speech at the PIIE (Ueda, 2024).

The Zero-Inflation Trap and the Zero Lower Bound on the Nominal Interest Rate

Reflecting on the past, the BOJ initiated non-traditional easing measures in the late 1990s, with brief interruptions during 2000–2001 and 2006–2007 when the short-term policy rates were positive. Having been a BOJ board member during the inception and termination of these measures, I would like to discuss their efficacy and limitations. While extensive literature exists on this topic, the BOJ is currently conducting a "Broad Perspective Review" of its experience, as I mentioned earlier, with results forthcoming. Today, I confine myself to informally addressing the perennial question of Japan's struggle to escape a long period of zero-to-low inflation, also known as the zero-inflation trap, despite extensive non-traditional monetary policy interventions. This discussion also serves as an introduction to this conference.

Chart 1 shows a simple 3-year moving average of the rate of change in headline CPI, and vividly illustrates the zero-inflation trap. Inflation, by this measure, remained between −1.0% to 0.7% from 1996 to 2022, a span of 27 years.[1] I think that the primary explanation for this phenomenon lies in the effective zero lower bound on nominal interest rates (ZLB), shown in Chart 2, where the overnight rate fell below 0.5% by late 1995. By the onset of the zero-inflation trap, the BOJ had exhausted its leverage over short-term interest rates as a means of stimulating the economy.

The BOJ's Large-Scale Monetary Easing

I acknowledge potential objections to this assertion. Many central banks, including the BOJ, introduced various non-traditional measures to stimulate the economy, some of which remained in use in Japan until recently, as outlined earlier. I anticipate presentations during the conference will suggest that some of these measures can effectively overcome the difficulties created by the ZLB. Nonetheless, the BOJ's prolonged struggle to escape the zero-inflation trap serves as evidence of the challenges posed by the ZLB.

Some may argue that the evolving policy framework adopted by the BOJ was at certain points not optimal. For instance, during the initial years of the zero-inflation trap, there was no explicit inflation target. In 2000, the BOJ deliberated whether it should define the price stability as some specific inflation rate, such as zero or a small positive number, but did not reach a consensus at that time. Eventually, in March 2006, the BOJ stated that a range of 0 to 2% with a median of 1% was consistent with its understanding of price stability before clarifying further by confirming in December 2009 that the range did not include negative values, and the BOJ finally introduced the price stability target of 2% in January 2013. With hindsight, the introduction of a clear inflation target could have influenced the discussion before the BOJ's decision to terminate the zero-interest policy in August 2000. At that time, core inflation was still −0.5 percent, while forward guidance on the short rate introduced in April 1999 stated that the Bank would continue the zero rate until deflationary concerns were dispelled. Although it is difficult to attribute the subsequent deflation solely to the minor rate increase, the termination may have weakened the efficacy of the forward guidance.

Another aspect worth considering is the timing of asset purchases. The BOJ's active

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1. The CPI figures are staff estimates and exclude the effects of the consumption tax rate hikes, and others.

acquisition of long-term JGBs happened relatively late compared with the observed inflation dynamics (Chart 1). While the BOJ began buying more long-term JGBs with the onset of quantitative easing in March 2001, there was no significant increase in its holdings of JGBs until 2013, as shown in Chart 3. By contrast, the Fed's holdings of US Treasury securities began to rise sharply in early 2009, in response to the global financial crisis.

Having said that, it should be noted that, as shown in Chart 4, the 10-year JGB yield was already below 2% in the late 1990s, while the 10-year Treasury yield was close to 4% when the Fed initiated its large asset purchases. This prompts the question of how much impact larger-scale JGB purchases would have had in the early 2000s.

The Zero-Inflation Trap and the Entrenched Nature of Low Inflation Expectations

Let me now turn to a second possible explanation for the BOJ's difficulties. I think the entrenched nature of low inflation expectations played a key role; it led to changes in economic agents' behavior, especially the strategic pricing behavior of firms, and, in turn, prolonged the period of the zero-inflation trap. As my colleagues will elaborate later, when firms do not think their peers will raise prices, they think it is best to keep their prices (and wages) unchanged, even in the face of small changes in costs or demand, making overall inflation or inflation expectations more entrenched at around zero. An economy in this situation may need a large shock to move from one equilibrium to another.

The BOJ conducted extensive surveys among firms regarding their price-wage-setting behavior. Chart 5 shows some notable findings. Many firms answered that, during the period of the zero-inflation trap, they were not able to raise prices because their competitors were not doing so, while over the past couple of years, the opposite trend has emerged. While there is an element of circular reasoning in this observation, the important point is that such strategic interactions can give rise to multiple equilibria, or, at least diminish the response of prices and wages to positive shocks.[2] Chart 6 shows the rate of change in wages set in the annual spring wage negotiations, which astonishingly remained at virtually zero during 1999–2013, reflecting the entrenched nature of the zero-inflation trap. However, there is evidence of changes after 2013: first, wages started to rise modestly in response to the new easing policy framework introduced in 2013 and the emerging labor shortage; then they rose sharply in 2023–2024, probably in response to the recent global inflation and the continuation of the easing framework.[3]

III. Challenges Ahead

Let me briefly outline the challenges that lie ahead. Our primary objective is to achieve 2% inflation in a sustainable and stable manner. Thus far, we have made progress in moving away from zero and lifting inflation expectations, but we must now re-anchor them, this time at the 2% target. We will proceed cautiously, as do other central banks

2. Taylor (2000) makes a similar point with regard to US inflation dynamics. Lagarde (2023) argues that the global inflation of 2021–23 acted as a coordination mechanism in changing expectations and pricing behavior.
3. See, Ueda (2024) and Uchida (2024).

with inflation-targeting frameworks. While many of the challenges we face are similar to those encountered by our counterparts, some are uniquely difficult for us.

One prime example of such challenges is determining the neutral interest rate (r^*). Estimating it accurately is challenging for any central bank, but it is particularly so in Japan, given the prolonged period of near-zero short-term interest rates over the past three decades. Although real interest rates have exhibited some fluctuations, the absence of significant interest rate movements poses a considerable obstacle in assessing the economy's response to changes in interest rates.

Last, but certainly not least, I hope the discussions at the conference today and tomorrow will offer some valuable takeaways for the central bank community and be of some help going forward.

Thank you for your kind attention.

Chart 1   Inflation Rate (Consumer Price Index <All Items>)
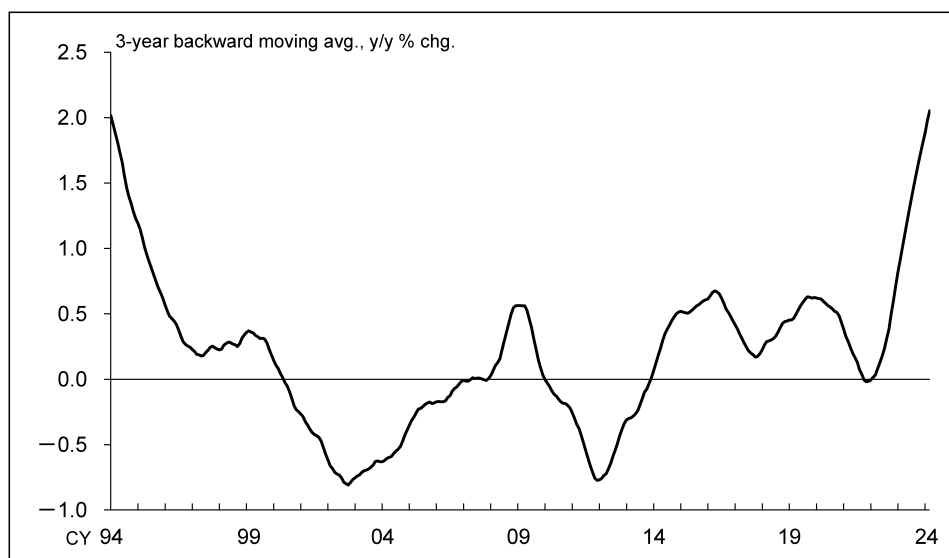
Note: Figures are staff estimates and exclude the effects of the consumption tax hikes, policies con-
cerning the provision of free education, and travel subsidy programs.
Source: Ministry of Internal Affairs and Communications.

Chart 2   Short-Term Interest Rate and Inflation Rate
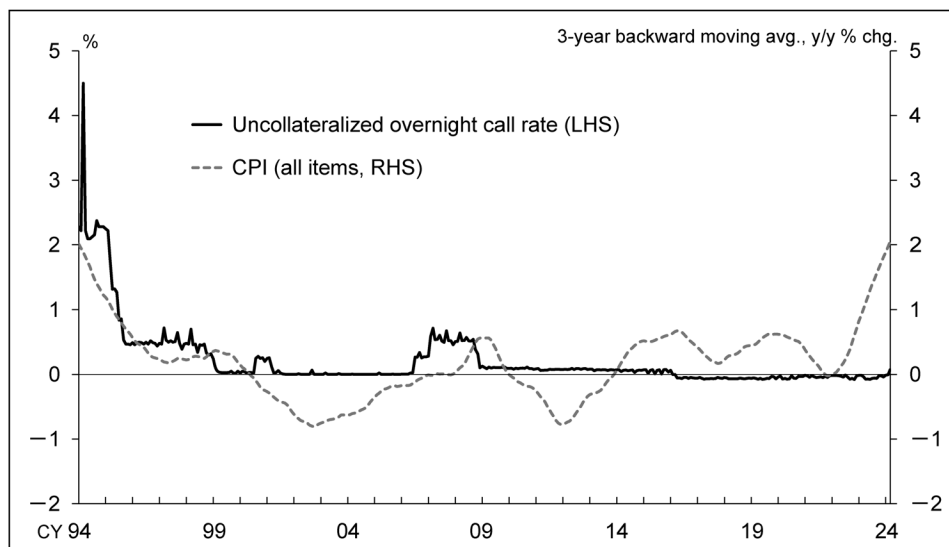
Note: The CPI figures are staff estimates and exclude the effects of the consumption tax hikes, policies
concerning the provision of free education, and travel subsidy programs.
Sources: Ministry of Internal Affairs and Communications; Bank of Japan.

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Chart 3   Central Bank's Government Bond Holdings
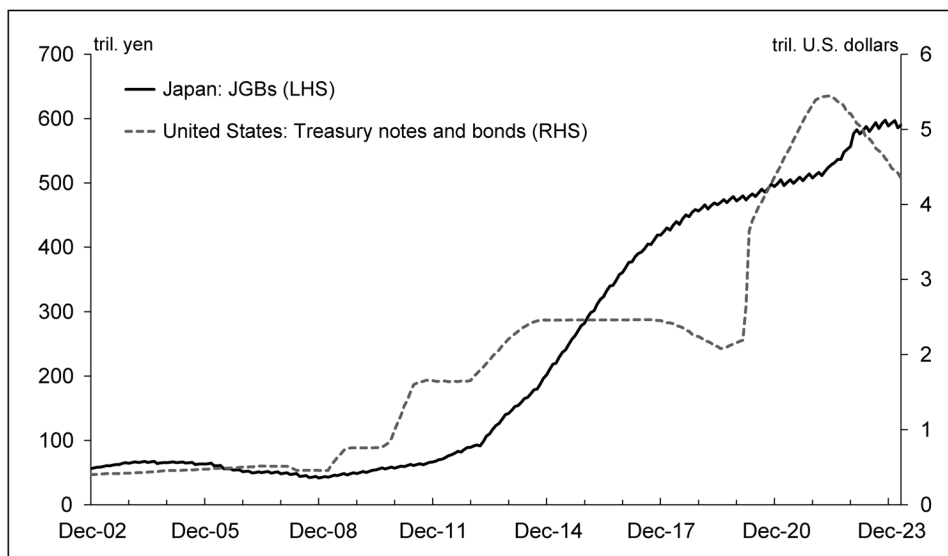
Note: Figures are monthly data for Japan and data on last Wednesday of each month for the United States.
Sources: Board of Governors of the Federal Reserve System; Bank of Japan.

Chart 4   Long-Term Interest Rates

Note: The long-term interest rates are market yield on U.S. Treasury Securities and JGBs at 10-year constant maturity.
Sources: Board of Governors of the Federal Reserve System; Ministry of Finance.

Chart 5   Large-Scale Survey on the Corporate Sector
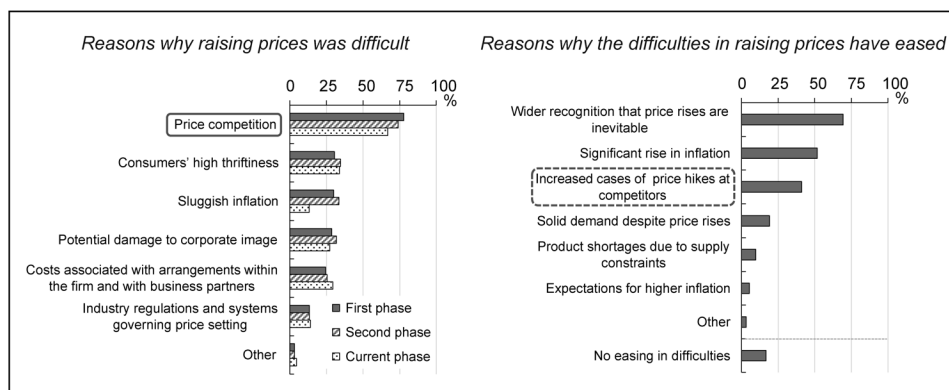
Note: In the left-hand chart, firms were asked to respond to the question by dividing the past 25 years since the mid-1990s into three phases, which comprise (1) the "first" phase, defined as the period from the mid-1990s to the 2000s, (2) the "second" phase, defined as the 2010s, and (3) the "current" phase, defined as the period over the past one year.

Source: Bank of Japan.

Chart 6   Base Pay Increase (Spring Wage Negotiation)

	CY 2023	CY 2024
Base pay increase	+2.1%	+3.6%
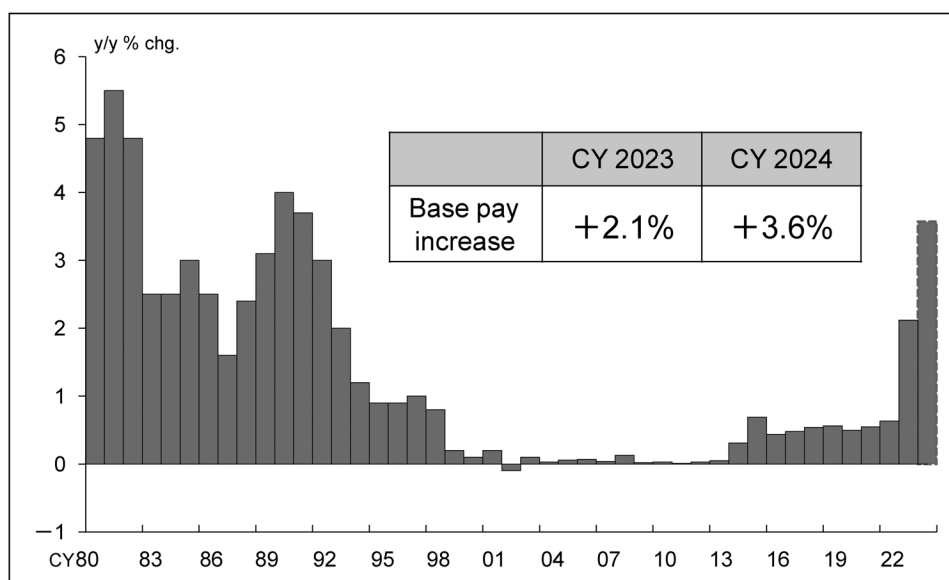
Note: Figures from 1980 to 2014 are those published by the Central Labour Relations Commission, while those from 2015 to 2024 are figures released by Rengo. The figure for 2024 is from Rengo's fifth aggregation.

Sources: Japanese Trade Union Confederation (Rengo); Central Labour Relations Commission.

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The Mayekawa Lecture:
The Way to Stability and Growth in the World Economy

by John B. Taylor

I. Introduction

The establishment of this lecture series was originally the outcome of discussions which led to my selection as the inaugural lecturer. My address, "The Way Back to Stability and Growth in the Global Economy" (Taylor [2008]), occurred at a fragile moment for the economies of the world. How fragile it was, we would not know until a few months later.

A major concern at that conference, however, reflected in my speech, was not so much potential deflation (a problem on which Japan finally seemed to be making some progress), but inflation. The year 2008 was characterized by sharp global increases in energy and food prices, the latter leading to social unrest in many poorer countries, some of which enacted food export restrictions. The price of a barrel of Brent crude reached nearly $150 in July 2008.

The IMF would soon echo inflation concerns saying that "The global economy is in a tough spot, caught between sharply slowing demand in many advanced economies and rising inflation everywhere, notably in emerging and developing economies." In this respect, it echoes the findings of Obstfeld (2013) in the Mayekawa Lecture at the 2023 BOJ-IMES Conference, Tokyo, Japan, May 31–June 1, 2023. It also goes back even further to Taylor (1988) which was prepared while I was a visiting scholar at the Bank of Japan.

The Mayekawa Lecture listed the major problems that I identified and drew parallels with events during Governor Mayekawa's eventful tenure (1979–84). While noting the important difference in economic vantage points between the late 1970s or early 1980s and 2008, I stressed the importance of a comprehensive "Mayekawan" approach to research and policy when considering the numerous economic difficulties. The difficulties I listed were:

Mary and Robert Raymond Professor of Economics, George P. Shultz Senior Fellow in Economics at the Hoover Institution and Senior fellow at the Stanford Institute for Economic Policy Research, Stanford University (E-mail: john.taylor@stanford.edu).
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(1) high and rising global inflation,
    (2) financial instability and risks,
    (3) high and rising prices of energy, food, and many other commodities,
    (4) continuing high current account imbalances,
    (5) globally inconsistent exchange rate policies, and
    (6) rising protectionism and isolationist sentiment.

    As Mayekawa stressed many years ago, it was a challenge for policymakers to adopt a more comprehensive international policy focus that recognized the important interaction of these economic problems simultaneously, instead of approaching them separately.

    All six of these concerns resonate strongly—once again—in today's economic, political, and geopolitical conjuncture, and I would suggest that the holistic Mayekawan approach remains badly needed to find the best policy paths going forward. I endeavor to explain this in my lecture today by focusing on a series of charts and tables.

II. Taylor Rule and Behind the Curve

Let me begin with the following figure based on data for the Bank of Japan as shown in Figure 1. It shows the "Call Money Rate" for Japan. In particular, Figure 1 shows the interbank interest rate for Japan for the ten-year period from early 2014 to early 2024. It clearly demonstrates the very easy policy of the Bank of Japan during this period. It was not until recently that the call money rate rose, and this was still at very low levels. Clearly the rate would have to rise further to be in the neighborhood of 2 percent and thus to be consistent with interest rates globally.

    The next figure (Figure 2) shows the interest rate as it would be set by the Federal Reserve System. Various rules are shown, and all the rates are well above the rate shown on Figure 1 for Japan. In early 2024, the rate was above 5 percent, which is well above the interest rate set by the Bank of Japan.

    To see the actual interest rate, please take a look at Figure 3. It shows the actual Federal Funds Rate set by the Federal Reserve Board from early 2022 through early 2024. It is clear that the Federal Reserve decided that its monetary policy was behind the curve, and it had to catch up. It went from near zero to over 5 percentage points.

    The chart in Figure 3 going forward comes from the following equations for the federal funds rate, which is denoted as r in Figure 4, where the inflation rate is p, and the real GDP gap is y. If one plugs in the variables into the equations, one gets values as in Figure 4.

    To get a better sense of how far off the Federal Reserve was from the basic rules, and the possible damage that is caused by the deviation, take a look at Figure 5 and Figure 6. Figure 5 shows the Federal Funds Target Range. Figure 6 shows the actual deviations. Clearly the actual rate was too low according to the Taylor rule starting in early 2021, and it had not come close to catching up until 2023. It was during this period that inflation started to go way above the Federal Reserve's own target of 2 percent. This is very obvious in Figure 7. Also, the impact on the unemployment rate,

shown in Figure 8, is very clear.

III. Concluding Remarks

These charts and the associated remarks about the charts have shown that the Federal Reserve got well behind the curve based on a rules-based monetary policy in the United States. This occurred at the same time that the Bank of Japan got behind the curve, though with a longer lag in the case of Japan. The paper has also outlined a method to get back.

By reviewing the years leading up to the present monetary situation, it provides the background needed for analyzing current and future monetary policy decisions. Using actual data, it also points to high inflation data from other parts of the world with a special emphasis on countries in South America which is close to the United States. As shown in Figure 9, countries in South America such as Brazil, Columbia, Chile, Mexico and Peru have had very high inflation. And the same is true for many other regions of the world. Inflation has become a global issue.

The answer to the key question "Are We Entering a New Era of High Inflation?" is clearly "yes," unless monetary policy makers continue to adjust policy. There are now more reasons than ever for central banks to use a more rules-based policy. Central banks should start now with policy rules that markets understand. The policy interest rate would increase as inflation rises, as has already begun to happen in the United States. It would of course be a contingency plan, as are all rules. This would greatly reduce the chance of a large damaging change later.

Figure 1 Call Money Rate—Japan
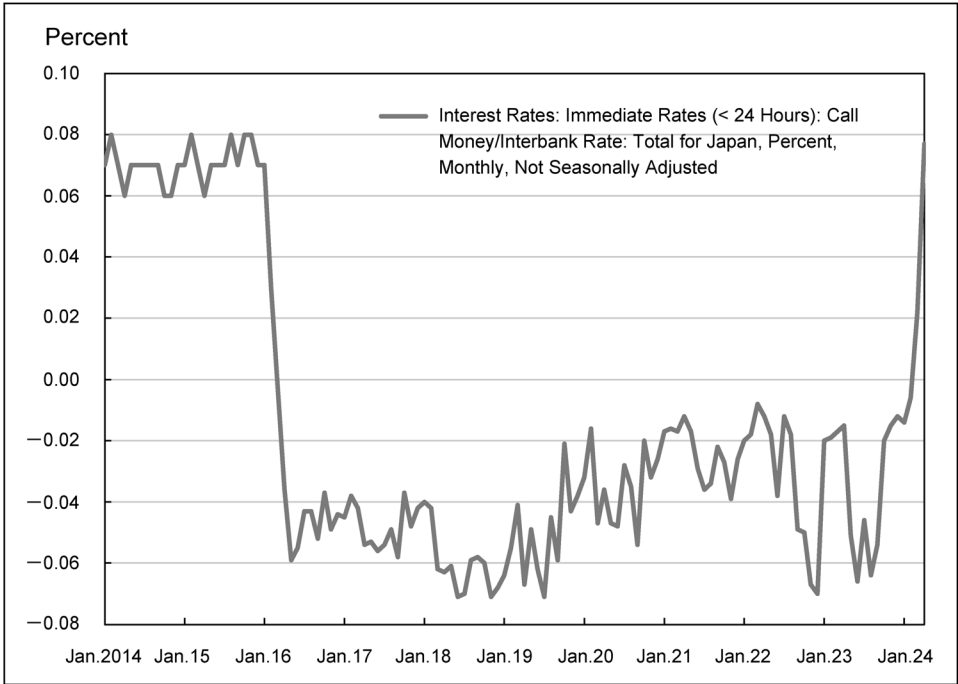
Source: Federal Reserve Bank of St. Louis, *Federal Reserve Economic Data*.

Figure 2 Monetary Policy Rules as Reported in the Federal Reserve Report

Taylor (1993) rule	$R_t^{T93} = r_t^{LR} + \pi_t + 0.5\,(\pi_t - \pi^{LR}) + (u_t^{LR} - u_t)$
Balanced-approach rule	$R_t^{BA} = r_t^{LR} + \pi_t + 0.5\,(\pi_t - \pi^{LR}) + 2\,(u_t^{LR} - u_t)$
Balanced-approach (shortfalls) rule	$R_t^{BAS} = r_t^{LR} + \pi_t + 0.5\,(\pi_t - \pi^{LR}) + 2min\,[\,(u_t^{LR} - u_t)\,,0]$
Adjusted Taylor (1993) rule	$R_t^{T93adj} = max[R_t^{T93} - Z_t,\ \text{ELB}]$
First-difference rule	$R_t^{FD} = R_{t-1} + 0.5\,(\pi_t - \pi^{LR}) + (u_t^{LR} - u_t) - (u_{t-4}^{LR} - u_{t-4})$

Note: $R_t^{T93}, R_t^{BA}, R_t^{BAS}, R_t^{T93adj}$, and R_t^{FD} represent the values of the nominal federal funds rate prescribed by the Taylor (1993), balanced-approach, balanced-approach (shortfalls), adjeusted Taylor (1993), and first-difference rules, respectively.
  R_{t-1} denotes the midpoint of the target range for the federal funds rate for quarter $t-1$, u_t is the unemployment rate in quarter t, and r_t^{LR} is the level of the neutral real federal funds rate in the longer run that is expected to be consistent with sustaining maximum employment and inflation at the FOMC's 2 percent longer-run objective, represented by π^{LR}. π_t denotes the realized four-quarter price inflation for quarter t. In addition, u_t^{LR} is the rate of unemployment expected in the longer run. Z_t is the cumulative sum of past deviations of the federal funds rate from the prescriptions of the Taylor (1993) rule when that rule prescribes setting the federal funds rate below an effective lower bound of 12.5 basis points.
  The Taylor (1993) rule and other policy rules generally respond to the deviation of real output from its full capacity level. In these equations, the output gap has been replaced with the gap between the rate of unemployment in the longer run and its actual level (using a relationship known as Okun's law) to represent the rules in terms of the unemployment rate. The rules are implemented as responding to core PCE inflation rather than to headline PCE inflation because current and near-term core inflation rates tend to outperform headline inflation rates as predictors of the medium-term behavior of headline inflation.
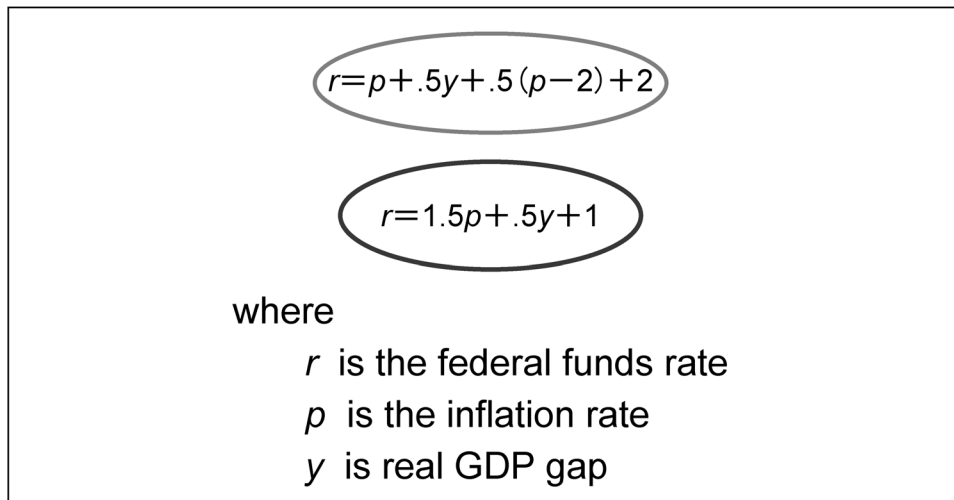
Source: Board of Governors of the Federal Reserve System (2024)

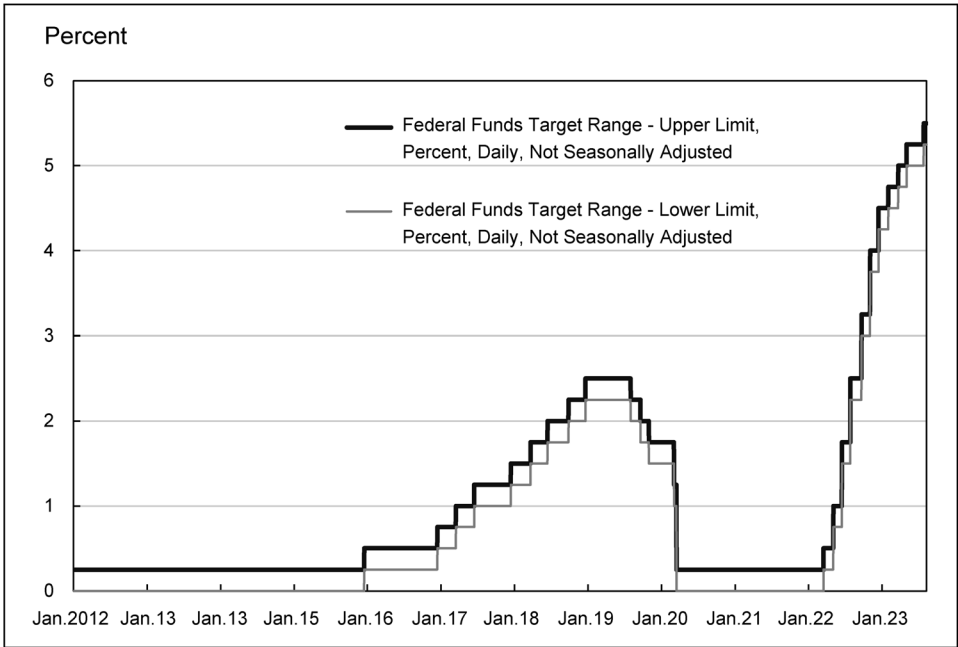**Figure 3 The Federal Funds Effective Rate**
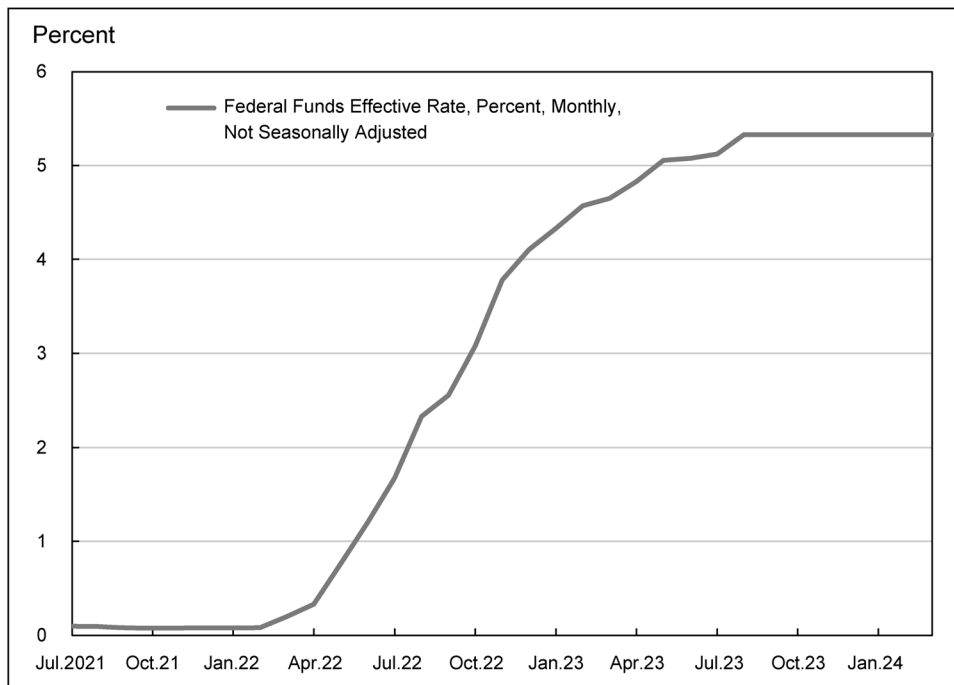
Source: Federal Reserve Bank of St. Louis, *Federal Reserve Economic Data*.

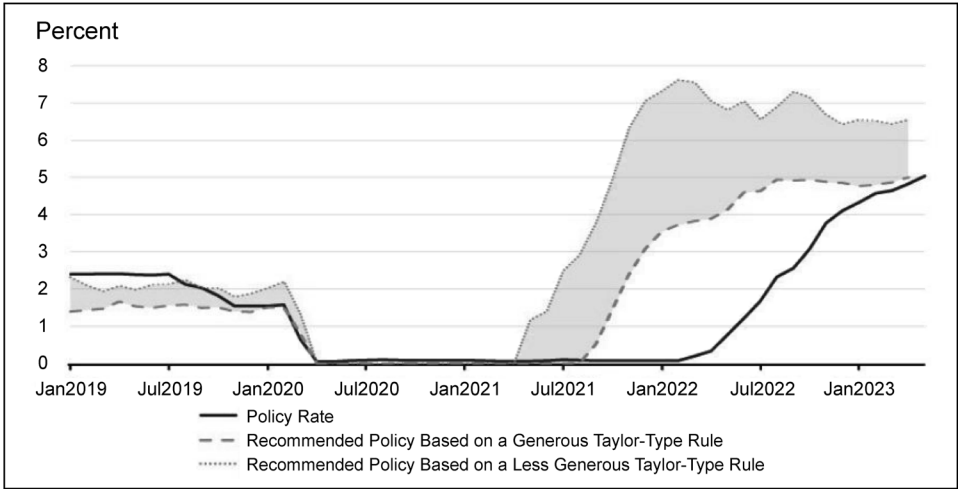**Figure 4 A Simple Version of the Taylor rule**

$$r = p + .5y + .5(p - 2) + 2$$

$$r = 1.5p + .5y + 1$$

where

r is the federal funds rate

p is the inflation rate

y is real GDP gap

Source: Taylor (1993)

Figure 5 Federal Funds Target Range

Source: Federal Reserve Bank of St. Louis, *Federal Reserve Economic Data*.

Figure 6 Actual Policy Rate and Policy Rate Recommendations from Taylor-Type Rules in US

Source: Bullard (2023)

Figure 7   The Inflation Rate in US

Percent
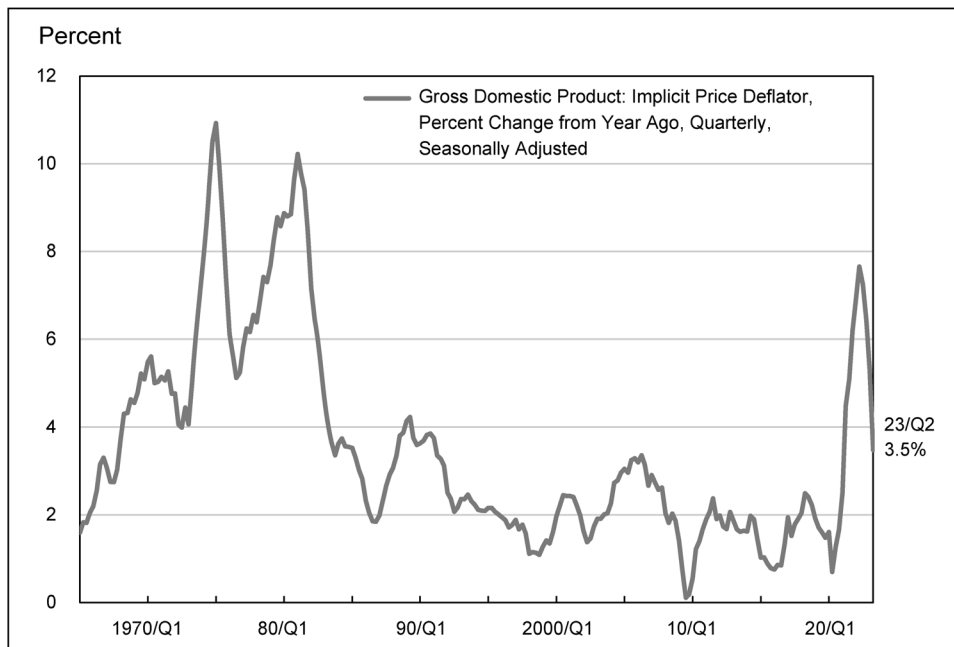
Source: Federal Reserve Bank of St. Louis, *Federal Reserve Economic Data*.

Figure 8   The Unemployment Rate in US

Percent

Source: Federal Reserve Bank of St. Louis, *Federal Reserve Economic Data*.

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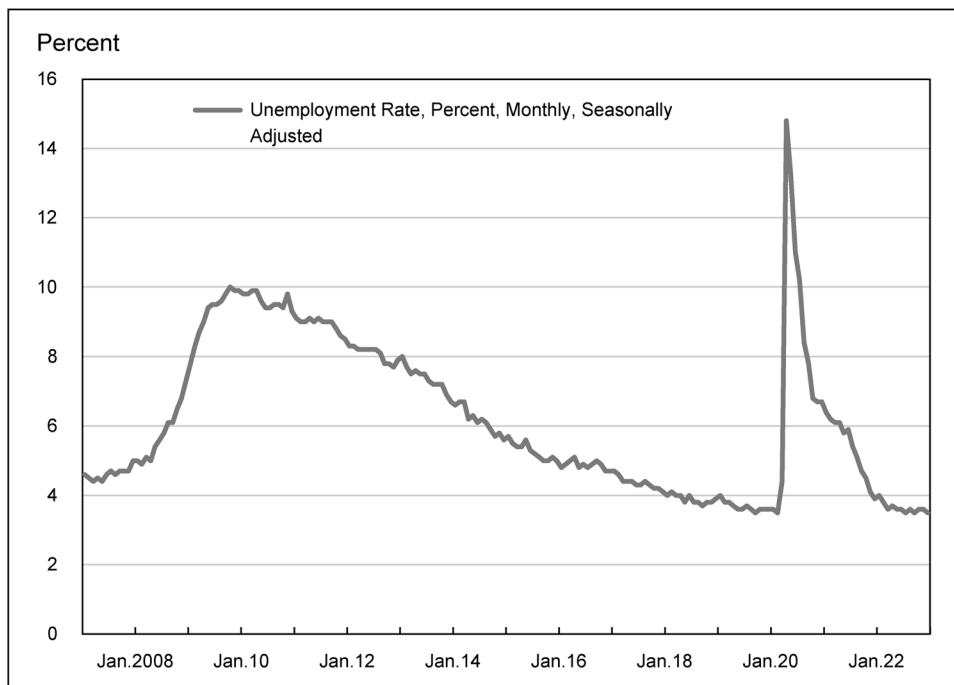
Figure 9   Inflation Rate in Latin America from January 2020 to January 2022
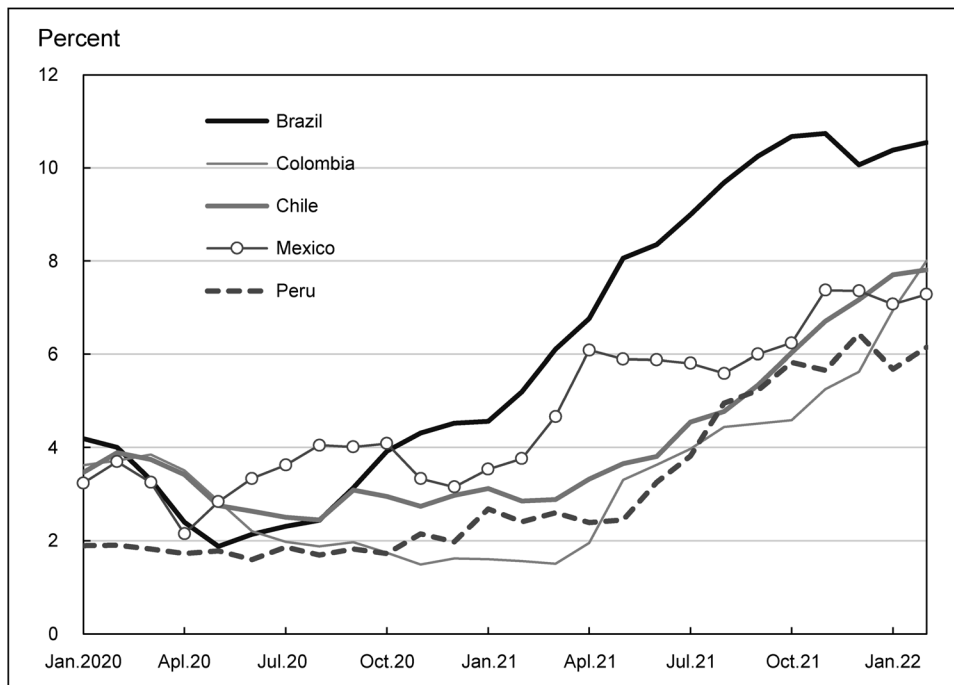
Note: Peru refers to Lima
Source: Haver Analytics

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Price Dynamics in Japan over the Past 25 Years

Keynote Speech by Shinichi Uchida, Deputy Governor of the Bank of Japan

Introduction

It is my great pleasure to welcome all of you to this conference. As Governor Ueda mentioned in his opening remarks, the Bank of Japan is conducting the "Broad Perspective Review" of our monetary policy over the past 25 years. In short, it has been a battle against persistent deflation and a battle with the zero lower bound.

Let me start by giving an overview of the inflation picture during this period. Please look at Chart 1. Japan's deflation started in the late 1990s and continued for 15 years. The average inflation rate was just minus 0.3%. It was a mild but persistent deflation.

To tackle this situation, the Bank introduced the 2% price stability target and Quantitative and Qualitative Monetary Easing, or QQE, in 2013, and a negative interest rate policy and Yield Curve Control, or YCC, in 2016. As a result, we succeeded in achieving a situation without deflation, but the average inflation rate was 0.5%, which fell short of our 2% goal. Recently, inflation rate has risen to around 3%, following the global inflation.

The big question is whether the current change in inflation picture means an irreversible, structural change from deflation, or just a temporary phenomenon led by global inflation. In this speech, I will try to give an answer to this important question, which has implications for the future course of our monetary policy as well as Japan's economy.

I. The Causes of Japan's Deflation

The Bursting of the Asset Bubble and Chronic Shortages of Demand

For this, we need to go back to the 1990s and explore the causes of Japan's deflation. As background to this deflation, from a real economy perspective, Japan's economy experienced two things: a decline in the growth trend and chronic shortages of demand. You can see these in Chart 2.

The causes of these developments are compound. The most important factor appears to be the bursting of the asset bubble in the early 1990s. This was followed by financial system turmoil and painful balance sheet adjustments in the corporate sector. Companies had to address excess capacity, excess labor, and debt-overhang. Against this backdrop, they became more and more reluctant to take risks and were slow to adjust their operations to the globalization trend brought about by the rises of the emerging economies. As shown in the left-hand panel of Chart 3, the corporate sector turned to a net saving position. Companies invested their limited resources mostly abroad, as

shown in the center panel of Chart 3. This lowered the accumulation of capital stock and the growth rate of labor productivity and hence, the potential growth rate, as shown in the right-hand panel of Chart 3.

In this environment, the natural rate of interest, r^*, declined earlier and to a greater extent than in other countries. It is always difficult to estimate r^*, and various models give us different figures ranging from minus 1% to plus 0.5%, as you can see in Chart 4. But it is safe to say that our r^* is low and has been declining over time. Otherwise, we cannot explain what has happened over these decades.

Declining and Aging Population and Decline in the Natural Rate of Interest
In addition to the bursting of the bubble, the declining and aging population might have affected r^*. The impact of demography on r^* is not straightforward, even theoretically. r^* is often related to the per-capita growth rate of GDP. So, a declining population itself would not necessarily lower r^* if the size of the economy went hand-in-hand with labor input. But still, a higher dependency ratio should lower per-capita growth, as you can see in Chart 5.

To address the problem of dependency, the answer is clear: continue working. The good thing is that senior people are much healthier than before. But the move toward continued employment did not happen until the 2010s. The labor force participation rate of seniors started to rise from 2012, as you can see in Chart 6. Japan then experienced a labor-shortage situation for the first time since the bursting of the bubble, with the aggressive stimulus to the economy by QQE and other policies. Before then, companies did not necessarily have to rely on senior workers.

As you know, Japan is a frontrunner among countries with aging populations. In 2019, when Japan hosted the G20 meetings, "aging" was one of the priority topics. Participants discussed various issues on this topic and reached the natural conclusion: the impact of aging is complicated. When senior citizens reduce savings in their life cycle, r^* rises. But, if people have strong concerns over the risks associated with increased longevity, younger generations save more and seniors slow the pace at which they use their savings. I am not saying that a declining and aging population is a problem by itself. I would rather stress that society appears to have failed or been slow to address this issue properly.

We tend to have a negative attitude when we discuss demographic issues. Companies tended to focus on the demand side and worry about shrinking domestic markets. Of course, a declining population also means a decline in the labor force. However, the supply-side implications were ignored or marginalized during the course of deflation, for good reason, I would say. As you can see in Chart 7, during that period, companies felt that they had more than enough employees. I will return to this issue later. Here, I just want to stress that the labor market is the key.

Decline in Actual and Expected Inflation
Let's move onto inflation. Actual and expected inflation declined in the 1990s, stayed low in the 2000s, and then rose somewhat after 2013 (Chart 8).

There are two distinctive features in our inflation expectations. First, inflation expectations in Japan have a high positive correlation with growth trends or growth ex-

pectations, as you can see in Chart 9. Secondly, the formation of medium- to long-term inflation expectations is adaptive rather than forward-looking, as shown in Chart 10. Of course, these observations are far from ideal. No central banker would welcome them. It means that inflation expectations are not anchored and fluctuate, reflecting real variables and actual inflation rates.

Basically, what happened is as follows (Chart 11). In the 1990s and 2000s, the inflation rate declined due to chronic demand shortages. The growth trend and r^* declined, and the Bank of Japan's monetary policy, which was mostly conventional at that time and faced with the zero lower bound constraint, could not sufficiently stimulate demand. Prolonged weak demand prevented the inflation rate from rising. It is natural that people lack faith in the central bank's ability to raise the inflation rate and, so, inflation expectations remained low. All in all, our monetary policy did not have enough power to lift up the actual and expected inflation under the zero lower bound constraint, while it would be fair to mention that the policy measures then contributed to protect the financial system by providing ample liquidity.

Since 2013, we have overcome the zero lower bound to some extent through the introduction of QQE and YCC. As you can see in Chart 12, real interest rates were in negative territory, and monetary policy has been very accommodative, even while r^* has been low. But ten more years are needed to give enough stimulus to change the whole picture of the economy.

II. Deflationary Norm

Formation of Deflationary Norm

So far, I have explained the mechanism by which Japan's economy dropped into deflation and failed to exit from it, from the perspective of a central banker. This is the main component of our story, though I am afraid it may not be particularly interesting from an academic point of view. In the end, it was just a typical story of the zero lower bound.

To paint a complete picture, however, we need to add another set of stories. There is one phenomenon which only Japan has experienced. The mild but persistent deflation created a social norm based on the belief that "today's prices and wages will be the same tomorrow." I use the word "social." It is not just an economic phenomenon.

Chart 13 shows the distribution of the inflation rate for all goods and services in the CPI. You can see that most items have concentrated around zero % in Japan. In the US, the peak was around 2%, and the distribution is much wider compared with Japan. Of course, these figures are before the pandemic and the recent global inflation. In Japan, the price-setting behavior based on the belief that there would be no change in prices and wages spread widely among companies and became a kind of norm. They all kept their prices unchanged for fear of losing customers.

How does this come to be the norm? Again, the initial trigger was chronic demand shortages. A typical textbook way of handling demand shortages would be to reduce prices, downsize production, and reduce the number of employees, in the hope of a later recovery. But that was not the case in Japan. There was a strong consensus in society

that employment should be maintained as long as possible. Companies continued to hold on to their labor force, and the government helped them by providing various subsidies, furlough programs, and public financing. As you can see in Chart 14, the unemployment rate was not very high, even at its peak, and we had limited cases of bankruptcy.

On the price front, companies continued to face harsh competition, as their rivals were still there. As for wages, employees started to accept reduced wages in exchange for job security (Chart 15). Companies also tried to replace retiring employees with part-time workers. As in Chart 16, price markups declined significantly, while wage markdowns increased.

In our large-scale survey of the corporate sector, companies responded that, in the face of harsh competition, they refrained from passing on costs to their customers, as you can see in the left-hand panel of Chart 17. Instead, they tried to cut costs by reducing wages and by asking their suppliers to reduce prices, or they just accepted smaller profit margins as shown in the right-hand panel of Chart 17.

They also argued that, under this deflationary norm, it was difficult to move in the direction of making better products and raising prices. As the left-hand panel of Chart 18 shows, more than 70% of the respondents favor a future landscape with mild, positive price and wage inflation to that with zero inflation. They believe such an environment will make their businesses easier, as they can pass on costs to their customers. They also said that if such a situation is realized, they would invest more and raise wages, instead of just cutting costs, as shown in the right-hand panel of Chart 18.

Those results correspond with some stylized facts. For the past 25 years, Japanese companies have implemented process innovations that cut costs, rather than product innovations that develop new products. This explains and is explained by the decline in markups. Companies did not invest enough in R&D and failed to differentiate their products sufficiently from their competitors.

It is often argued that deflation or the deflationary mindset in Japan is the fundamental cause of the slow economic development during that period. Here, you may argue, causes and consequences are being confused. You may also argue that relative prices and overall inflation are being mixed up. In theory, of course, changes in the relative prices between individual products can happen even when the overall inflation rate is zero. Companies can raise their relative prices regardless of the overall inflation rate. Basically, I agree. It is difficult to tell whether and through what channels this norm has adversely affected the economy.

Menu Costs

There are several possible candidates for theoretical explanations of the norm, such as the nominal rigidity of wages and menu costs. Here I would like to focus on menu costs, as I believe this illustrates some important aspects of what happened during this period.

In Chart 19, we can see that the frequency of price changes in Japan declined in the 1990s, especially in the service sector. The frequency of price increases, that is, the share of prices that saw an upward change, declined along with trend inflation. In this context, the decline in frequency itself is quite natural, but the extent of the decline

is large. Meanwhile, the frequency of price decreases, that is, the share of prices that saw a downward change, rose only slightly, even though trend inflation declined. A salient decline in the former and a modest rise in the latter both suggest that companies have become more reluctant to change their prices. These observations suggest that there have been an increase in menu costs. Please look at Chart 17 again. Based on the survey mentioned above, companies responded that they refrained from passing on costs to their prices because, among other things, they were afraid of losing reputation. That is why I used the word "social" norm to describe this "economic" phenomenon.

Higher menu costs, together with mild inflation, have slowed the pace of price adjustment. And for us, the central bank, this requires more effort to get out of this situation. The "no change in prices and wages" norm worked as if inflation expectations are anchored at zero %. And the gravity towards zero % is stronger than a 2% anchor; as you can see, the 0% peak of the distribution in Japan's CPI is much higher than 2% peak seen in that of the US.

III. Escaping from the Deflationary Situation

Two things are required to escape this situation. First, we need to resolve the original causes of deflation, that is, demand shortages and consequent excess labor supply. Secondly, we need to overcome the threshold of menu costs, or more fundamentally, the deflationary norm.

As to the first, QQE and other accommodative monetary policy tools provided powerful stimulus to the economy and, together with government measures, created more than 5 million jobs, mainly for women and seniors (Chart 20). It was basically a high-pressure economic strategy.

Chart 21 shows what happened in the labor markets during the period under QQE. In this period, the year-on-year rate of change in employee income was stable at around 2–3 percent. Prior to the pandemic, the increase was driven by a rise in the number of employees. But since the pandemic, the increase has been led by a rise in wages, given the limited room for additional labor supply of women and seniors. The labor market structure appears to have changed after the pandemic, and wages are likely to continue increasing.

In other words, when we started QQE in 2013, there was considerable slack in the economy. We did not expect this scale of additional labor coming from women and seniors. Of course, this should be taken as a favorable development in addressing our demographic challenges. In addition, there was another type of slack, a kind of hidden slack, in which companies continued to provide too many services to their customers for free, which is possible only with an abundant labor force. The Bank of Japan has spent ten years providing high pressure, aiming to remove all of these slacks in the economy.

Another issue we need to address is to overcome the threshold of menu costs, or the deflationary norm. As an initial response, menu costs appear to have been normalized after the global inflation. Please see Chart 19 again. The frequency of price changes has returned to the levels of the early 1990s. And in Chart 22, the shape of the distribution

of the CPI has changed significantly. Now the distribution is wider and the peak is lower, which is not surprising in the current situation. The question is whether this is a temporary development due to the recent global inflation or an irreversible, structural change. I will discuss this issue again shortly, focusing more on the fundamental issue of the deflationary norm.

Conclusions and Future Prospects

Before I conclude, let me summarize today's explanation in Chart 23. The bursting of the asset bubble in the 1990s was followed by financial system turmoil and painful balance sheet adjustments in the corporate sector. Companies and society as a whole were slow to address trends in globalization and, more importantly, the declining and aging population.

The trend growth rate declined, coupled with chronic demand shortages, particularly in the labor market. r^* also declined. On price front, actual and expected inflation declined, and the Bank of Japan's monetary policy did not have enough power to lift them up under the zero lower bound constraint.

Faced with this difficult situation, the consensus in society was that employment should be maintained. Labor hoarding by companies, supported by the government, contributed to maintaining economic and social stability in exchange for leaving the excess labor and excess numbers of companies. Price markups declined significantly, along with an increase in wage markdowns. "No change in prices and wages" became the norm. Companies proceeded with process innovations rather than product innovations, which affected and was affected by markups.

From 2013, the Bank of Japan started to provide high pressure to the economy under QQE and YCC, which, together with government measures, created millions of jobs, mainly for women and seniors, and gradually changed labor market conditions, resulting in labor shortages. And the recent global inflation has put final pressure on the deflationary norm. These are the summary of today's explanation.

Now it is time to answer the question I posed at the beginning of this speech. Are these trends irreversible? As I mentioned, two things are needed to change the current situation: resolving the original causes of deflation and overcoming the deflationary norm.

As to the first issue, resolving the original causes of deflation, I can confidently answer "yes." Labor market conditions have changed structurally and irreversibly. We cannot expect much more labor participation to come from women and seniors. The job participation rate for women in Japan is now higher than that in the US. To be precise, there is still some more room for supply. Women may work longer hours as fulltime workers. Companies are extending the retirement age to keep their labor force. These efforts are reasonable and necessary, but they are not enough to change the overall picture.

As to the second issue, overcoming the deflationary norm, the answer is not so clear. Will companies continue the current price-setting behavior even after the cost-push pressure from global inflation wanes? The key once again is the labor market. If the structural changes in the labor market continue, companies will have to build business models that generate enough profits and wages to keep and attract employees. As to

price-setting strategy, companies need to rewrite their prices in their menus promptly, reflecting their labor costs while paying due attention to the possible impact on demand for their products.

In the end, the "social norm" is set to be dissolved. The main driving force for these developments and long-waited structural changes is labor shortages. Labor shortages drive individual companies' transformations and the dynamics of the whole economy, while this process entails relatively low transition costs, as it is less likely to give rise to unemployment.

After ten years of experience under QQE, YCC, and the negative interest rate policy, the Bank of Japan declared in this March that these unconventional policy tools had fulfilled their roles. We returned to a conventional monetary policy framework, aiming at a 2% price stability target through adjustments of the short-term policy rate, which means we have overcome the zero lower bound. While we still have a big challenge to anchor the inflation expectations to 2%, the end of our battle is in sight.

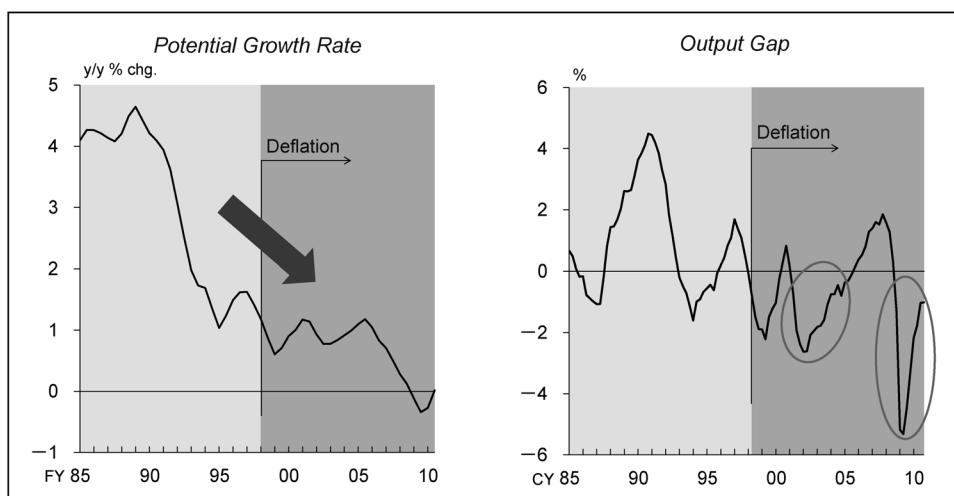So, I would like to conclude my speech with this phrase: "This time is different."

Chart 1 Inflation Rate
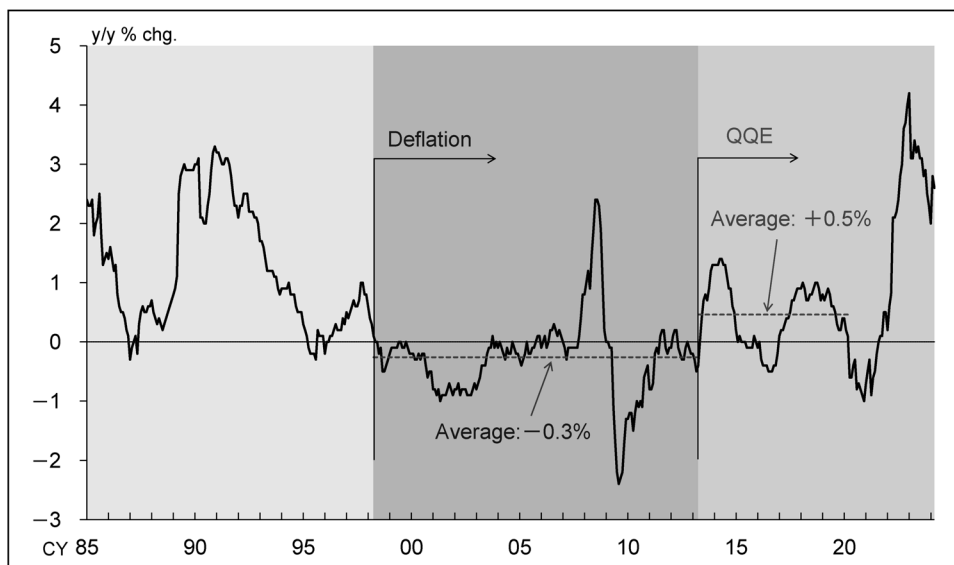
Note: Figures are the CPI for all items less fresh food, excluding the effects of the consumption tax hikes, etc.
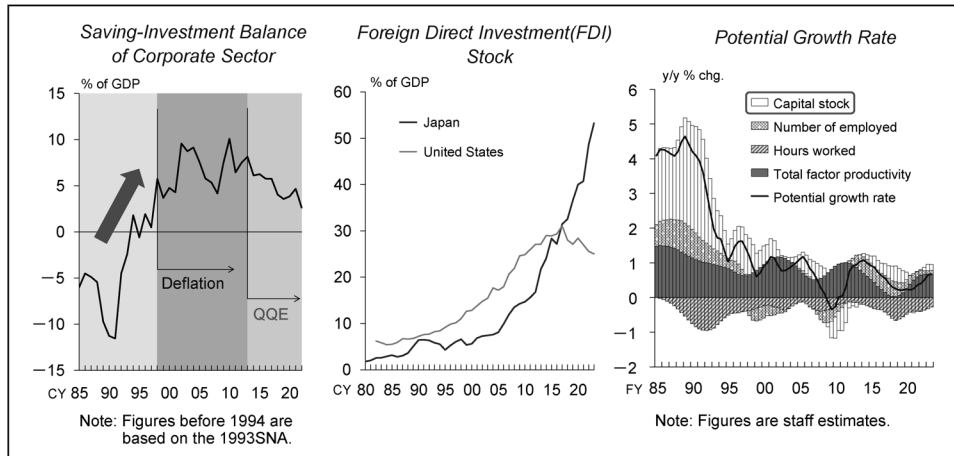Source: Ministry of Internal Affairs and Communications.

Chart 2 Potential Growth Rate and Output Gap until 2010
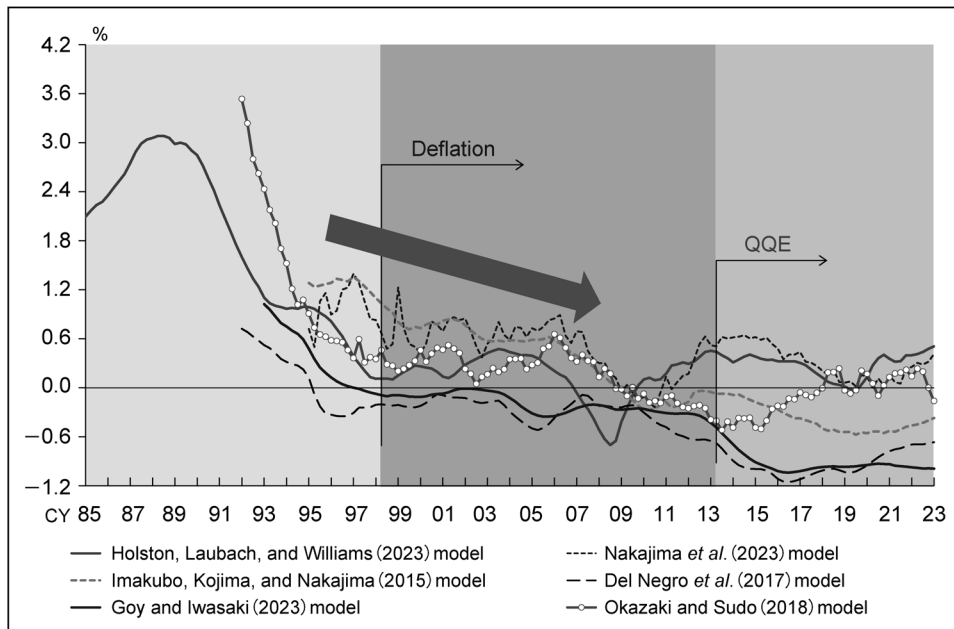

Note: Figures are staff estimates.
Source: Bank of Japan.

Chart 3   Corporate Investment

Saving-Investment Balance of Corporate Sector

Foreign Direct Investment(FDI) Stock

Potential Growth Rate

Note: Figures before 1994 are based on the 1993SNA.

Note: Figures are staff estimates.

Sources: Cabinet Office; Bureau of Economic Analysis; International Monetary Fund; United Nations Conference on Trade and Development; Bank of Japan.

Chart 4   Natural Rate of Interest

- — Holston, Laubach, and Williams (2023) model
- ----- Nakajima *et al.* (2023) model
- ---- Imakubo, Kojima, and Nakajima (2015) model
- – – Del Negro *et al.* (2017) model
- — Goy and Iwasaki (2023) model
- —○— Okazaki and Sudo (2018) model

Note: The estimates are based on staff calculations using the models proposed in the different papers.
Sources: Bank of Japan; Ministry of Finance; Ministry of Health, Labour and Welfare; Cabinet Office; Ministry of Internal Affairs and Communications; Bloomberg; Consensus Economics Inc., "Consensus Forecasts."
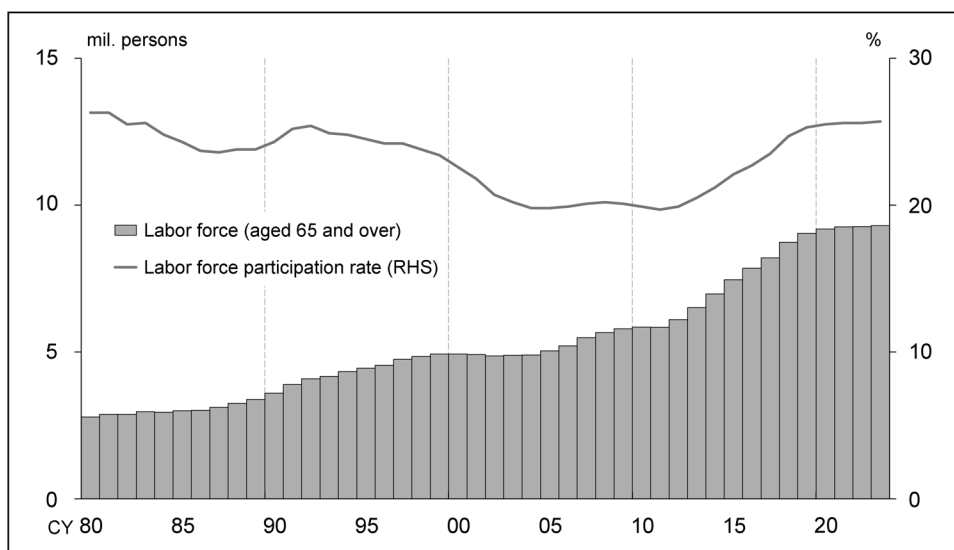
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Chart 5   Dependency Ratio
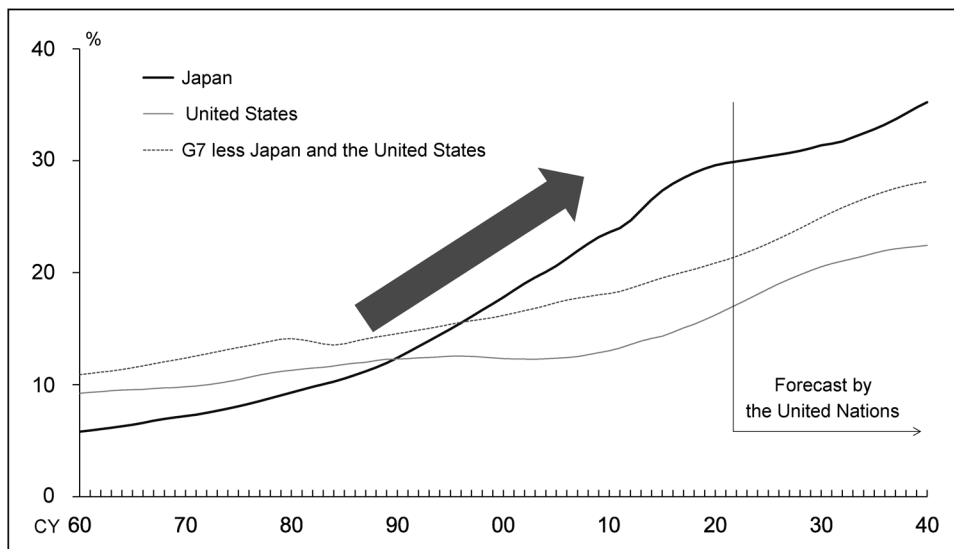
Note: Dependency ratio is the ratio of the population aged 65 and over to the total population. Figures from 2022 onward are estimates by the United Nations.
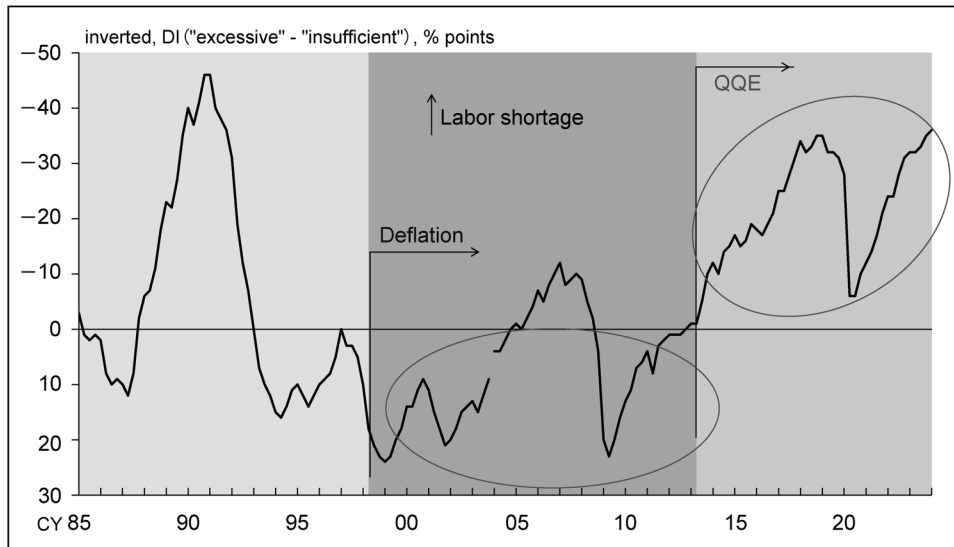
Source: United Nations.

Chart 6   Labor Force Participation of Seniors

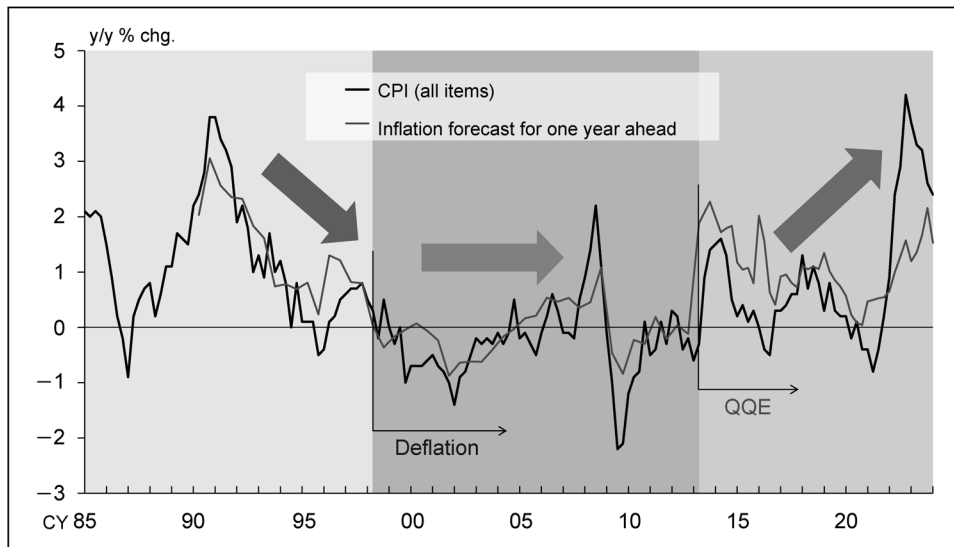Source: Ministry of Internal Affairs and Communications.

Chart 7   Employment Conditions felt by Companies

inverted, DI ("excessive" - "insufficient") , % points

QQE

↑ Labor shortage

Deflation →

| CY 85 | 90 | 95 | 00 | 05 | 10 | 15 | 20 |

Note: Based on the Tankan. All enterprises and industries. There is a discontinuity in the data for December 2003 due to a change in the survey framework.
Source: Bank of Japan.

Chart 8   Actual and Expected Inflation Rates

y/y % chg.

— CPI (all items)
— Inflation forecast for one year ahead

Deflation →

QQE →

| CY 85 | 90 | 95 | 00 | 05 | 10 | 15 | 20 |

Note: "Consensus Forecasts" was conducted twice a year until 2013, three times a year in 2014, and four times a year from 2015 onward. The CPI figures are staff estimates and exclude the effects of the consumption tax hikes, policies concerning the provision of free education, and travel subsidy programs.
Sources: Ministry of Internal Affairs and Communications; Consensus Economics Inc., "Consensus Forecasts."

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Chart 9 Medium- to Long-Term Expected Growth Rates and Expected Inflation Rates
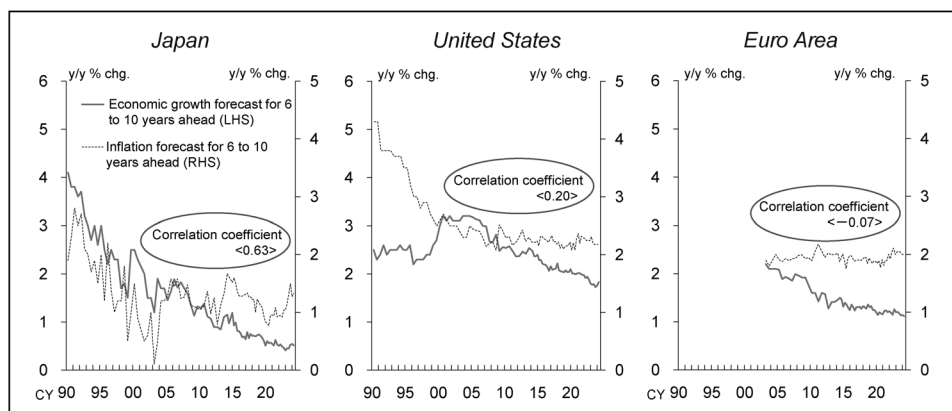
Note: "Consensus Forecasts" was conducted twice a year until 2013, three times a year in 2014, and four times a year from 2015 onward. Correlation coefficients are calculated using data for CY 1990–2024 for Japan and the United States and CY 2003–2024 for the euro area.
Source: Consensus Economics Inc., "Consensus Forecasts."

Chart 10 Degree of Adaptiveness in Inflation Expectations
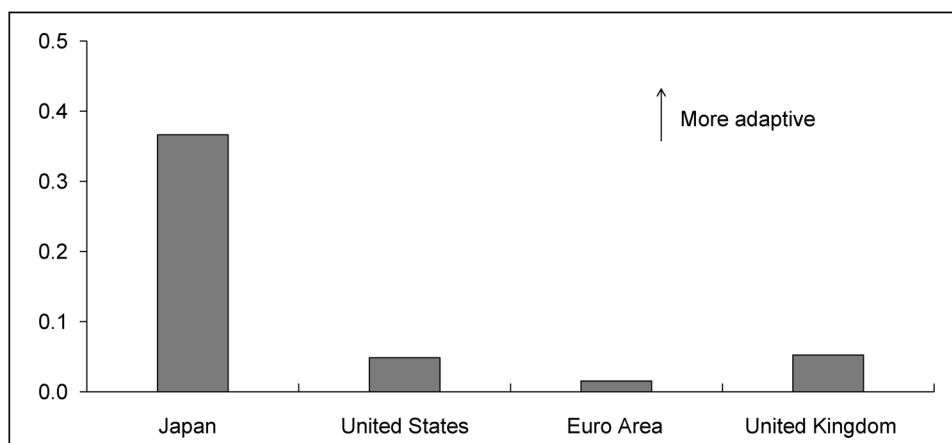
Notes: 1. This figures show the contribution of observed inflation to inflation expectations 6-10 years ahead using the following equation: Inflation expectations 6-10 years ahead (%) = $\theta \times$ Observed headline inflation rate (lagged 1 quarter, %) + $(1 - \theta) \times$ Central bank price stability target (2%)
2. The estimation periods are as follows: 2000/Q1–2024/Q1 for Japan and the United States; 2003/Q2–2024/Q1 for the euro area; and 2005/Q1–2024/Q1 for the United Kingdom.
Sources: Consensus Economics Inc., "Consensus Forecasts"; Ministry of Internal Affairs and Communications; Bureau of Labor Statistics; Eurostat; Office for National Statistics.

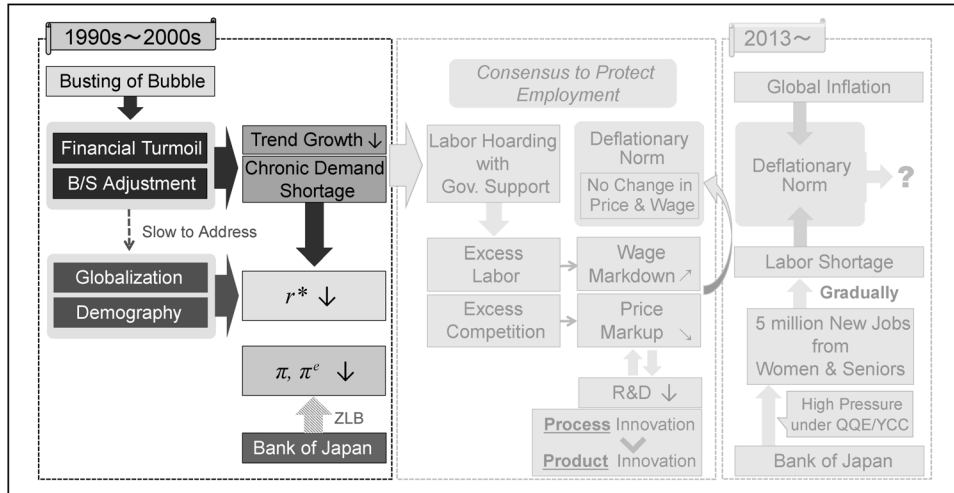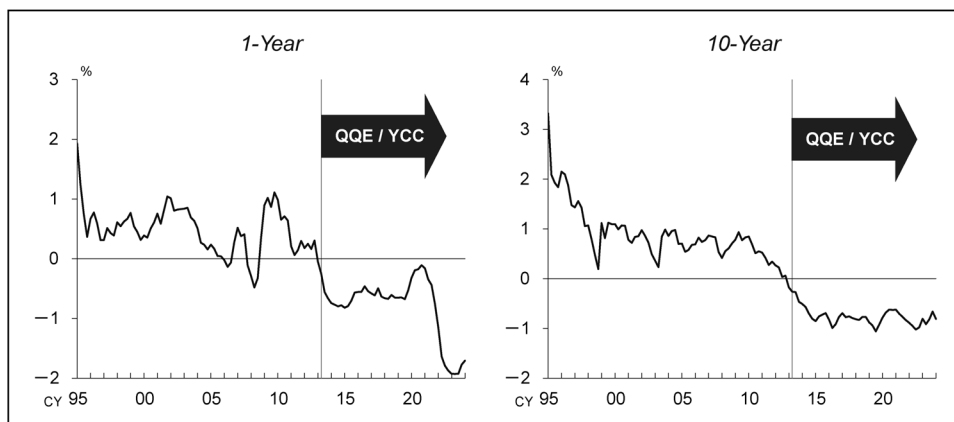**Chart 11   Summary of This Story**

Chart 12   Real Interest Rates

Note: Figures for real interest rates for each maturity are calculated as government bond yields minus the composite index of inflation expectations (staff estimates) for the corresponding maturity.

Sources: Bank of Japan; QUICK, "QUICK Monthly Market Survey <Bonds>"; Consensus Economics Inc., "Consensus Forecasts"; Bloomberg.
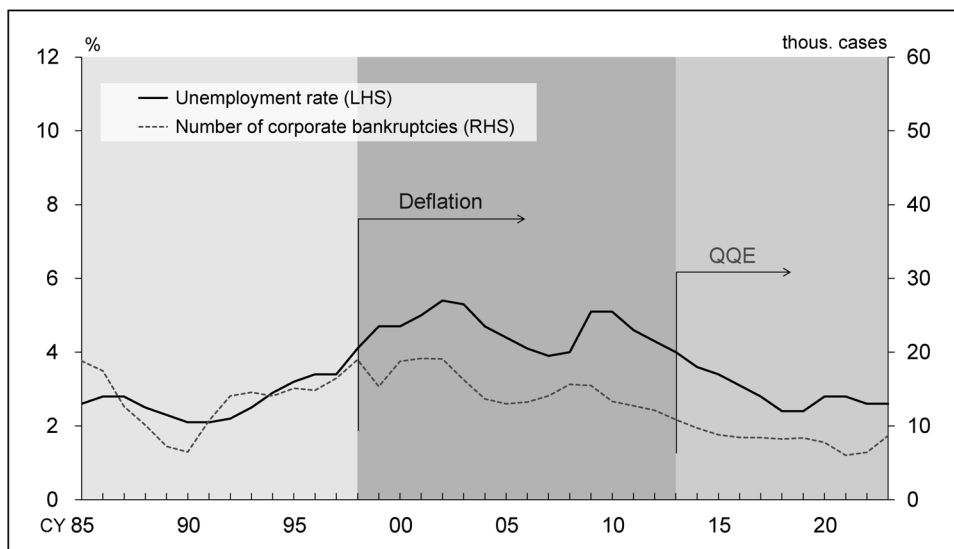
## Chart 13   Price Change Distribution (CPI)
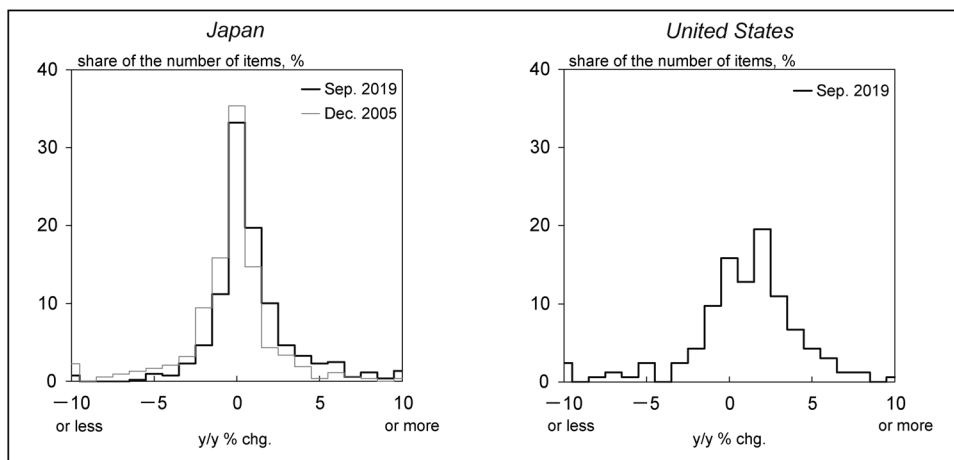
Japan

United States

Note: Figures for Japan are for the CPI (less fresh food and energy). Those for the United States are for the CPI (less energy).

Sources: Ministry of Internal Affairs and Communications; Bureau of Labor Statistics.

## Chart 14   Unemployment and Bankruptcy

Sources: Ministry of Internal Affairs and Communications; Tokyo Shoko Research, Ltd.

Chart 15   Average Nominal Wages and Part-Time Worker Ratio
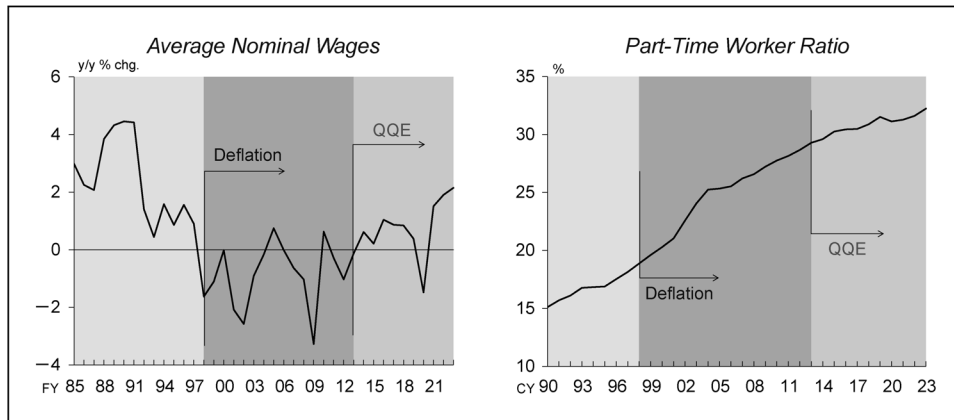
Note: In the left-hand chart, figures indicate total cash earnings (Monthly Labour Survey) for establish-
ments with 30 or more employees until FY 1990 and those with 5 or more employees from FY
1991 onward. Those from FY 2016 onward are based on continuing observations following the
sample revisions of the Monthly Labour Survey and the figure for FY 2023 is that from April 2023
to February 2024.

Source: Ministry of Health, Labour and Welfare.

Chart 16   Price Markups and Wage Markdowns
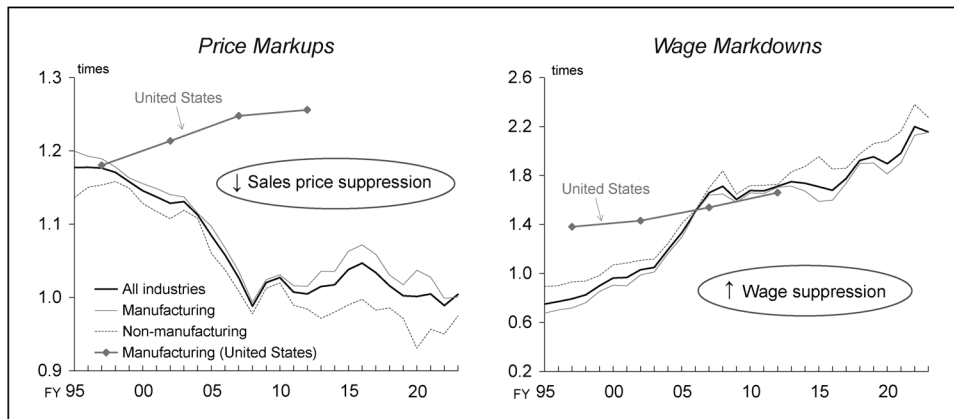
Note: Price markups and wage markdowns are estimated based on the method of Aoki, Hogen, and
Takatomi (2023) using individual firm data from the Development Bank of Japan's "Corporate
Financial Databank." Calculations for the U.S. manufacturing sector are based on the results of
Yeh *et al.* (2022). Figures for FY 2023 are from April to December 2023.

Sources: Cabinet Office; Development Bank of Japan; Ministry of Finance; Research Institute of Econ-
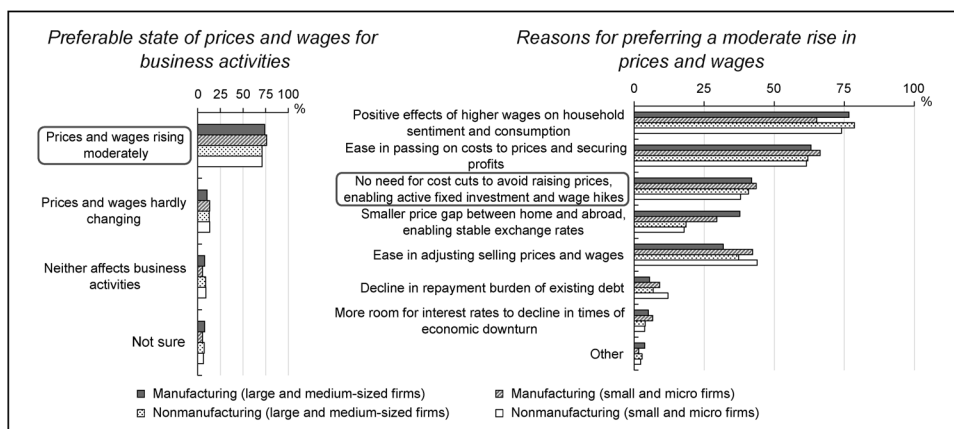omy, Trade and Industry (RIETI); Yeh *et al.* (2022).

Chart 17   Large-Scale Survey on the Corporate Sector (1)

Reasons why raising prices was difficult

Addressing cost increases
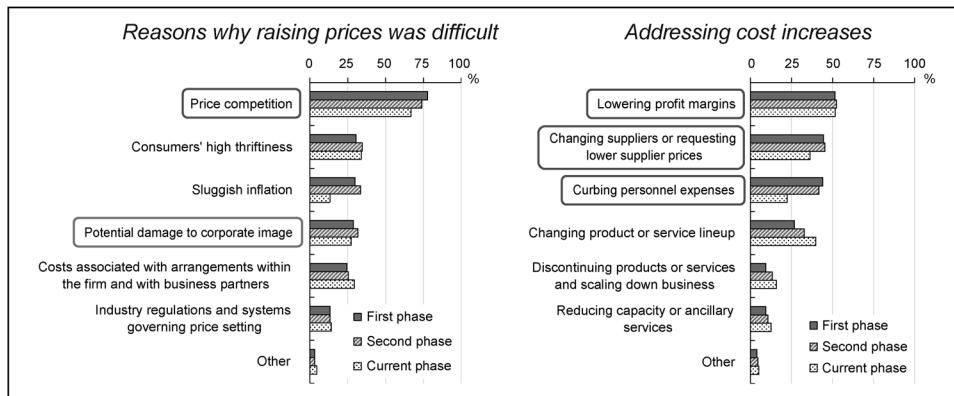
Note: Firms were asked to respond to the questions by dividing the past 25 years since the mid-1990s into three phases, which comprise (1) the "first" phase, defined as the period from the mid-1990s to the 2000s, (2) the "second" phase, defined as the 2010s, and (3) the "current" phase, defined as the period over the past one year.
Source: Bank of Japan.

Chart 18   Large-Scale Survey on the Corporate Sector (2)

Preferable state of prices and wages for business activities

Reasons for preferring a moderate rise in prices and wages

Note: In the right-hand chart, figures are the ratios among firms which responded "prices and wages rising moderately" as a preferable state in the left-hand chart.
Source: Bank of Japan.

Chart 19   Frequency of Price Changes
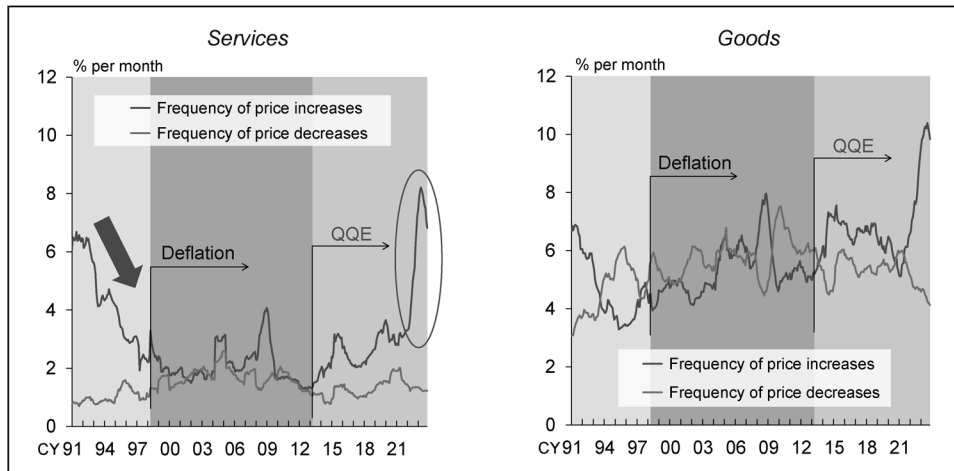
Note: Figures are the share of prices (based on the average for each item and city) that changed from
      the previous month (12-month backward moving average). Data excludes fresh food, electricity,
      manufactured and piped gas, water charges, housing rent, periods of consumption tax hikes, and
      temporary price changes mainly due to special sales.
Source: Ministry of Internal Affairs and Communications.
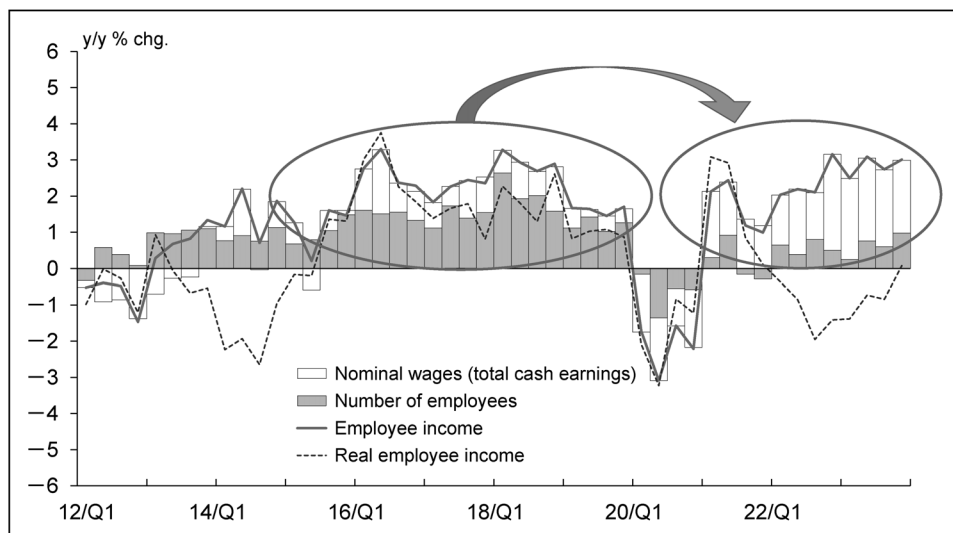
Chart 20   Labor Market since the Start of QQE (1)
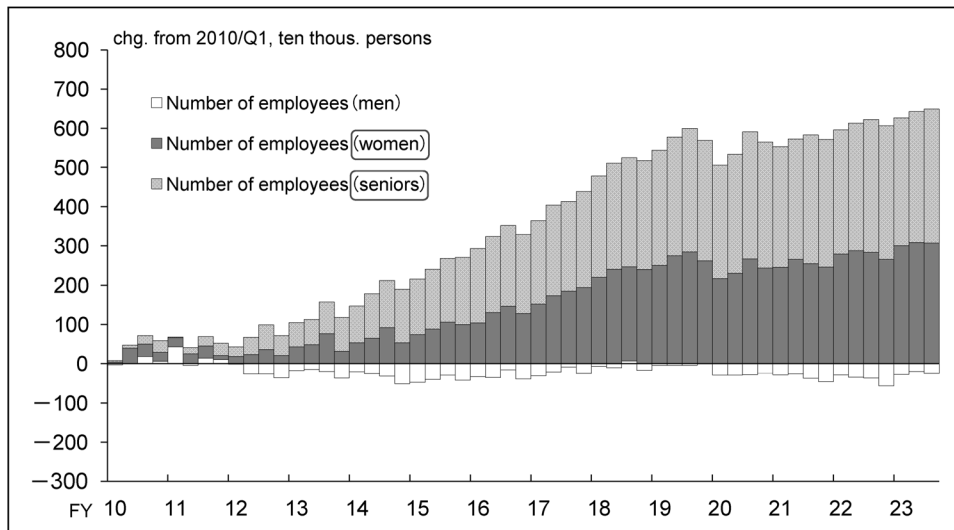
Note: Figures for women and men are for employees aged between 15 and 64, while those for seniors
      are for employees aged 65 and over.
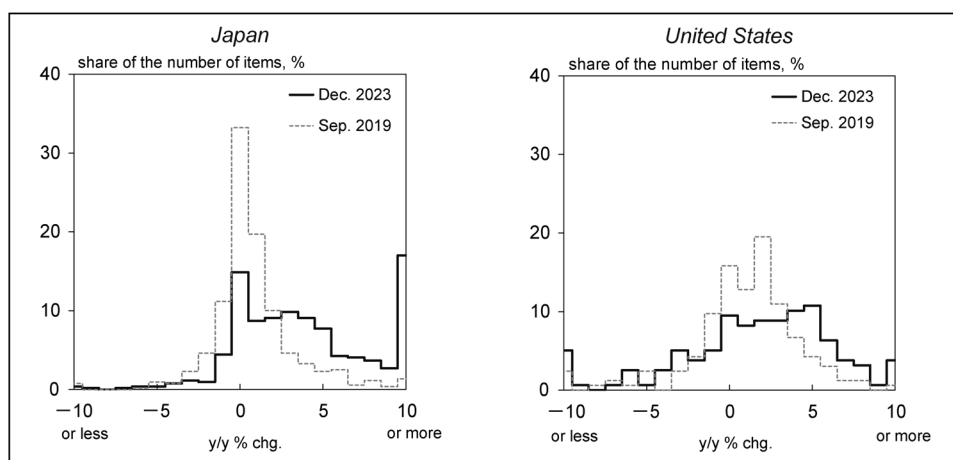Source: Ministry of Internal Affairs and Communications.

Chart 21   Labor Market since the Start of QQE (2)

Note: In the chart, Q1 = March-May, Q2 = June-August, Q3 = September-November, Q4 = December-February. Employee income = Nominal wages (Monthly Labour Survey) × Number of employees (Labour Force Survey). Figures from 2016/Q1 onward are based on continuing observations following the sample revisions of the Monthly Labour Survey. Those for real employee income are based on staff calculations using the CPI (less imputed rent).

Sources: Ministry of Health, Labour and Welfare; Ministry of Internal Affairs and Communications.
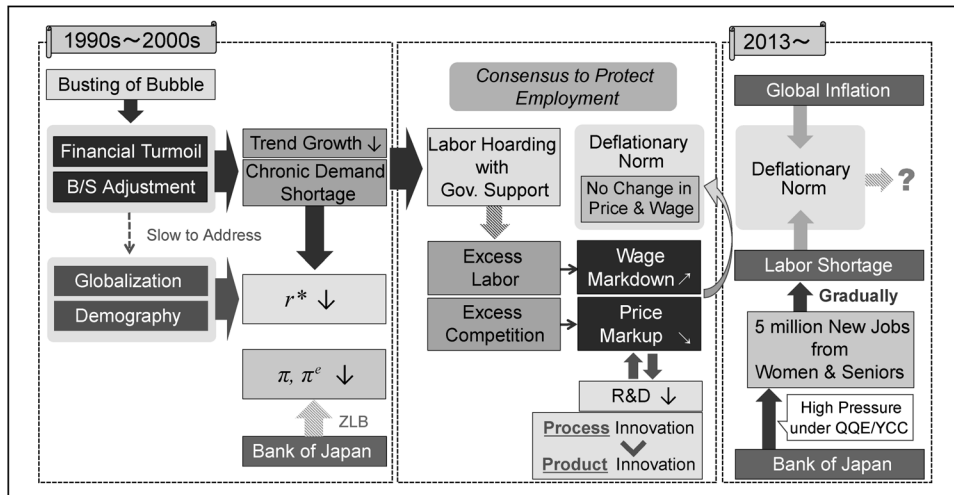
Chart 22   Price Change Distribution (CPI)

Note: Figures for Japan are for the CPI (less fresh food and energy). Those for the United States are for the CPI (less energy).

Sources: Ministry of Internal Affairs and Communications; Bureau of Labor Statistics.

Chart 23   Summary of This Story: Overall View

The Forward Guidance Trap

Athanasios Orphanides

This paper examines the policy experience of the Federal Reserve (Fed), the European Central Bank (ECB), and the Bank of Japan (BOJ) during and after the Covid-19 pandemic and draws lessons for monetary policy strategy and its communication. All three central banks provided appropriate accommodation during the pandemic but two failed to unwind this accommodation in a timely manner. The Fed and the ECB guided real interest rates to inappropriately negative levels as the economy recovered from the pandemic, fueling high inflation. The policy error can be traced to decisions regarding forward guidance on policy rates that delayed lift-off while the two central banks continued to expand their balance sheets. The Fed and the ECB fell into the forward guidance trap. This could have been avoided if policy were guided by a forward-looking rule that properly adjusted the nominal interest rate with the evolution of the inflation outlook.

Professor of the Practice of Global Economics and Management at the MIT Sloan School of Management (E-mail: athanasios.orphanides@mit.edu)

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I. Introduction

The recent past has been a tumultuous period for central banks. In 2020, the pandemic posed an unprecedented challenge that could have led to a catastrophic collapse in economic activity beyond what was mandated by shutdowns. Thankfully, this was averted with an unprecedented and decisive fiscal and monetary policy response around the world. In the 2021 BOJ-IMES Conference which was held virtually, we discussed how central banks unleashed the power of their balance sheets to provide critical monetary support that cushioned the economic blow (Orphanides [2021]). Central banks earned praise for this policy success.

A year later, sentiment started to change. In his keynote address at the BOJ-IMES Conference in 2022, Carl Walsh discussed the cost-benefit calculus of a delayed exit from accommodative policy in the context of the inflation surge experienced in most advanced economies (Walsh [2022]). For several central banks, the praise associated with their actions in 2020 was replaced with concern that they had fallen behind the curve by end-2021. The economic recovery from the pandemic was faster than had been anticipated, yet central banks delayed adjusting policy for a time, even after the improvement in the outlook had become evident and inflation had started to rise. Coupled with global supply disruptions, the delay in normalizing policy led to high inflation.

What led to this policy error?

The theme of the 2023 BOJ-IMES Conference is *Old and New Challenges for Monetary Policy*. Some challenges are perennials, both old and recurring. My focus will be on one of these perennial challenges: Preserving price stability. Avoiding pitfalls in monetary policy strategy that risk compromising price stability. This is a challenge all central bankers need to be thinking about all the time. Preserving price stability is the most important task of monetary policy, a prerequisite for supporting economic growth and employment over time.

Communication is an integral part of monetary policy strategy. From theory and practice, we have learned that policy actions are most effective when the public understands their rationale and how the central bank will respond to changes in the economic outlook. In recent decades, communication practices have evolved, espousing welcome transparency.[1] Though monetary policy has become considerably more transparent and more systematic than had generally been the case a few decades ago, central banks tend to avoid communicating clearly a reaction function; in this manner they reveal a preference for discretion despite the economic costs associated with it.

When policy rates are constrained, as has been the case during the pandemic, reinforcing expectations that policy will remain accommodative becomes particularly useful.[2] This can be easily achieved with communication of a reaction function that ensures policy is systematic and is appropriately adjusted with economic conditions, but alternatives can be considered that may be appealing to policymakers who prefer to maintain greater policy discretion. One way to shape expectations about policy rates

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1. Yellen (2012) described this change as a "revolution" in central bank communication.
2. Bernanke (2020) presents a recent review of policy tools when policy rates are constrained. Clouse *et al.* (2003) summarize the earlier literature and policy experience.

without explicit communication of a reaction function is with forward guidance—the practice of communicating explicit information about the likely path of future policy. Even if not perfectly credible, forward guidance can be effective and, in some circumstances, can have some of the advantages of a well-designed policy rule for helping the formation of expectations by the public and market participants.[3] In recent years, a number of central banks resorted to this practice, and doing so appeared to be helpful while inflation remained low and policy rates constrained. Under these circumstances, forward guidance suggested an implicit commitment to keeping policy rates as low as possible for a long time. But is this practice useful as part of an overall monetary policy strategy aiming to preserve price stability, when surprises to inflation cannot be ruled out?

Recent experience suggests not. The inflation spike associated with the post-pandemic economic recovery illustrated that the strategy of shaping expectations about policy rates through explicit communication of future interest rates instead of a clear, forward-looking reaction function is problematic. Under these circumstances, forward guidance can become a trap. A forward-looking rule that properly adjusts the nominal interest rate with the evolution of the inflation outlook is a superior guide for systematic monetary policy.

This paper compares and contrasts the recent experience of the Federal Reserve (Fed), the European Central Bank (ECB), and the Bank of Japan (BOJ) to draw lessons for monetary policy strategy and its communication. Two of these three central banks, the Fed and the ECB, fell behind the curve in the post pandemic recovery as a result of unwise changes in their policy strategy and communication during the pandemic.[4] Importantly, these changes included the adoption of forward guidance to provide additional policy stimulus, instead of a systematic policy reaction function. The Fed and the ECB fell into the forward guidance trap.

II. The Pandemic and Post-Pandemic Recovery

Figure 1 presents an overview of GDP growth and inflation in G3 economies (United States, Euro area, and Japan) during the 21st century. The two major economic crises common to the three economies are clearly visible: The Global Financial Crisis (GFC) and the Covid-19 pandemic both caused deep recessions. The behavior of inflation was markedly different in the two episodes. Compared to historical norms, inflation remained relatively stable during and after the GFC. During the pandemic recession, inflation initially fell, as was expected, but subsequently rose to levels not seen in several decades.[5]

Figure 2 focuses on the recent period to trace the evolution of the economy around the pandemic. The evolution of GDP per person was quite similar in the three

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3. See Woodford (2012), D'Amico and King (2023) and references therein.

4. A number of recent studies have examined this policy error, see Bordo, Cochrane, and Taylor (2023) and references therein.

5. As we discuss later, the stability of inflation after the GFC, and concerns that inflation remained somewhat below 2%, may have been a contributing factor in the complacency about the risks of high inflation that followed.

Figure 1 Growth and Inflation in G3 Economies

（a）GDP Growth（over 4 Quarters）

（b）Inflation（over 12 Months）
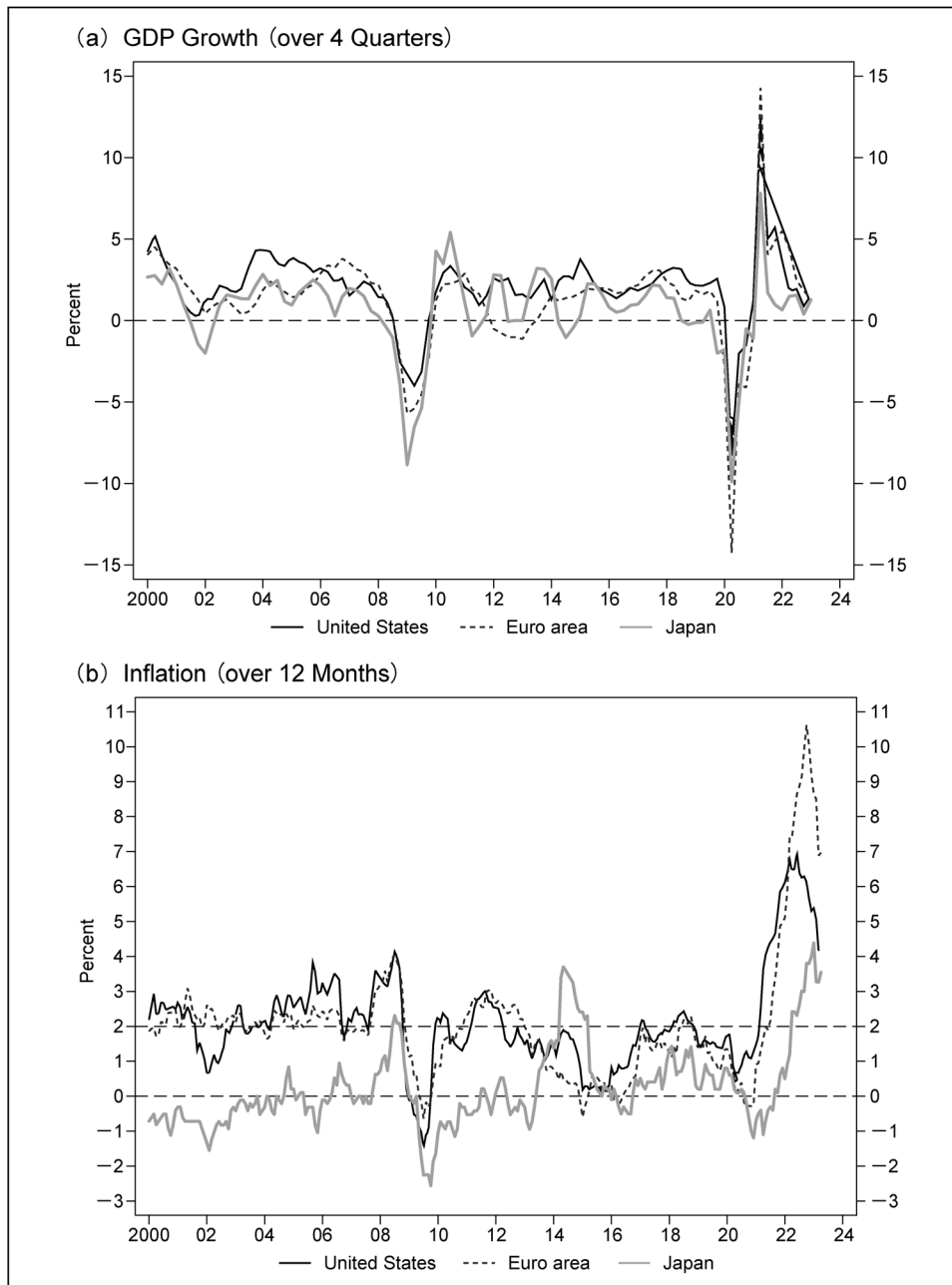
Note: Quarterly data (a); Monthly data (b)
Source: Federal Reserve Bank of St. Louis, *Federal Reserve Economic Data*.

economies, reflecting the shutdown in the economy in 2020 and subsequent return to more normal economic activity. Unlike the GFC, the recovery from the pandemic was quite rapid, and was more or less completed during 2021 in all three economies. The

Figure 2   GDP per Person and Inflation

（a）GDP per Person

（b）Inflation（over 12 Months）
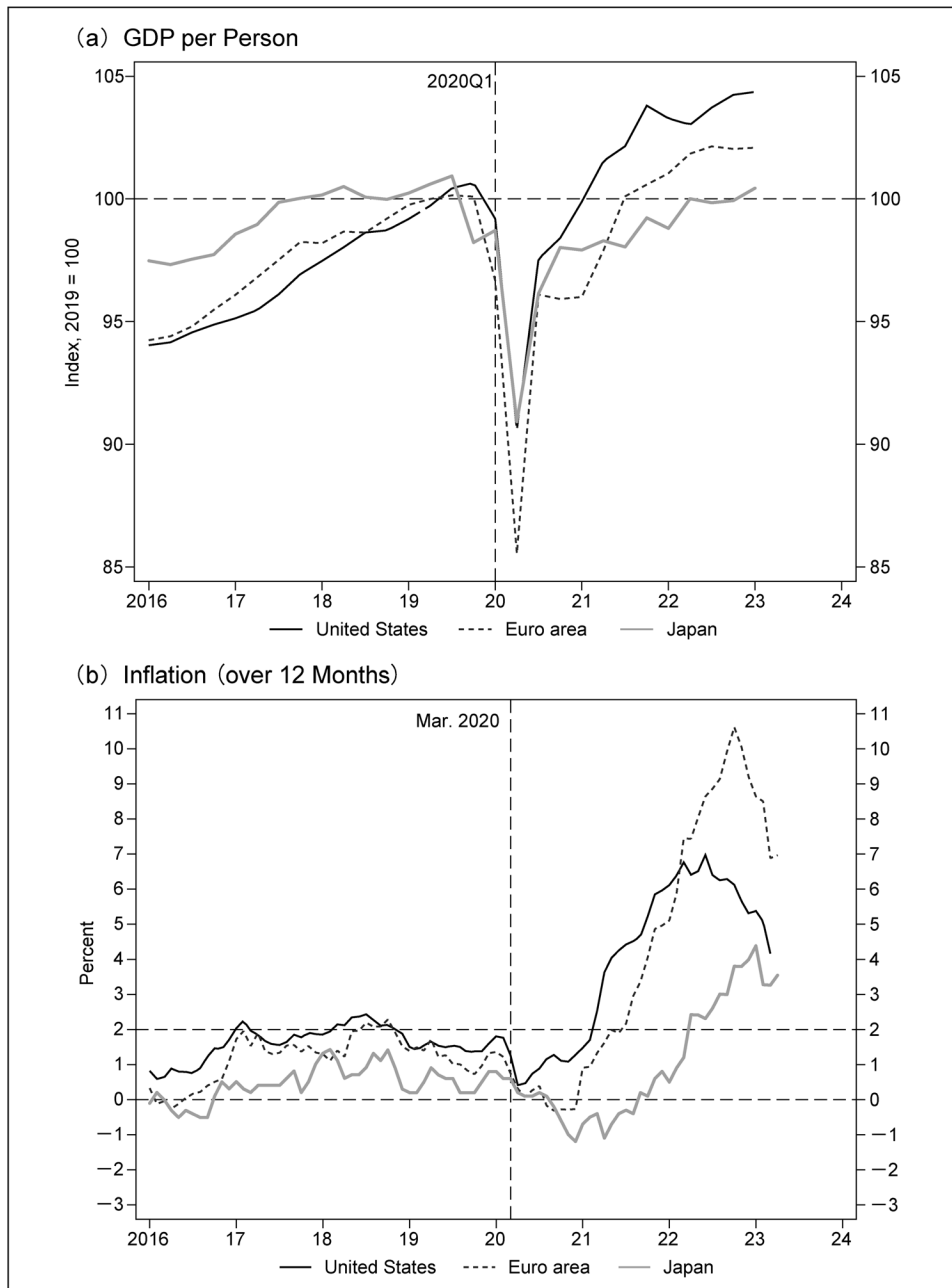
Note: Quarterly data (a); Monthly data (b).
Sources: Federal Reserve Bank of St. Louis, *Federal Reserve Economic Data*; author's calculations.

evolution of inflation reveals greater differences. The three economies experienced disinflation at the onset of the pandemic. This proved short-lived in the United States and the euro area. In the United States, inflation started to rise already in the second

Figure 3   Monetary Policy

（a）Policy Rate

（b）Balance Sheet

Note: Month-end data.
Sources: Federal Reserve Board; European Central Bank; Bank of Japan.
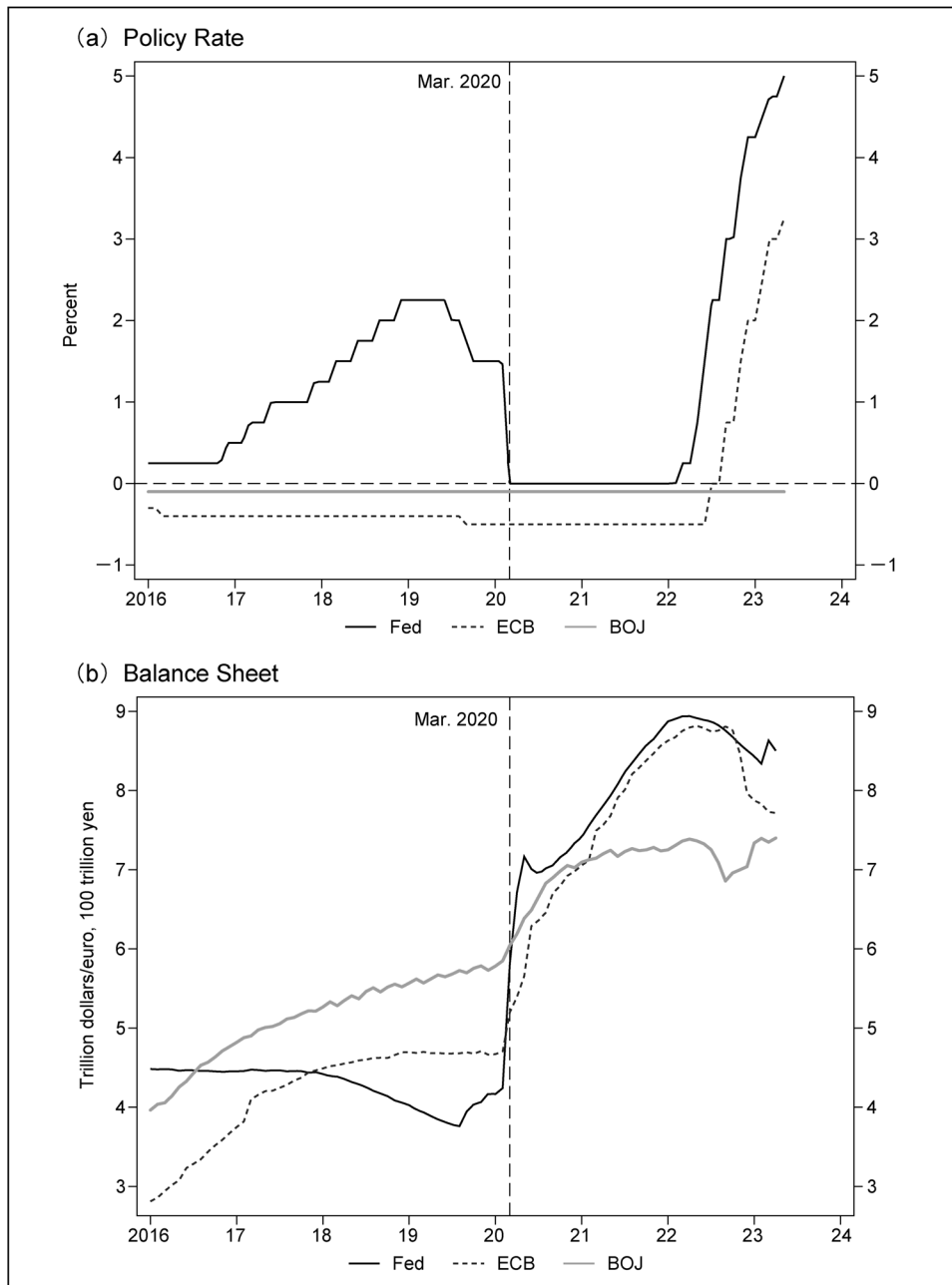
half of 2020, exceeded 2% early in 2021 and took off, rising to 7% in June 2022. In the euro area, inflation exceeded 2% somewhat later, in July 2021, but rose sharply to 5% by year-end, and continued to rise during 2022, reaching 10% in the second half of the

year. In contrast, the decline in inflation persisted longer in Japan, and the subsequent rise was less pronounced. Inflation in Japan only reached 2% in the first half of 2022 and peaked at 4.4% in early 2023.

The rapid recovery can be attributed to the decisive policy response—both fiscal and monetary. The unprecedented monetary policy easing during 2020 can be seen in Figure 3. Policy rates were quickly pushed to zero by the Fed. For the ECB and the BOJ policy rates were already at their effective lower bound—somewhat below zero—and were kept there. Because policy rates were constrained, a critical component of policy accommodation in this episode was the expansion of the balance sheet. In the first three months of the pandemic, all three of these central banks expanded their balance sheets by far more than during any other crisis.

The easing of policy observed during 2020 was the appropriate response, a policy success for which central banks deserve praise. However, this policy response also created a challenge. The unexpectedly strong recovery that followed engendered the risk of high inflation: This should have prompted an adjustment in monetary policy, a decision to stop providing additional accommodation, a plan towards policy normalization. Instead, in the case of the Fed and the ECB, massive accommodation through additional balance sheet expansion continued during 2021 and beyond, well after the economy had recovered. And all three central banks kept policy rates unchanged, while inflation started to rise. Did this reflect appropriate policy?

III. Falling behind the Curve

Evaluating monetary policy in real time requires keeping track of the evolution of the outlook for the economy, particularly the outlook of inflation and associated risks over the near and medium term. The presence of transmission lags in monetary policy implies that, while informative, the recent past of inflation and economic activity are not sufficient for judging the appropriateness of the current stance of monetary policy. Readings of actual inflation also reflect transient noise that would be counterproductive to address by adjusting monetary policy. This is why forward indicators of inflation are critical for monetary policy, why central banks spend considerable resources on forecasting and on analyzing related information from surveys of expectations and financial markets from which inflation expectations can be inferred.[6]

Figure 4 summarizes the evolution of inflation expectations in the United States, euro area and Japan, as can be inferred from inflation swap rates. Each panel presents daily readings since 2019, at the one-, two-, and five-year horizons. Inflation swap rates provide comparable information across economies, which facilitates a real-time comparison of the evolution of the outlook for inflation in the three economies.[7]

....
6. Indeed, near-term forecasts typically present more useful summary descriptions of the current state of the economy than first releases of actual data describing the recent past: They can incorporate qualitative information not reflected in hard data and filter noise. See Orphanides (2019) for additional discussion of the use of forecasts vs outcomes for policy design.
7. Additional information, including survey data on inflation, the projections provided by central banks and other institutions, as well as model-based indicators of inflation expectations would be useful for a deeper dive in real-time policy analysis. For the comparisons made in this study, focusing on inflation swap rates is sufficient and their evolution has been broadly similar to that of survey expectations.

Figure 4 Inflation Swap Rates
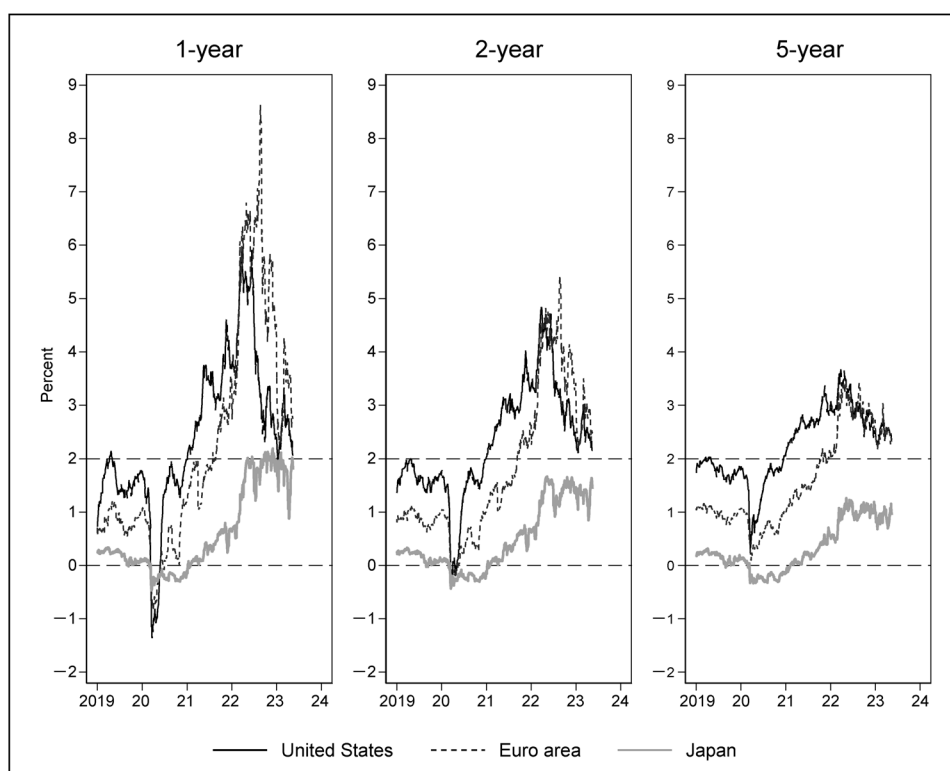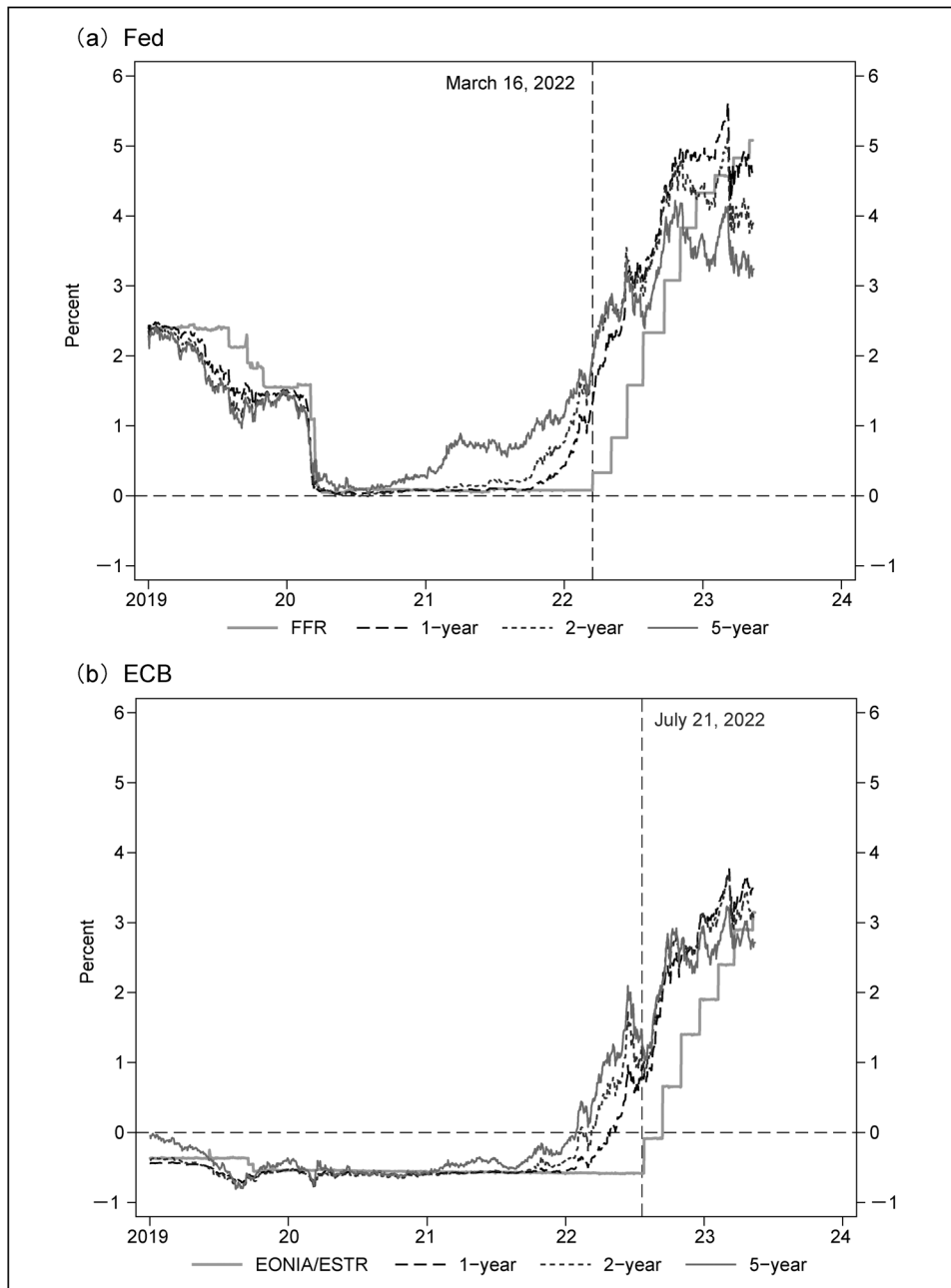

Note: Daily data.
Source: Bloomberg.

The evolution of inflation expectations suggests that two of the three central banks—the Fed and the ECB—fell behind the curve long before they started raising their policy rates in 2022. The short- and medium-term outlook for inflation in the United States and the euro area indicated that the ultra-accommodative policy stance adopted in 2020 required adjustment already during 2021. Some policy accommodation should have been removed during 2021 and both the Fed and the ECB should have been prepared to adopt a restrictive policy stance if the outlook for inflation continued to deteriorate beyond their common 2% goal.

The evolution of the outlook for inflation also highlights a crucial difference for Japan. Despite the inflation spike in 2022, the BOJ's continued provision of policy accommodation has been appropriate. While one-year-ahead inflation expectations reached 2%, the outlook for inflation over the medium run remained quite benign. Inflation expectations at the two- and five-year horizons persisted well below 2% throughout this period, indicating that the BOJ policy needed to remain accommodative.[8]

In light of this evidence, a closer examination of policy decisions and communication is only warranted for the Fed and the ECB. To assess the role of forward guidance

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8. This is consistent with the analysis in Kuroda (2022) who noted differences in the evolution of the inflation between Japan and other G7 economies in this period.

Figure 5   Overnight Interest Rates and OIS Rates

（a）Fed

（b）ECB

Note: Daily data.
Sources: Federal Reserve Bank of St. Louis, *Federal Reserve Economic Data*; Bloomberg.

in the observed delay in policy normalization by these two central banks, we next study the evolution of policy expectations as reflected in overnight index swap (OIS) rates, the associated implied real interest rates and their relation to the inflation outlook.

Overnight interest rates and OIS rates for the United States and the euro area are presented in Figure 5. The thicker lines show the daily overnight rates for the Fed and the ECB, while the remaining lines show corresponding one-, two-, and five-year OIS rates. The dashed vertical lines mark the dates when the Fed and the ECB first raised policy rates after the pandemic. As with the inflation swap rates, OIS rates are comparable across the two economies, facilitating comparisons. OIS rates capture expectations of future policy at the pertinent horizons and allow gauging the role of policy communication and forward guidance in shaping monetary conditions, beyond what is reflected in overnight interest rates. Of course, these are nominal interest rates, and we know that what matters for the economy, and for assessing the appropriateness of the monetary policy stance is the configuration of real interest rates. We can obtain market-based measures of ex ante real interest rates by employing the inflation swap rates and OIS rates shown in Figures 4 and 5.
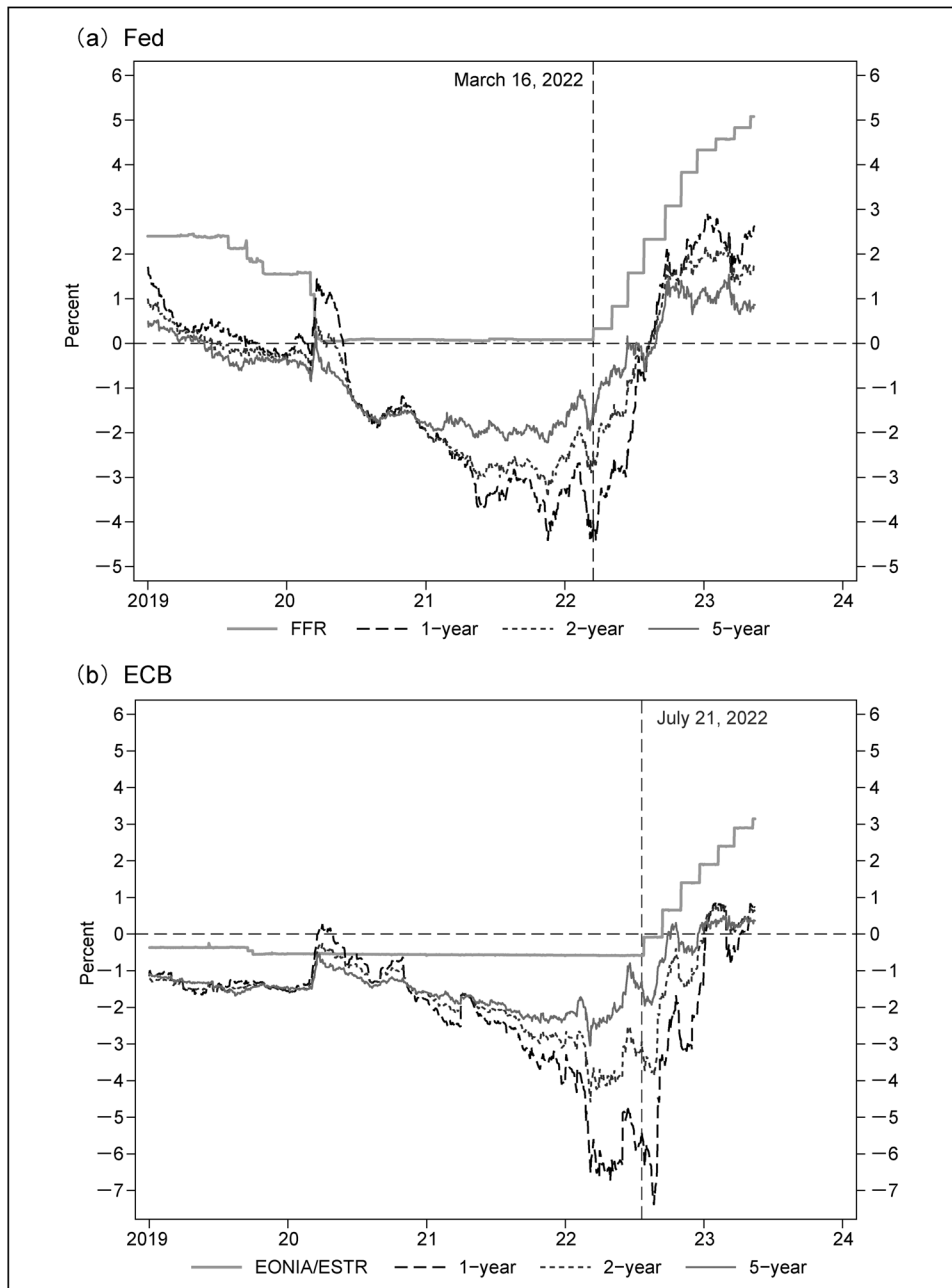
The implied ex ante real interest rates, shown in Figure 6, provide a first indication of how much behind the curve these two central banks fell after the pandemic. The vertical lines in the charts mark lift-off for the Fed and the ECB: March 16, 2022 and July 21, 2022, respectively. As can be seen, for over a year before lift-off, as inflation rose and the outlook for inflation deteriorated, both the Fed and the ECB kept guiding real interest rates to lower and more negative levels. The policy adopted during this period was not merely maintaining the degree of policy accommodation that was appropriately put in place during 2020. By continuing to guide real interest rates lower, the Fed and the ECB provided additional accommodation, predictably fueling a further deterioration of inflation. Was this compatible with the systematic monetary policy response one would have expected in an environment of rising inflation? Of course not! The delay in adjusting policy suggests a flaw in the monetary policy strategy and communication that had been adopted by these two central banks during the pandemic. The Fed and the ECB had fallen into the forward guidance trap.

IV. How Did the Fed Fall into the Trap?

To illustrate how the Fed fell behind the curve in the post-pandemic recovery, Figure 7 compares the inflation outlook and ex ante real interest rates, as implied by inflation swap rates, at the two-year horizon.[9] As the inflation outlook deteriorated, the Fed maintained its policy rate unchanged at zero and communicated that it would maintain this policy, thereby guiding real interest rates to more negative levels. How can we explain why the Fed fell into this trap? Two elements in the Fed's implementation of forward guidance induced a significant delay in the policy response to an unexpected increase in inflation: First, a decision to move from *forecast-based* to *outcome-based* forward guidance; And second, an implicit commitment to a gradual reduction of net asset purchases (tapering), and to raising policy rates only after net asset purchases ended.

....
9. The two-year horizon is useful for several reasons. First, it provides an indicator that captures both current policy as well as the role of policy communication, including forward guidance. Second, it provides information about monetary policy that cannot be reflected with overnight rates at the zero lower bound. Third, it helps account for the transmission lag in monetary policy.

Figure 6   Nominal Overnight Rates and Implied Real Interest Rates

（a）Fed

（b）ECB

Note: Daily data. Implied real interest rates derived from the inflation swap rates and OIS rates shown
        in Figures 4 and 5.

Sources: Federal Reserve Bank of St. Louis, *Federal Reserve Economic Data*; Bloomberg; author's
          calculations.

   The introduction of *outcome-based* forward guidance represented a significant and
unfortunate shift in the Fed's monetary policy strategy away from what had served pol-

Figure 7   Two-Year Inflation Swap Rate and Implied Real Rate: Fed
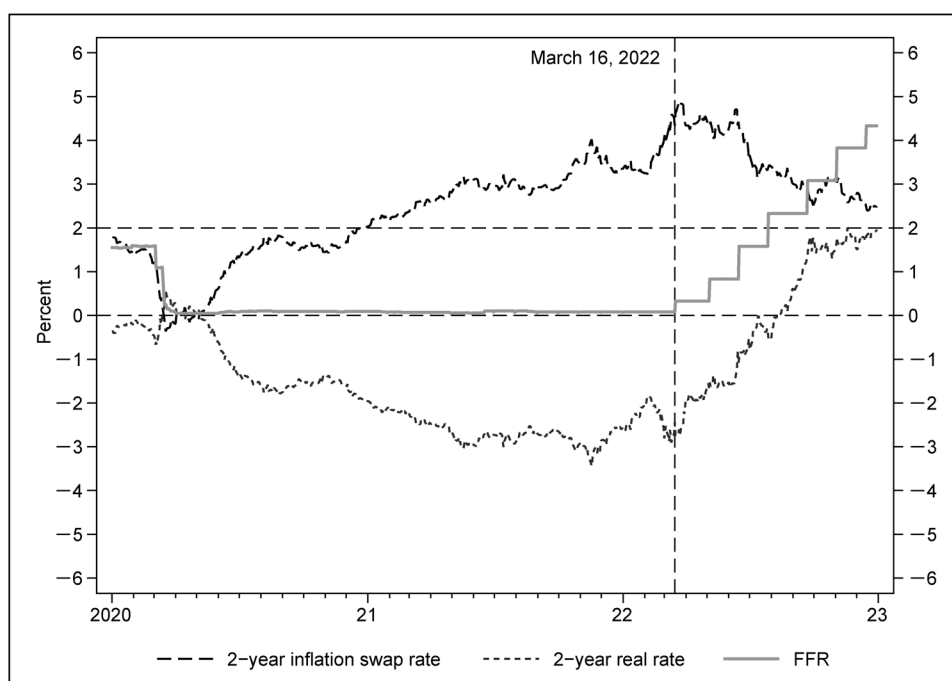
Note: Daily data.
Sources: Federal Reserve Bank of St. Louis, *Federal Reserve Economic Data*; Bloomberg; author's
    calculations.

icy better earlier in the 21st century. The change can be easily identified by comparing
the FOMC statements released on July 29, 2020 and September 16, 2020. In July, the
Fed provided forward guidance based on the outlook of the economy:

> "The Committee expects to maintain this target range until it is confident that
> the economy has weathered recent events and *is on track to achieve* its maxi-
> mum employment and price stability goals." (Federal Reserve Board [2020a],
> emphasis added.)

By contrast, the statement following the September meeting read as follows:

> "The Committee…expects it will be appropriate to maintain this target range
> until *labor market conditions have reached* levels consistent with the Commit-
> tee's assessments of maximum employment and *inflation has risen* to 2 percent
> and is on track to moderately exceed 2 percent for some time." (Federal Reserve
> Board [2020b], emphasis added.)

With this change, the Fed communicated a shift towards a myopic approach to pol-
icy. This decision alone virtually ensured a policy error in case the inflation outlook
deteriorated abruptly.

The September 2020 FOMC meeting was the first meeting after the Committee's
adoption of a revised monetary policy strategy that suggested the Fed was more will-

ing to tolerate temporary episodes of inflation above 2% than in the past. The revision reflected concern that encounters with the zero lower bound might lead to a bias of inflation below 2%, on average, over time.[10] This likely contributed to the unfortunate error reflected in the September statement. That said, the Fed's revised policy framework did not pre-ordain a shift to the myopic approach reflected in the statement.[11] The Minutes of the September 2020 meeting, released three weeks later, suggest that at least some members of the FOMC were uncomfortable with the implicit suggestion that this policy guidance reflected an unconditional commitment, disjointed from the evolution of the outlook:

> "...members generally agreed that the Committee's policy guidance expressed its assessment about the path for the federal funds rate most likely to be consistent with achievement of the Committee's goals, but that *it was not an unconditional commitment*." (Federal Reserve Board [2020c], emphasis added.)

However, as a practical matter, the change in communication supported policy myopia that persisted for some time. As late as November 2021, despite the severe deterioration in the inflation outlook that was already evident and that ordinarily would have prompted a policy tightening, Chair Powell communicated that the myopic approach adopted in September 2020 continued to guide policy and argued against lift-off. In response to a question at the post-policy-meeting press conference he explained:

> "We have not focused on whether we meet the liftoff test, because we don't meet the liftoff test now because we're not at maximum employment." (Federal Reserve Board [2021a])

Another complication that contributed to the policy error was the interaction of interest rate policy with balance sheet policy. Implicit in the Fed's policy strategy was that the Fed would only start raising rates after it ended net asset purchases, as it had done following the end of the GFC easing cycle in the previous decade. Furthermore, the Fed had indicated great reluctance to end net asset purchases abruptly. As the inflation outlook deteriorated during 2021, this presented a challenge which was clearly reflected in the Minutes of the November 2021 FOMC meeting:

> "Various participants noted that the Committee should be prepared to adjust the pace of asset purchases and raise the target range for the federal funds rate sooner than participants currently anticipated if inflation continued to run higher than levels consistent with the Committee's objectives." (Federal Reserve Board [2021b])

By the December 2021 meeting, the Minutes revealed that the need to start tightening policy had become more pressing:

> "... participants judged that the increase in policy accommodation provided by the ongoing pace of net asset purchases was no longer necessary. They remarked

....
10. See Clarida (2021).
11. This is explained in some detail by Clarida (2023). It is notable that two dissents were registered at the September 2020 meeting, both relating to the communication of forward guidance.

that a quicker conclusion of net asset purchases would better position the Committee to set policy to address the full range of plausible economic outcomes." (Federal Reserve Board [2021c])

And yet, the forward guidance provided precluded liftoff. The preference to end net asset purchases gradually, further delayed action.

At the January 2022 meeting, the Fed finally announced that it would end quantitative easing in early March:

> "The Committee decided to continue to reduce the monthly pace of its net asset purchases, bringing them to an end in early March." (Federal Reserve Board [2022])

In so doing, the Fed effectively preannounced liftoff at its next meeting which was scheduled after "early March." Liftoff materialized on March 16, 2022.

## V. How Did the ECB Fall into the Trap?

As the inflation outlook deteriorated during 2021, the ECB maintained the policy rate unchanged at the negative level reflecting its effective lower bound and guided real interest rates to increasingly lower, more negative levels. Figure 8 illustrates the ECB's predicament. While the ECB was behind the curve already by end-2021, the ECB's challenge became even worse during the first half of 2022, as a result of a spike in energy prices in Europe. And yet, the ECB continued to delay liftoff until July 21, 2022, all the while driving real interest rates even lower.

How did forward guidance lead the ECB into this trap? Two elements induced a significant delay in the ECB's policy response to an unexpected increase in inflation: First, a calendar-based implementation of two asset purchase programs, with a pre-announced schedule of net purchases (over a year, on some occasions). Second, a commitment to raising policy rates only after net asset purchases ended—a "sequencing" restriction that was an important component of the ECB's forward guidance. This combination raised the odds of a significant delay in adjusting policy rates if inflation rose faster than the baseline scenario envisioned by the ECB during the pandemic, as indeed happened.

The ECB policy rates were already at their effective lower bound when the pandemic shock was recognized in March 2020. Faced with "lowflation," the ECB had already been using various forms of forward guidance and asset purchases to provide additional accommodation. Similar to the Fed, the ECB linked forward guidance on liftoff to the end of its asset purchase programs. This was reiterated at the March 2020 meeting:

> "The Governing Council continues to expect net asset purchases to run for as long as necessary to reinforce the accommodative impact of its policy rates, and to end shortly before it starts raising the key ECB interest rates." (ECB [2020a])

Maintaining the policy rate at the effective lower bound did not have to continue regardless of what was happening to inflation, but in practice the forward guidance

Figure 8   Two-Year Inflation Swap Rate and Implied Real Rate: ECB
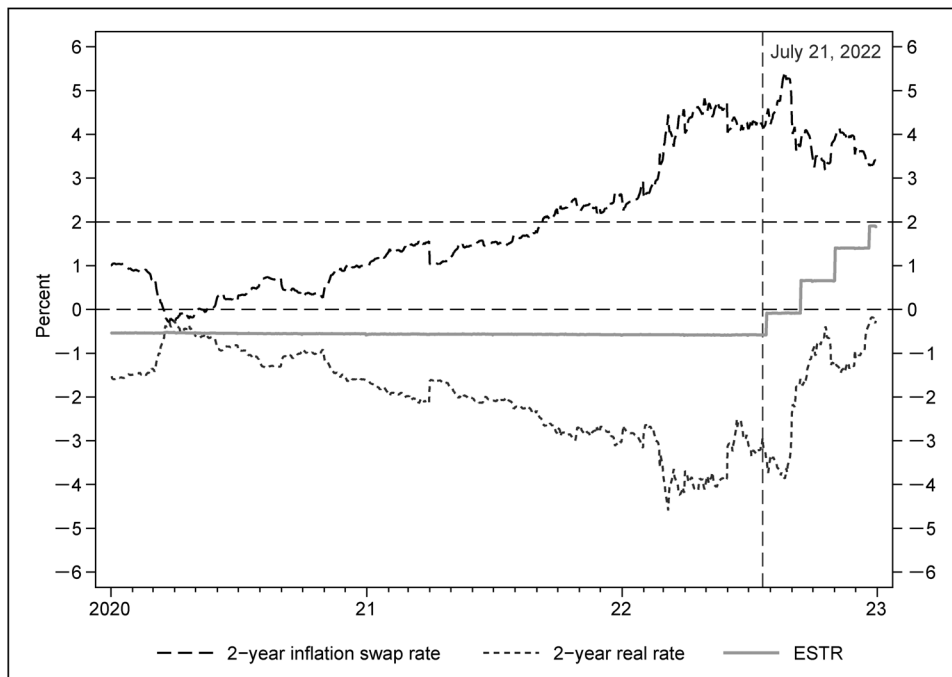
Note: Daily data.
Sources: Federal Reserve Bank of St. Louis, *Federal Reserve Economic Data*; Bloomberg; author's
         calculations.

constrained appropriate action. As late as November 15, 2021, in her testimony to the European Parliament, ECB President Lagarde explained that despite the spike in inflation, these self-imposed conditions argued against changing the policy rate well into 2022:

> "Regarding policy interest rates, in our forward guidance we clearly articulated the three conditions that need to be satisfied before rates will start to rise. Despite the current inflation surge, the outlook for inflation over the medium term remains subdued, and thus these three conditions are very unlikely to be satisfied next year." (ECB [2021a])

Another similarity with the Fed, was the communication of greater tolerance for "transitory" periods with inflation exceeding 2%. The communication following the December 2021 meeting explained:

> "In support of its symmetric 2% inflation target and in line with its monetary policy strategy, the Governing Council expects the key ECB interest rates to remain at their present or lower levels until it sees inflation reaching 2% well ahead of the end of its projection horizon and durably for the rest of the projection horizon, and it judges that realised progress in underlying inflation is sufficiently advanced to be consistent with inflation stabilising at 2% over the medium term. This may also imply a transitory period in which inflation is moderately above

target." (ECB [2021b])

The commitment to only raise rates after net asset purchases ended proved quite problematic in large part because during the pandemic the ECB decided to adopt an ill-advised calendar-based implementation of quantitative easing, with purchases being pre-announced for long periods.

Before the pandemic, the ECB was expanding its balance sheet through the Asset Purchase Programme (APP) at a monthly pace of 20 billion euro to help correct its "lowflation" challenge. These asset purchases had provided significant accommodation, compressing term premia on euro area government bonds by over 100 basis points (Lane [2020]). The ECB had decided to restart APP purchases on September 12, 2019, and communicated these would continue "as long as necessary to reinforce the accommodative impact of its policy rates, and to end shortly before it starts raising the key ECB interest rates" (ECB [2019]). This formulation for asset purchases allowed policy to respond in the event inflation rose but was abandoned during the pandemic in favor of a calendar-based implementation.

The calendar-based implementation was used both for the APP as well as for the Pandemic Emergency Purchase Programme (PEPP) that was introduced during the pandemic. For example, on December 10, 2020, the ECB announced that it would "increase the envelope of the pandemic emergency purchase programme (PEPP)" and extended the horizon of net purchases to "at least the end of March 2022" (ECB [2020b]). This was a commitment to keep easing policy through this facility for 15 months, regardless of how the economy evolved. And while at the December 16, 2021 meeting the ECB decided to discontinue net asset purchases under the PEPP at the end of March 2022, it also announced APP purchases would continue for much longer. The ECB envisioned that the pace of purchases would gradually decline but likely extend beyond the third quarter of 2022:

> "In line with a step-by-step reduction in asset purchases and to ensure that the monetary policy stance remains consistent with inflation stabilising at its target over the medium term, the Governing Council decided on a monthly net purchase pace of €40 billion in the second quarter and €30 billion in the third quarter under the APP. From October 2022 onwards, the Governing Council will maintain net asset purchases under the APP at a monthly pace of €20 billion for as long as necessary to reinforce the accommodative impact of its policy rates." (ECB [2021b])

By the March 10, 2022 meeting it was evident that inflation and the inflationary outlook were far worse than the ECB had anticipated during 2021. The 2-year inflation swap rate rose further from 2.63% at end-2021 to above 4% in the days before the meeting. The implied 2-year real-interest rate declined to a historic low, around minus 4%.

Yet the ECB was trapped by its forward guidance and continued to ease policy. The ECB decided to keep the policy rate unchanged at its negative level and continue net asset purchases. At the conclusion of the meeting, the ECB confirmed net asset purchases would continue during the first half of the year, as it had communicated in

2021, and only adjusted its guidance regarding purchases during the third quarter:

> "Monthly net purchases under the APP will amount to €40 billion in April, €30 billion in May and €20 billion in June. The calibration of net purchases for the third quarter will be data-dependent and reflect its evolving assessment of the outlook." (ECB [2022a])

At the following meeting, on April 14, 2022, with inflation galloping to historic highs, the ECB continued to ease policy as it had previously communicated. It confirmed that net asset purchases would continue throughout the second quarter of 2022, but added they would end in the third quarter: "... net asset purchases under the APP should be concluded in the third quarter" (ECB [2022b]).

On June 9, 2022, the ECB finally announced that it "decided to end net asset purchases under its asset purchase programme (APP) as of 1 July 2022" (ECB [2022c]). By ending net asset purchases on the first day of the third quarter, the ECB finally cleared its self-imposed constraint on policy rates. Liftoff took place on July 21, 2022. The nominal overnight interest rate was pushed up by 50 basis points to just below zero. But by then, inflation had already exceeded 8%.

VI. Lessons for Policy Strategy and Communication

A number of questions can be raised and lessons can be drawn from this experience for monetary policy strategy and its communication that can help improve practices and protect against avoidable policy mistakes. The lessons are not necessarily new, but they are worth revisiting nonetheless, given the recent experience.

A first question, revisiting an old debate, is whether pegging the nominal interest rate is the most reliable benchmark for monetary policy. Recall the two limitations on monetary policy that Milton Friedman highlighted in his 1967 AEA Presidential address: Monetary policy "cannot peg interest rates for more than very limited periods;" and it "cannot peg the rate of unemployment for more than very limited periods" (Friedman [1968]). As practiced by the Fed and the ECB, forward guidance suggested that nominal rates would be pegged for far too long, irrespective of inflation developments. With inflation and inflation expectations increasing, real interest rates kept declining, overheating the economy. In effect, the Fed and the ECB fell victims of the first limitation highlighted by Friedman so many decades ago. This fundamental error is the essence of the forward guidance trap.

To be sure, it is feasible to implement reasonable monetary policy with a nominal interest rate instrument, as both the Fed and the ECB had demonstrated earlier in their history.[12] But doing so requires that the interest rate is set in a systematic fashion, responding appropriately to a nominal variable that underpins the nominal anchor provided by the central bank. This is critical for avoiding "nominal indeterminacy" in a monetary economy (McCallum [1981, 1986]). More generally, it is critical for the successful implementation of systematic monetary policy with an interest rate instru-

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12. In earlier periods, both the Fed and the ECB policy could be well-described with simple forward-looking rules that properly adjusted the policy rate with the inflation outlook and economic activity, see e.g., Hartmann and Smets (2018), Orphanides and Wieland (2013), and Orphanides (2019).

ment (Taylor [1993]; Taylor and Williams [2010]). Close attention to the outlook for inflation, in particular, is essential for successfully maintaining well-anchored inflation expectations and ensuring monetary policy contributes to overall economic stability (Orphanides and Williams [2022]).

In effect, to avoid falling victim of Friedman's first limitation requires that policy implemented with a nominal interest rate instrument is rule-like, even if it is not strictly based on an explicit policy reaction function. To avoid the forward guidance trap, guidance on future interest rate policy should be contingent to the evolution of the economy, similar to the prescriptions of a policy rule. This is not a new observation. As Plosser (2012) had commented over a decade ago, in the context of the Fed's policy strategy, "articulating rules as guides provides the best kind of forward guidance, which would be helpful in stabilizing the economy and the path of inflation."

The formulation of a benchmark policy rule that could serve as a guide and provide forward guidance need not be a fixed and immutable formula. This could be part of the recurrent evaluation of a central bank's monetary policy strategy and its communication. The central bank's strategy must also foresee periodic review and occasional adaptation of the benchmark rule chosen to communicate policy, reflecting the evolution of our knowledge of the economy.

Another lesson from the recent experience concerns the pitfalls of formulating and communicating policy on the basis of one baseline scenario, without adequate attention to alternatives. The forward guidance on policy rates provided by the Fed and the ECB communicated useful information about the likely path of policy rates as long as the economy evolved in line with the baseline scenario of the recovery from the pandemic. While this was adequate during the pandemic, this approach proved inadequate for coping with an upward surprise in inflation that emerged during the post-pandemic recovery. As a general principle, central banks need to be prepared for contingencies, for unexpected elements. This is an old challenge in central banking that we need to keep coming back to from time to time. As a critical component of policy strategy, forward guidance was problematic. Instead of facilitating a prompt response to the evolving inflation outlook, it constrained the policy response.

Alternative approaches to forward guidance placing less emphasis on the baseline scenario would have been more robust. For example, plausible scenario analysis could have been employed to better explain the contingent nature of policy.[13]

The policy mishap observed recently also highlighted the challenges that arise when balance sheet tools need to be activated to provide additional policy accommodation at the effective lower bound. When multiple substitutable instruments are simultaneously employed to adjust policy, as has been observed at the effective lower bound, their combined effect must be properly accounted (Hofmann *et al*. [2021]). The risk of miscalibration and misinterpretation of policy plans rises when balance sheet policy and interest rate policy are not well-coordinated. In the case of the ECB, the multiplicity of programs for bond purchases added yet more complexity. Forward guidance on overnight interest rates as well as balance sheet expansions provide policy accommodation by compressing longer-term yields. The more direct approach of using

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13. Bordo, Levin and Levy (2020) provide a pertinent illustration of this approach for the Fed.

a yield at a longer-than-overnight maturity as an instrument when the overnight rate is constrained could reduce these risks. Though available experience is limited (e.g., the BOJ's yield curve control), this is a promising alternative to the approach followed by the Fed and the ECB that warrants further study.[14]

VII. Concluding Remarks

Forward guidance may be appealing to policymakers who wish to improve the effectiveness of monetary policy by shaping expectations of future policy rates while maintaining policy discretion. Even if not perfectly credible, the communication of explicit information about the likely path of future policy can be effective and, in some circumstances, can have some of the advantages of a well-designed policy rule. However, forward guidance can become a trap, inviting policy errors that worsen economic performance.

The experience of the Fed and the ECB during the post-pandemic recovery suggests this is not merely a theoretical possibility. Both central banks fell into the forward guidance trap and were unable to fulfil their responsibility of preserving price stability, thereby compromising growth and employment over the long run. The complications associated with formulating policy at the effective lower bound contributed to this policy error but alternative strategies to forward guidance could have better mitigated these risks. Ultimately, the preference for discretion, over the commitment to a more systematic and less discretionary approach led to the adoption of an approach to forward guidance that trapped the Fed and the ECB to providing excessive accommodation during the post-pandemic recovery, inconsistent with preserving price stability and supporting economic growth and employment over time.

Compared to forward guidance, clearer communication of a central bank's reaction function would protect against the forward guidance trap and improve policy outcomes. A simple forecast-based policy rule could serve as a benchmark for communicating the systematic, contingent nature of monetary policy—the best form of forward guidance.

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14. The introduction of a three-year yield target as a policy instrument by the Reserve Bank of Australia (RBA) during the pandemic initially appeared to offer a useful case study but in the end it did not. Unfortunately, subsequent to the introduction of the three-year yield target, the RBA also introduced a calendar-based bond purchase program, similar to that of the Fed and the ECB, thereby undermining the three-year yield target (Orphanides [2023]).

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