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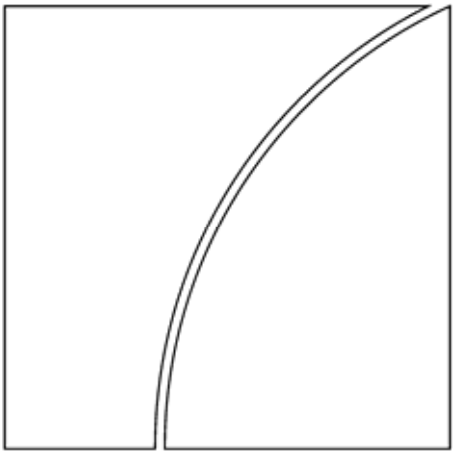

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Monetary policy decisions: preparing the inputs and communicating the outcomes

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This is a background note for the Autumn 2007 Central Bank Economists' Meeting. The views expressed are those of the author and do not necessarily reflect the views of the BIS or the central banks the author represents.

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Abstract

The Autumn 2007 Central Bank Economists' Meeting at the BIS gathered senior representatives from 35 central banks to discuss both the material staff provide to policymakers at their institution as inputs to the policy decision and how the policy outcomes are communicated to the public. The central banks represented at the meeting included all of the largest central banks as well as banks from Africa, Asia, Europe, Oceania, and North and South America. The representatives contributed a background paper describing practices at their central bank. The papers covered what material is provided to policymakers, how it is produced, how it is evaluated, how it has changed and how decisions are communicated. This note was prepared to inform and help structure the discussion. It reviews the central bank contributions, drawing as well on the results of two surveys of central banks conducted by the Central Banking Studies group at the BIS in 2007. The surveys cover the provision of monetary policy analysis and advice by central bank staff and the monetary policy communication practices of central banks.

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Monetary policy decisions: preparing the inputs and communicating the outcomes

William Nelson[1]

1. Introduction

The material provided by staff to policymakers at central banks as inputs to policy decisions, and the procedures followed to prepare the material, are fairly similar across institutions because central banks have by and large converged on a common way of conducting monetary policy. Central banks influence conditions in the market for interbank reserves so as to keep short-term money market rates near a target set by the decision-making body (DMB) of the central bank. That interest rate target, in turn, is chosen to keep inflation low and stable and to limit fluctuations in output and unemployment, with some variation across central banks with regard to the weights and priorities placed on the two objectives. Since interest rate changes affect the economy with a lag, DMBs must adjust policy in the light of the outlook for future economic developments. To help make those decisions, central bank economists provide policymakers with material bearing on the outlook for economic activity and on the implications for that outlook of current and potential future monetary policy settings.

Still, there are meaningful differences in the material provided and procedures followed, reflecting idiosyncratic choices at central banks and also variations in aspects of policy frameworks. DMBs may consist of single Governors or many members, just insiders or a mix of insiders and outsiders. Whereas some central banks develop a consensus DMB view of the economic situation, others proceed with each DMB member maintaining and communicating a separate view. Some central banks have articulated a specific inflation target while others have more general objectives. DMBs meet with different frequencies, from monthly to quarterly. Some central banks, especially the inflation targeters, publish regular reports that typically include a forecast of inflation, a discussion of how they will achieve their objectives and a review of past performance. A few central banks publish their own forecast for the policy rate. Central banks that publish a quarterly inflation forecast often only update the forecast for their DMB in advance of that publication. Moreover, there appears to have been a movement towards more systematic inflation targeting and published inflation forecasts.

The Autumn 2007 Central Bank Economists' Meeting at the BIS gathered senior representatives from 35 central banks to discuss both the material staff provide the DMB at their institution and how the policy outcomes are communicated to the public. The central banks represented at the meeting included all of the largest central banks as well as banks from Africa, Asia, Europe, Oceania, and North and South America.[2] The representatives

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[1] Bank for International Settlements. David Archer, Claudio Borio, Gabriele Galati, Alex Heath, Bill White and Feng Zhu provided helpful and thoughtful comments and suggestions. Clara García provided excellent research assistance.

[2] The central banks that participated in the meeting were the Central Bank of Argentina, the Reserve Bank of Australia, the Austrian National Bank, the National Bank of Belgium, the Central Bank of Brazil, the Bank of Canada, the Central Bank of Chile, the People's Bank of China, the Bank of the Republic (Colombia), the Czech National Bank, the European Central Bank (ECB), the Bank of France, the Deutsche Bundesbank, Magyar Nemzeti Bank, the Reserve Bank of India, the Bank of Israel, the Bank of Italy, the Bank of Japan, the Bank of Korea, the Central Bank of Malaysia, the Bank of Mexico, the Netherlands Bank, the Reserve Bank of

contributed background papers describing practices at their central banks. The papers covered what material is provided to the DMB, how it is produced, how it is evaluated, how it has changed and how decisions are communicated.

This note was prepared to inform and help structure the discussion. It reviews the central bank contributions, drawing as well on the results of two surveys of central banks conducted by the Central Banking Studies group at the BIS in 2007. The data reported here therefore do not reflect the practices of the entire central banking universe, only those who participated in the meeting or responded to the surveys.[3] The surveys cover the provision of monetary policy analysis and advice by central bank staff and the monetary policy communication practices of central banks. The next section provides some background material on the meeting participants' central banks that bears importantly on the inputs provided to their DMBs. The third section reviews the range of material supplied, including forecasts, alternative scenarios and policy guidance. The fourth section describes how that material is produced, including how long it takes, the relative use of models and expert judgment and the relationship between policymakers and staff. The fifth section summarises how the forecasts and other inputs are evaluated, and the final section discusses central bank communications about monetary policy decisions.

2. Background

The material that central bank staff provide to their policymakers is importantly influenced by characteristics of the decision-making process and the DMB. In particular, the precise monetary policy objectives of the central bank determine to a significant extent the content of the material. The objectives also shape how the central bank communicates with the public and evaluates its performance, which in turn, affects the process followed to prepare the material. The size and composition of the DMB, and whether it has outside representatives, also affect both the nature of the material provided and the process by which it is produced. Finally, the frequency with which monetary policy decisions are normally made, and any lower-frequency extra-extensive assessment of the outlook, partly determine the quantity and nature of material provided for each meeting.

Of the central banks that participated in the meeting, about half define their monetary policy objective as an explicit inflation target – many of recent vintage – and another quarter indicate that they have a price stability objective. Most of the remaining central banks characterised their objectives as "multiple" or "a generalised stability objective". Since inflation targeting central banks are not insensitive to fluctuations in output, and those central banks with multiple objectives, in particular the Federal Reserve, consider maintaining low and stable inflation to be a precondition for achieving maximum growth over the long term,

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New Zealand, the Central Bank of Norway, Bangko Sentral ng Pilipinas, the National Bank of Poland, the South African Reserve Bank, the Bank of Spain, Sveriges Riksbank, the Swiss National Bank, the Bank of Thailand, the Central Bank of Turkey, the Bank of England, the Federal Reserve Bank of New York and the Board of Governors of the Federal Reserve System. Eight of the meeting participants – the seven national central banks from the euro area and the Federal Reserve Bank of New York – are central banks that do not set their own independent monetary policy, but rather contribute to the monetary policy decision of a larger region. The Federal Reserve Bank of New York and the Board of Governors of the Federal Reserve System contributed separate papers. The discussion of the papers in this summary generally refers to the entire set of responses and so overweights the responses from these two currency areas to some extent.

[3] Serge Jeanneau and Paul Moser-Boehm compiled and analysed the results of the surveys. Of the 35 central banks that participated in the Autumn Economists' Meeting, 30 provided responses to the survey on inputs to the policy process and 26 provided responses to the survey on communications. The results reported in this note do not reflect the responses to the surveys from central banks that did not participate in the meeting.

the monetary policy of both groups of central banks has much in common. Nevertheless, as will be discussed below, there are some differences in the procedures of the two groups, driven in part by requirements for communications. A notable outlier, at least in terms of intermediate targets, is the Central Bank of Argentina, whose monetary policy focuses on the control of M2 growth.

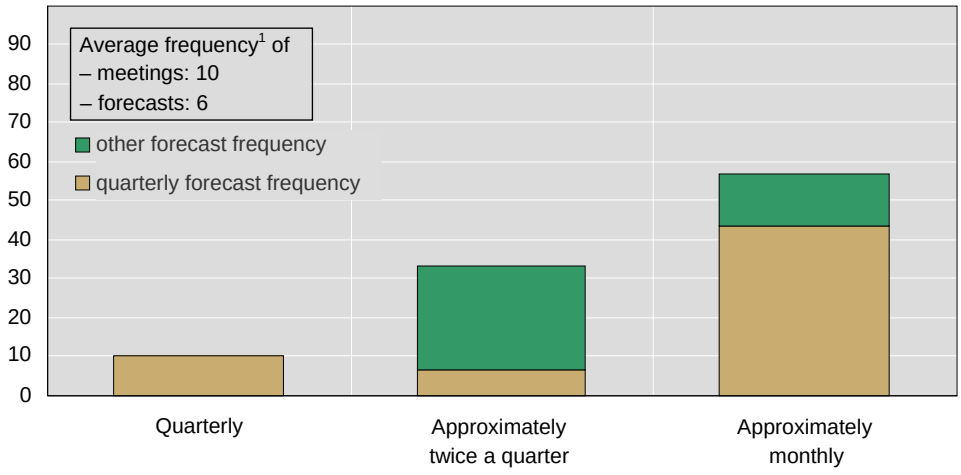
The composition of the decision-making bodies at the central banks varies considerably. At four of the central banks (the Reserve Bank of India, the Bank of Israel, the Central Bank of Malaysia and the Reserve Bank of New Zealand), the monetary policy decision is made by the Governor alone. At the other central banks, the DMB varies in size from three (Switzerland) to 19 (ECB). At just over half of the central banks, the DMB is made up exclusively of insiders, while others have a majority of outside members. At the majority of those central banks with decision-making committees, the decision is made by vote, although in a significant minority – including many that formally require a vote – the decision-making is typically by consensus.

As shown in Figure 1, slightly under two thirds of the central banks' decision-making bodies meet monthly and nearly a third meet about twice a quarter. The remaining few meet less frequently, mostly quarterly. Of those that meet monthly, a considerable fraction produce full forecasts only quarterly, typically for subsequent publication.[4] At those central banks, the staff preparation for the quarterly meetings, and the associated material provided to the MB, is more extensive than for meetings for which the forecast is not updated.

Figure 1

Meeting frequency

Per cent



[1] Number of times per year.

3. Staff inputs to the monetary policy process

As support for the monetary policy decision, staff inputs include current analysis, forecasts, alternative projections and policy advice. Many participants report that staff at their central bank are putting considerable effort into improving their assessment of the current situation,

[4] As discussed in Section 6, all the meeting participants publish a forecast.

using statistical reports, financial data and anecdotal information, and developing methods, such as factor models, to evaluate the large volume of data available on current-quarter activity, including often noisy preliminary estimates. Participants described developing an increasingly technical toolkit for preparing the central forecast, although several banks discussed challenges associated with the transition from estimates of the current quarter, which are best made using incoming data and expert judgment, to later quarters, which are more amenable to model-based projections. Similarly, a number of banks noted issues associated with combining forecasts from different models. In addition, many banks are engaged in programmes to more effectively use information contained in monetary and credit aggregates, both for lower-frequency trends in inflation and for evaluating financial imbalances. Staff are also meeting a demand by their DMBs for increased analysis of policy alternatives, although at a significant minority of central banks, the analysis does not include a specific policy recommendation.

Table 1

Staff input for the monetary policy decision-making process

	Regularly provided as background material for the decision-making meeting		**Usually presented at MPC meeting by a senior staffer**
	Per cent[1]	**Average per annum**	**Per cent**[1]
Historical dataset of economic and financial indicators	60	7	33
Chart pack of economic and financial indicators	87	11	53
Analysis of recent data/current economic situation	97	12	93
Analysis of recent financial market developments	100	12	87
A central staff projection or forecast	97	5	83
Alternative projection(s) or forecast(s)	80	6	67
Private sector macro forecasts	97	10	70
Assessment and analysis of risks	100	8	83
Analysis and evaluation of policy alternatives	83	7	70
Market expectations for policy adjustment, and/or analysis of likely reactions	97	13	83
Staff policy recommendation(s)	67	7	50
Other	3	8	0

[1] Of central banks.

As can be seen in Table 1, the staff inputs to the monetary policy process are fairly similar across central banks, reflecting the requirements of the DMB to know where the economy is, where it is going and how policy influences the outcome in order to make their policy decision. At nearly all central banks, the staff provide the DMB with an analysis of recent

data on the current economic situation, an analysis of financial market developments, market expectations for policy, a central projection and an analysis of risks. Most banks also prepare an analysis of policy alternatives, alternative projections and information on private sector forecasts. At about two thirds of the respondents, the staff provide policy recommendations.

For many central banks, the set of material provided is not the same for each meeting. In many cases, the staff prepare only a projection in advance of an inflation or monetary policy report wherein the projection is published, or just after national statistics are updated. For example, as can be seen in the table, while current analyses are provided to the DMBs about once a month on average, central projections are provided only slightly more often than quarterly.

In response to the survey, almost all the central banks reported that the amount of policy analysis supplied by their staff had increased over the past few years. Central banks offered a number of reasons for the changes in recent years. Significant fractions pointed to a desire by their DMB for a stronger focus on policy options and implications, a stronger focus on risk and uncertainty, and more quantitative analysis. Several central banks also mentioned an increased analytical capacity of the staff as a reason.

3.1 Assessment of current economic and financial conditions

Changes in the economic outlook tend to be dominated by changes in the estimate of the starting point, and revisions between initial and final estimates of activity can significantly alter the appearance of the economic environment. Moreover, the risks to the outlook often have their roots in the current landscape. Not surprisingly, therefore, staff devote considerable resources to assessing current economic and financial conditions and provide their policymakers with a wide range of information to evaluate them. Incoming economic statistics on activity and inflation are typically summarised for the DMB either at or before the policy meeting and, in many cases, in briefings or memos as the data become available. The focus of the analysis of current activity is usually trends in inflation as well as the levels of inflationary pressures. The Bank of the Republic (Colombia), for example, calculates the output gap using five different models that, in several instances, estimate potential output jointly with the NAIRU and the equilibrium real interest rate. At the Central Bank of Brazil, the analysis of recent developments – including changes in the output gap, the real interest rate, the exchange rate and inflation expectations – in briefings for the individual policy committee members and in the policy deliberations is structured around the way these developments have contributed to changes in the outlook for inflation.

Central banks follow developments in their own economy as well as those in the rest of the world, with particular emphasis on their major trading partners. Central banks that are part of a larger currency area – the Federal Reserve Bank of New York and the national central banks of the euro area – assess the economic situation in both their region and in the entire currency area. In general, though, the focus at these banks remains on the developments in the broader currency area. For instance, Belgian economic developments are hardly discussed in the material prepared by the staff of the National Bank of Belgium in advance of policy meetings.

Central bank economists draw on many different sources of information, including economic statistics, financial asset prices and flows, and survey results, to evaluate the current economic situation. In addition, many of the participants' contributions highlight the central bank's extensive use of anecdotal information from business contacts. The Reserve Bank of Australia, for example, interviews around 100 different business contacts monthly and systematically compiles the qualitative and quantitative information gathered from these contacts, which has proven useful in assessing macroeconomic trends. Similarly, the Bank of Thailand uses anecdotal information from interviews of about 60 different businesses each quarter in order to cross-check their assessment of incoming data. The Bank of England and

the Federal Reserve Bank of New York draw heavily on contacts in the financial markets to inform their analysis of financial market developments.

Moreover, in some cases, meeting participants indicated that they also look at regions within their country or currency area for insight on emerging trends. Each quarter, the managers of the 32 branches and the overseas offices of the Bank of Japan gather at the Bank to report on regional developments. Prior to each FOMC meeting, the staff of the 12 Federal Reserve Banks compile a report on regional and sectoral developments based on information from Bank and branch directors and local business contacts. Similarly, the regional offices of the Bank of Canada conduct interviews with the senior management of about 100 firms, the results of which are provided to the DMB in advance of each meeting.

Staff advice also invariably includes an assessment of financial conditions. DMBs appear particularly interested in the expectations for policy implied by financial asset prices, which are nearly always included among the inputs. The Netherlands Bank highlighted the need to incorporate the role of financial intermediation, in particular wealth effects stemming from the boom-bust pattern in the housing market, into its macroeconomic models. The BIS survey results suggest staff also generally report on the developments in the major financial markets. In some cases, the information on financial market developments in other countries is very detailed. Staff at the Bundesbank, for example, provide Council members with financial indicators from both industrial economies and emerging markets. A few participants specifically indicated that they analysed financial stability indicators, such as the robustness of balance sheets or the appropriateness of risk compensation. and no doubt for many such analysis is implicit in the review of financial developments. For example, the Bank of Canada reviews the balance sheet positions of households, firms and lending institutions, as well as monetary and credit developments, and the information factors into its assessment of risks to the outlook.

At many other banks in addition to the Bank of Canada, inputs include a review of monetary and credit developments. The ECB conducts a monetary analysis intended to identify the underlying rate of monetary expansion that is related to inflation dynamics over the medium to longer term. The analysis is used as a cross-check on the assessment of inflationary pressures derived from the economic analysis. The Bank of Japan follows monetary and credit developments as possible indicators of financial imbalances pursuant to the longer horizon of the second perspective of its monetary policy approach (the first perspective encompasses the shorter-horizon outlook for activity and inflation). The Bank of England has initiated a new survey of bank and non-bank lenders to help better differentiate between demand and supply determinants of money and credit.

3.2 Central forecasts

Since monetary policy influences economic activity with a lag, staff inputs to the policy process virtually always include forecasts. In most cases, the forecast reflects a combination of sector-specific econometric analysis and staff judgment about the near term with more model-driven conclusions for longer horizons. Forecasts are conditioned on a wide range of assumptions about exogenous variables and are generated using a variety of different models. In addition, as addressed in the subsequent section, most staff input also includes alternative forecasts using different assumptions or models.

Economic statistics are usually published several weeks after the reference period, so the initial quarter of a forecast is typically the current quarter or even the previous quarter. Consequently, the calculation of the initial quarter of the forecast is primarily based on an

evaluation of current economic indicators.[5] And, as noted above, changes in the forecast for the initial quarter can have a profound effect on the outlook. A number of central banks mentioned that one of the challenges they face is making use of the large volume of data available on recent developments. The Bank of Italy estimates "bridge models" for the growth of aggregate GDP and components, for both the euro area and the three largest member countries, using financial variables, survey results and monthly activity measures. Similarly, the Bank of Spain is developing a model for euro area real GDP growth in the previous, current and next quarter based on a limited set of quarterly and monthly indicators. Economists at the Bank of Italy have also developed a dynamic factor model that estimates the underlying trend in monthly GDP based on about 300 time series, and they are developing a similar model for core inflation. Economists at the Federal Reserve Bank of New York, by contrast, have experimented with using large factor models to forecast output and inflation and have found that the improved forecast performance did not justify the expense. Sveriges Riksbank summarises the implications of new information by calculating an average forecast from a large number of simple bivariate vector autoregressions (VARs).

Beyond the current or next quarter – staff typically provide their DMB with forecasts covering the next two or three years – central bank staff tend to rely on a blend of inputs from sector experts informed by single-equation time series models, judgment and more model-based estimates. By contrast, at Bangko Sentral ng Pilipinas, the central projection is often taken directly from their model estimates, with no judgmental adjustments beyond those used to select the model and the assumptions for exogenous variables. In the Eurosystem, twice a year, the staffs of the ECB and the national central banks (NCBs) compile a forecast of the euro area (the Eurosystem staff Broad Macroeconomic Projection Exercise). In the remaining two quarters, the ECB staff take responsibility for the preparation of the euro area forecasts. At the Swiss National Bank, the forecast for inflation is driven in the short run by time series dynamics and financial variables, at the intermediate term by Phillips curve models (dynamic stochastic general equilibrium (DSGE) and traditional econometric models), and at the long term by models incorporating money and credit variables (structural VAR and structural vector equilibrium correction models).

The relative weights on expert judgment and model output can depend, in part, on institutional considerations. The Czech National Bank switched to model-based projections of the near term in part because the move resulted in a more limited role for judgment and narrowed the room for manipulation. A number of central banks noted that an increased reliance on model-based estimates helped structure policy discussions and facilitated the consideration of alternative assumptions and scenarios.

As shown in Table 2, forecasts are predicated on a wide range of interest rate assumptions. While over two fifths prepare a central forecast based on a neutral assumption such as unchanged rates, significant fractions provide forecasts based on interest rate paths that vary over time. About two fifths of central banks provide a forecast with interest rates chosen to match the market outlook, a third base their assumptions on an interest rate reaction function, about a quarter provide a forecast based on the staff's view of optimal policy, and a few use a model-based optimal policy calculation. A number of central banks provide multiple forecasts that are based on different interest rate assumptions. The National Bank of Poland, for instance, uses market-based expectations to calibrate the interest rate assumption for its internal forecast, but publishes a forecast based on unchanged rates.[6] At the Central Bank of Norway, the preliminary path for the policy rate is chosen to satisfy five criteria. The path

[5] A few of the notes refer to the estimate of activity in the current quarter as "nowcasting".

[6] While the majority of forecasts provided to policymakers by central bank staff are based on interest rate paths that vary over time, the majority of forecasts published by central banks are based on a neutral assumption such as unchanged rates.

should: stabilise inflation close to the target over the medium term; provide a balance between the paths for inflation and capacity utilisation; result in acceptable developments under alternative assumptions; and be gradual and consistent with the Bank's previous response pattern. The fifth criteria is that, as a cross-check, it should be possible to explain deviations of the path from policy rules.

Table 2

Central forecasts[1]

	Regularly provided as background material for the decision-making meeting based on:		**Usually also presented at MPC meeting by a senior staffer(s) based on:**	
	Interest rate assumption	**Exchange rate assumption**	**Interest rate assumption**	**Exchange rate assumption**
A neutral interest/exchange rate assumption (eg last, unchanged path)	43	70	23	53
Market forward or forecasted interest/exchange rates	47	10	43	7
Interest rate reaction function/exchange rate equation	27	27	20	17
Model-based optimal policy calculations	13	–	13	–
Staff view of appropriate policy/staff forecast of exchange rate	27	20	20	13
Other	0	7	0	3

[1] Percentage of central banks.

Central bank economists show more unanimity in their exchange rate assumptions, perhaps because of the notorious difficulty of forecasting exchange rates. Nearly three quarters base their forecasts on a neutral assumption such as an unchanged exchange rate. Nonetheless, not insignificant fractions provide forecasts that are predicated on market-based or staff forecasts of exchange rates.

The models used to inform the outlook vary considerably across the central banks. As noted, single-equation or small-scale time series models are often used by sector experts. Models of the entire economy include: small macroeconomic models of just a few equations; VARs; small and large DSGE models; and large-scale macroeconomic models of several hundred equations. In several instances, the central bank maintains models of regions in addition to the national (or currency area) economy. The Bank of Canada maintains a large macroeconomic model of the United States. The Federal Reserve Board, in turn, has two models (a large model and a DSGE model) of global economic developments. The ECB maintains one model that treats the euro area as a single economy (the area-wide model) and another that models country blocs and trade links (the multi-country model). Many central banks noted that they had recently developed or were developing DSGE models. The Central Bank of Chile, for example, has recently introduced a DSGE model for the Chilean

economy as a tool for simulations and counterfactual scenarios. Research efforts at the National Bank of Belgium include a number of DSGE-related objectives, including the development of models for the euro area and the United States, incorporating labour market frictions in DSGE models, and incorporating a financial sector and financial frictions.

Many central banks use different models and econometric approaches for different purposes while some tend to focus their analysis on the results of a single model. Ongoing research at the Bank of Italy is comparing the performance of a host of alternative forecasting tools with a view to exploring the possibility of improving forecasting accuracy by combining projections from different models. Staff at the Bank of England draw on a suite of different forecasting models, ranging from the more theoretically driven to the more data-driven, to supplement the output of its main macroeconomic model, which is based around a DSGE model. The results are combined with staff judgment to produce their initial projection for inflation and output. At the Federal Reserve Board, the central forecast is based on the combined judgmental projections of experts for each sector of the economy and for regions of the rest of the world, each of whom draw on a range of econometric estimates and models. The process is coordinated by senior management of the three research divisions. Alternative scenarios for the domestic economy and calculations of optimal policy paths under different objective functions are calculated using a large-scale econometric model, and, as mentioned above, foreign scenarios utilise two models of the international economy. The Bank of Canada, the Bank of the Republic (Colombia), the Reserve Bank of New Zealand, the Bank of Thailand and the Central Bank of the Republic of Turkey all produce their baseline forecasts and alternative simulations using one model, albeit with judgmental adjustments. The Bank of Thailand is currently developing additional models to serve as cross-checks for their core model.

Some banks noted that the trend towards more technical analysis has entailed some challenges associated with policymaker preferences. The policymakers of the National Bank of Poland preferred models corresponding to the categories in the national accounts, preventing broad acceptance of a DSGE model that abstracted from observable statistical categories. Similarly, the fact that the Bank of Canada's DSGE model has no role for the output gap in the determination of inflation has caused some communication challenges there, because internal and external discussions of the outlook for inflation have largely been based on an output gap-based Phillips curve. In addition, a number of participants in a DSGE conference at the BIS in September indicated that the absence of a meaningful financial sector in most DSGE models made the models less useful for monetary policy analysis. Staff at Magyar Nemzeti Bank (Hungary) have scheduled a series of presentations for its DMB on the building blocks of the forecasting technology, intended to make the forecast less of a "black box" for the members.

3.3 Alternative projections, scenario analyses and risk assessments

Staff typically do not provide their DMB with just a single projection. Multiple forecasts can help assess the robustness of the baseline view, illustrate the consequences of possible outturns and evaluate uncertainty.

Most central banks provide alternative projections based on different assumptions about exogenous variables or on alternative models or calibrations. The Bank of England always creates two forecasts, one conditioned on unchanged policy and another on policy rates that follow market expectations. The Swiss National Bank provides its DMB with a central forecast and also with each of the inflation forecasts that were combined to form the central forecast. The Bank of Israel does not have a central forecast; instead, the staff provide their Governor with output from several different models. The ECB's monetary analysis acts as a cross-check on inflation forecasts based on its economic analysis.

In many cases, the staff present the DMB with projections that examine the consequences of specific scenarios that are not viewed as the most likely outcomes but are nevertheless

possibilities of particular concern. The Reserve Bank of New Zealand prepares scenario analyses that are chosen to illustrate risks salient to the policy deliberations or sensitivity of the central projection to assumptions. The scenarios include, among other things, variations in the paths for exogenous variables, shocks to endogenous variables using add factors, or adjustments to model parameters and steady state assumptions. At the Central Bank of Chile, when there are significant idiosyncratic events (such as a strike), staff prepare worst case and best case scenarios. At the Bank of Japan, the staff are exploring the possibility of developing macro stress tests that evaluate the consequences of extreme but plausible scenarios (such as financial crises) and possible policy responses.

Many central banks indicated that a desire by their DMB for an increased focus on risk and uncertainty had been a major driver behind changes to the inputs to the policy process. As shown in Table 3, the staffs of nearly all central banks provide a qualitative assessment of risks of some sort to the forecast. About a third prepare an estimate of the risk distribution specific to the current situation, such as a fan chart around the current forecast. A third provide estimates of uncertainty based on the historical distribution of shocks. In some cases, the scenario analyses feed directly into the risk assessment. Staff at both the Bank of Thailand and the Federal Reserve Bank of New York, for example, combine a probability assessment of alternative scenarios with the scenario outcomes to construct distributions around the central forecast. At both institutions, skews in those distributions factor into the assessment of upside or downside risks to inflation or output. In other cases, the confidence intervals around the central projection are calculated based on past forecast performance. Economists at the Federal Reserve Board, for example, present the DMB with two sets of confidence intervals: one set is based on stochastic simulations of their large macro model using shocks drawn from historical residuals; the other set is based on the historical forecast errors of the central projection.

Table 3

Assessment and analysis of risks to the forecast[1]

	Regularly provided as background material for the decision-making meeting	**Usually also presented at MPC meeting by a senior staffer(s)**
Qualitative risk analysis/assessment	93	83
Generalised standard distributions of shocks, model calibrations	27	20
Risk distributions specific to the current situation	33	20
Other	0	0

[1] Percentage of central banks.

3.4 Policy advice and draft communiqués

In order to make their policy choices, DMBs need not only information on the outlook for the economy, but also information about the effects of monetary policy on that outlook. The most commonly cited reason for changes to staff inputs was a desire by policymakers for a stronger focus on policy options and implications. Staff generally provide their policymakers with assessments about a range of policy strategies and, in many cases, a specific recommendation. Policy recommendations may be seen by some DMBs as a useful

synthesis of the analysis or may be helpful for building a consensus within the policy committee. Other DMBs may prefer to weigh the inputs without a specific recommendation or to consider a range of recommendations.

Only a few participants mentioned explicitly evaluating the current policy stance, eg the difference between the policy rate and an equilibrium rate. The Bank of France estimates a time-varying natural rate of interest for the euro area using a small macroeconomic model and a Kalman filtering procedure. The Federal Reserve Board staff present estimates of the short-term equilibrium real federal funds rate, which would return real output to its potential level in three years, and of the medium-term equilibrium rate, which would hold real output at its potential level once the economy had attained that condition.

However, a comparison of the likely prospects for inflation and growth under different policy paths may more than substitute for an explicit assessment of the policy stance for the purposes of policy deliberations, and nearly all central banks provide such a comparison. As shown in Table 4, over four fifths of the participants provide an analysis and evaluation of policy alternatives. Moreover, a quarter provide alternative projections based on different policy rules and tactics (Table 1), and four fifths provide alternative projections based on different "shocks, events or exogenous assumptions" (Table 3), which would no doubt include different assumptions about the policy rate in some cases. For example, economists at the Bank of Canada supply a central projection that is conditioned on the path for policy chosen to minimise a loss function for the central bank. But they also provide projections under various risk scenarios that might influence the staff recommendation for policy, as well as alternative policy scenarios that illustrate the consequences of different policy strategies.

Table 4

Policy advice and draft communications[1]

	Regularly provided as background material for the decision-making meeting	**Usually presented at the MPC meeting by a senior staffer**
Analysis and evaluation of policy alternatives	83	70
– Analysis of macroeconomic and financial consequences of specific policy alternatives	63	60
– Analysis of longer-term consequences of different policy adjustment strategies	27	20
Staff policy recommendation(s)	67	50
Explicit staff policy recommendation	47	40
Draft communiqué(s)/statement(s)	53	43
Other	3	3

[1] Percentage of central banks.

The Bank of Canada joins about two thirds of the meeting participants in indicating (in response to the survey) that they offer a policy recommendation, although only about half indicated, in response to a different question, that they provide an *explicit* recommendation. This disparity suggests that staff at several central banks provide only general or multiple recommendations (Table 4). At the Bank of Israel, for example, each of the four departments involved in economic and policy analysis develops a separate and independent policy

recommendation. The four recommendations are then presented to the Governor, who has sole responsibility for the monetary policy decision. At the Bank of Thailand, the staff briefing includes a discussion of the pros and cons of two policy options but also includes a specific recommendation. The Federal Reserve Bank of New York and all but one of the NCB participants from the euro area provide policy recommendations to their respective Governors, perhaps because the Governors are being prepared to present their views in a policy meeting at another institution where other staff and principals have greater control over the agenda.

About half the staffs also present their DMBs with a draft communiqué for release at the conclusion of the policy meeting (Table 4). Not all those preparing draft communiqués also offer policy recommendations. The policy alternatives document prepared by the staff of the Federal Reserve Board, for example, includes a discussion of alternatives that are intended to span the range of options under consideration by the DMB but no recommendations. For each alternative, the staff prepare a draft communiqué; the alternatives may differ in terms of the choice of policy rate or only in terms of the language proposed for the statement.

4. Process

Economists at the participating central banks prepare the inputs for the monetary policy process over several weeks prior to the monetary policy meeting. The procedures are largely similar, although there is a notable difference across banks in terms of policymaker involvement. Staff inputs developed without policymaker involvement may act as an independent cross-check on policymaker views, while inputs developed with policymaker involvement may be more likely to be seen as relevant by the DMB and can facilitate the achievement of a DMB consensus. Several central banks discussed difficulties managing the workload and maintaining research time for their economists. A few hinted that one source of difficulty was an unquenchable policymaker appetite for information, and most indicated that the amount of material provided to policymakers had gone up over time. Still, a few that had revised their processes in recent years upon adoption of an inflation targeting regime reported that they were providing fewer or shorter but more focused inputs to their policymakers.

4.1 Preparation of the inputs

As shown in Table 5, central banks take, on average, about four weeks to prepare for a policy meeting. At some central banks, a subset of the policy meetings require additional preparation, typically because the forecast is updated only at those meetings and the staff are also preparing a monetary policy or inflation report. Usually, the preparation of the report and the forecast entail additional resources, and the briefings of the DMBs for those meetings are more elaborate. Preparations for these more elaborate meetings take, on average, six weeks (not shown). The time spent preparing for meetings is, of course, shorter at those central banks with more frequent meetings, although at the National Bank of Belgium, the staff debriefing following the Governing Council meeting marks the informal starting point of the preparations for the next meeting. On average, staff working on the inputs devote about half their time preparing material for a meeting, with the fraction ranging from 25% up to about 80%, excluding a few outliers.

The preparations require, on average, about 30 professional staff, and this number increases substantially at the largest central banks. About 100 staff members are involved in the

preparation at the Bank of Japan and about 130 at the Board of Governors.[7] Not surprisingly, with so many employees spending half their time preparing for policy meetings, several central banks noted that they face a significant challenge in maintaining sufficient time for staff research. Notably, however, few central banks indicated that heavy demands on staff time factored into the decisions concerning how frequently to hold meetings, or the fraction of the meetings requiring a higher level of preparation.

Table 5

Resources required for MPC meetings

	Average per cycle	Bottom decile	Top decile
How long does it take to prepare the input?			
– Number of business days	20	8	35
– Percentage of business days	55	25	82
How many staff are involved?[1]	34	7	97
Frequency of the MPC meetings[2]	10	4	12

[1] Research and statistical assistance included; purely clerical assistance excluded. [2] Per year.

The typical process kicks off with a meeting to determine the assumptions underlying the forecast, followed by one or two meetings to coordinate the forecast, then meetings to finalise material to be prepared for the DMB, and finally a briefing or briefings for the policymakers. For example, at the Central Bank of the Republic of Turkey, staff begin the quarterly forecast about three weeks before the policy meeting with an assessment of the economy and a meeting of the forecast team. A few days later, staff meet with a representative of the monetary policy committee (MPC) to formulate assumptions and choose alternative scenarios. About two weeks before the policy meeting, the first round of the forecast occurs, followed by feedback from the MPC representative. The forecast is then fine-tuned and presented at the policy meeting. At this central bank, as at others, the process is shorter and simpler when there is no formal forecast update for a policy meeting. In many cases, for such meetings, the staff prepare a short note on recent developments and, in some cases, an informal update on the inflation outlook.

An especially elaborate process is involved when the ECB conducts its broad macroeconomic exercise, which combines forecasts of the national economies by the NCB staffs.[8] The forecast is prepared in an iterative process under the supervision of senior staff at the ECB and the NCBs.

[7] Note that the figures for these two institutions do not include staff members at the regional banks or offices.

[8] The ECB carries out three types of projection exercises. The results of the Broad Macroeconomic Projection Exercise are provided to the Governing Council in June and December. The results of the "ECB staff macroeconomic projection exercise," which involves only ECB staff, are submitted to the Governing Council in March and September. The results of the Narrow Inflation Projection Exercise, which includes detailed short-term inflation forecasts and is produced by the NCB staff and compiled by the ECB staff, are presented at the same four meetings as the macroeconomic projections.

4.2 Involvement of policymakers

Policymaker involvement in the forecast process varies considerably across the participants. While only seven indicated in response to the survey that the Governor or other policymaker "typically request" changes to the forecast, many of the papers prepared for the meeting describe interactions similar to those noted above for the Central Bank of the Republic of Turkey. Over the course of the forecast round, staff consult with policymakers on the conditioning assumptions of the forecast and/or the alternative scenarios to run. At a few central banks, the staff preparation of inputs involves very little or no policymaker involvement, although in even these cases there is presumably indirect involvement, as DMB interest and preferences shape the inputs over time. Nearly two thirds of the central banks report that changes in their procedures in recent years have tended to increase the interactions between staff and policymakers.

There are advantages and disadvantages both to a strictly independent staff forecast and to policymaker involvement. The staff of the Federal Reserve Board provide a forecast to the DMB that does not reflect any direct policymaker intervention or input. The forecast can serve as a neutral point of reference for the members of the DMB and so be a cross-check on the members' own forecasts on which the policy decision depends. On the other hand, as noted by the Bank of Israel, strict independence can make it difficult to ensure that the inputs address issues of concern to policymakers. In addition, at many central banks, senior staff members are members of the DMB and so it would be very difficult to produce staff analysis without policymaker involvement. Finally, only a forecast compiled with policymaker involvement can represent the consensus view of the DMB.

Perhaps because of these trade-offs and institutional considerations, central banks with some similar characteristics and responsibilities have in some instances opted for quite different amounts of policymaker involvement. Many, but not all, of the central banks that publish a forecast meant to represent their DMB's views do not produce an independent staff forecast. At the Bank of England, the forecast is produced by staff under the guidance of its DMB. But the Federal Reserve publishes policymaker forecasts and also provides its DMB independent staff forecasts.[9] Furthermore, three of the participants where monetary policy decisions are made by the Governor alone have opted for different amounts of policymaker involvement. The staff of the Central Bank of Malaysia and, as noted above, the staff of the Bank of Israel produce independent forecasts. By contrast, the policymaker involvement at the Reserve Bank of New Zealand is extensive. The forecast is updated continuously during the week-long deliberations of the monetary policy committee (the Governor and senior staff), incorporating assumptions varied in response to the MPC's discussion.

Moreover, in some cases, central banks with different characteristics have counterintuitive levels of policymaker involvement. It might seem likely that a consensual committee would desire significant policymaker involvement so that a common story could be told in support of the policy decision. In contrast, an individualistic committee might be thought likely to desire an independent staff forecast that would simply inform the committee members' own, and different, views. However, the Federal Reserve's DMB is typically described as consensual, but it opts for an independent staff forecast and does not develop a consensus view across its DMB members. And the Bank of England's DMB is generally considered individualistic, but it develops a forecast that reflects the DMB members' best collective judgment in order to facilitate communication about its outlook for output and inflation.

Policymakers are understandably involved in the forecast process at all three of the central banks that construct and publish a projection that is predicated on the DMB's forecast of the

[9] The Federal Reserve publishes the ranges across the individual forecasts of the DMB members and so does not need to develop a consensus forecast.

policy rate (the Reserve Bank of New Zealand, the Central Bank of Norway, and Sveriges Riksbank). In particular, policymakers are especially involved in the determination of the published policy path. In Sweden, the involvement of the DMB in preparing the staff analysis and forecast has increased notably since the Riksbank began publishing the DMB's forecast of the policy rate. The DMB provides the staff with an initial guess as to the appropriate policy path early on in the forecast process, although that path can be changed and the forecast adjusted at the subsequent policy meeting.

One area where policymakers are involved uniformly across central banks is the preparation of draft communiqués to be released at the conclusion of the meeting. As noted above, at the Federal Reserve Board, staff circulate a draft of three or four different possible statements (meant to cover the range of views of the DMB) to the DMB for their review and comment prior to the policy meeting.

4.3 Redesigning procedures

A number of participants have gone through a substantial change in their monetary policy regime in recent years – in all cases involving the adoption of an inflation targeting framework – which had prompted them to redesign their processes for producing inputs to the policy deliberations. The Central Bank of Malaysia, for example, was reorganised in the aftermath of the Asian financial crisis, with the current structure adopted in October 2002. The changes have made monetary policy decision-making more organised and rigorous, leading in turn to a more structured process for the preparation of the inputs. The amount of material provided to the DMB has declined as the discussion has focused increasingly on the current analysis and projections. The Central Bank of the Republic of Turkey adopted an inflation-targeting framework between 2002 and 2004 and redesigned its procedures in 2005–06. The staff developed a forecasting and policy analysis system to support monthly briefings of the DMB. The DMB, in turn, became more focused on medium-term model-based projections. Additionally, the organisational structure of the bank was revised to expand the research department responsible for producing the forecasting. The introduction of inflation targeting at the Reserve Bank of South Africa in 2000 led to new data requirements and new modelling approaches. An external research institute was commissioned for conducting quarterly surveys of inflation expectations in the South African economy, which are used to gauge the credibility of the central bank's monetary policy. The main changes to the modelling process include the introduction of a suite of smaller macroeconomic models and of a calibrated structural model.

4.4 Inside versus outside policymakers

Central banks with both inside and outside DMB members must trade off the efficiency advantage of developing inputs within the central bank against the need to maintain a level playing field across DMB members. Central banks have different approaches for keeping outside members informed. At the Reserve Bank of Australia and the National Bank of Poland, all draft papers are reviewed at a meeting of the inside members before they are sent to outside members. At the Central Bank of Norway, staff provide their policy recommendation to the Governor, who in turn provides a policy recommendation to the DMB. At the Bank of Thailand, which experienced a sharp increase in the relative number of outsiders on the DMB in 2003, each external member is assigned an economist as an assistant and contact person. At the Bank of England, the entire DMB receives regular briefings and notes on incoming data, is involved in the development of the forecast and attends a briefing prior to the policy meeting.

5. Product and process evaluation

Nearly all the participants reported performing some sort of periodic review of their performance. In some cases, forecast evaluations are only done from time to time. For others, however, a forecast evaluation appears to be an important and valuable tool, contributing to both their communication with the public and internal quality control. Likewise, a few central banks indicated that they had benefited significantly from outside reviews of their operations.

5.1 Forecast evaluation

Most banks evaluate the performance of their forecasts systematically. For example, in a review conducted in 2006, the South African Reserve Bank found that its inflation forecasts generally had lower root mean squared errors than either the Reuters Consensus Forecast or a naïve AR(1) forecast. The Austrian National Bank has regularly reviewed the performance of both the longer-term forecasts from its macroeconomic model and the short-term inflation forecast. They have found that their forecasts generally underestimated both the strength of upturns and the amplitude of downturns, a tendency to smooth through the business cycles that was reported by a number of participants.

The economists at the Austrian National Bank also regularly analyse the reasons for the revisions to their inflation forecast and publish the findings. A similar analysis of the changes in the inflation forecast is an integral part of the inflation report of the Czech National Bank. Until a few years ago, the Czech forecast was based on an assumption of constant interest rates; but, more recently, it has been based on a projected path for rates, a switch that has allowed for a less judgmental assessment of the reasons for the changes in the inflation outlook. A regular assessment of the inflation forecast performance is an integral part of the staff analysis of many of the explicit inflation targeting central banks and is often an important part of their communication strategy. Such an analysis is published annually by the Central Bank of Norway and is also submitted to the government and parliament.

5.2 Outside reviews

Participants noted that they not only analyse their own performance, but also, in many cases, have benefited from outside reviews. Bangko Sentral ng Pilipinas, for example, commissioned an external review in 2005 by three academics, which led to several changes, including the adoption of a wider inflation target band and less frequent policy meetings. The Reserve Bank of New Zealand often invites experienced central bank policymakers to participate in its policy meetings as part of a peer review process. The Bank of England commissioned a review of its modelling practices in 2003 that provided momentum to the development of the primary model it now uses to process the judgments and assumptions of its DMB. The Bank of England also initiated a survey of business economists to evaluate the effectiveness of its communication strategies. Among other things, the results indicated that a more explicit discussion of the risks to the outlook could be beneficial, a change reflected in the August 2007 inflation report.

6. Communication

All the participating central banks provide to the public some explanation of their policy decisions. In response to the communication survey, participants indicated that the most important reasons for disclosures about monetary policy were increasing the understanding of market participants and the public about the objectives of monetary policy and guiding the market's and the public's expectations. In the meeting contributions, however, several

participants indicated that their institution found it difficult to convey the conditionality and uncertainty of forecasts. Perhaps as a result, many also expressed concern about the consequences when forecasts turned out to be wrong and indicated a desire to educate the public about the many short-term drivers of inflation that are outside the control of the central bank. These challenges and concerns applied to forecasts of the policy rate as well as to forecasts of inflation and economic activity. Participants were of two minds, however, about revealing information about deliberations and dissent, with some emphasising the advantages of presenting a consensus view and others seeing value in airing dissenting views.

6.1 Communication practices

The broad characteristics of the central banks' communication practices are shown in Table 6. Nearly all the participants issue a statement following a policy meeting, typically whether there has been a change in policy or not. In about half the cases, the statements are about one half to two pages long. Nearly all the statements include the reason for the policy decision. Most include an assessment of the current economic situation, the short-term outlook for the economy, and an assessment of risks. A third publish minutes of the DMB deliberations.

Table 6

Communications

	Percentage of central banks
Statement with reason	92
Minutes	35
Regular assessment of economic conditions, such as a monetary policy report or an economic bulletin	100
With staff forecast	23
With official central bank forecast	58

All the participants publish a regular, usually quarterly, report on the economy, often called a "monetary policy" or "inflation" report. The Central Bank of Argentina also publishes a monthly monetary report that describes and analyses the evolution of the monetary aggregates. More than three quarters of the central banks publish their forecast in one form or another, typically in the report. Most of the published forecasts represent the views of the Governor or DMB, but about a third of the time the forecast represents the views of the staff. The central banks that regularly publish a forecast tend to update the forecast at the publication frequency rather than the DMB meeting frequency. In many, but not all, cases, those central banks that publish a forecast that reflects the consensus view of the DMB do not produce a separate staff forecast.[10]

[10] For example, as noted above, the Federal Reserve produces a staff forecast and also publishes the forecast of the DMB.

6.2 Explaining policy decisions

The participants generally considered it beneficial to provide the public with information about the considerations behind monetary policy decisions, including explanations and forecasts of inflation and economic activity. The Central Bank of Malaysia releases forecasts once a year and provides updates on the outlook and risks after each policy meeting. The communications are considered to have improved the public's understanding of the rationale behind policy decisions and to have helped anchor expectations. The Central Bank of Chile considers the main advantage of publishing forecasts to be that it makes the policy decisions more understandable. The board members of the Central Bank of Chile frequently refer to the bank's forecasts in speeches and testimonies. Sveriges Riksbank notes several advantages to transparency: providing information on decisions facilitates accountability by making it easier to evaluate performance; transparency also makes policy as predictable as possible, removing a source of instability; in addition, transparency helps increase the efficiency of monetary policy by anchoring expectations, and also by encouraging efficiency in internal work since forecasts are continuously evaluated. The Austrian National Bank, which publishes its forecasts for the Austrian economy twice a year, also sees the practice as having the side benefit of encouraging internal efforts to ensure high-quality analysis and forecasts.

Participants also noted some of the disadvantages of providing information about policy decisions and, in particular, about publishing forecasts. The Bank of Israel cited as the main disadvantage to publishing forecasts their "annoying tendency to be wrong". Several participants noted as a challenge the difficulty of explaining to the public that a number of the short-term determinants of inflation were outside the control of the central bank. In contrast, the Reserve Bank of India sees the explanation of problems associated with achieving objectives as one means to build central bank credibility. In particular, it has sought recently to build public awareness of the role of supply factors such as energy and food prices in determining inflation. The National Bank of Poland has found that, while its publication of a staff inflation forecast has increased the openness of the central bank, the increase in transparency was initially more limited because the projection had to gain credibility as it was only one of the inputs to the DMB's assessment of the inflation outlook. Both Sveriges Riksbank and the Reserve Bank of New Zealand cite as a further disadvantage of publishing forecasts the tendency for market analysts to get too focused on narrow details, including small changes and just the near-term quarters, rather than on the broad picture. Sveriges Riksbank has attempted to counter this tendency by providing less detail in its Monetary Policy Report, but has met resistance from market analysts.

6.3 Providing guidance about future policy

A topic of particular interest at the moment is the publication of the central banks' outlook for their own policy rates. Three central bank currently publish such forecasts: the Central Bank of Norway, Sveriges Riksbank and the Reserve Bank of New Zealand (RBNZ). The Riksbank noted that one advantage of publishing policy rate forecasts was achieving a better ability to anchor expectations about future interest rates, and, similarly, the RBNZ pointed to achieving increased leverage over the yield curve. The banks also cited as an advantage an increased ability of the public to anticipate the likely policy reaction to ongoing developments. The RBNZ has published the monetary policy reaction function it uses in its forecasts, which has made it easier to discuss how policy responds to emerging information. The Riksbank has observed that some analysts have begun to use the bank's description of alternative scenarios to update their forecasts as new information arrives. The disadvantages cited by the RBNZ include encouraging an excessive responsiveness of the exchange rate to changes in the outlook, a tendency for the forecasts to be taken as more precise than they are, and the risk of damage to credibility when forecast errors occur. The Czech National Bank, which will begin publishing policy rate forecasts in 2008, anticipates the need to

explain that the forecasts will not represent a commitment and that therefore the actual interest rate path may deviate from the forecasted one.

Many of the central banks that do not publish forecasts of their policy rate nonetheless provide some guidance about their outlook for policy, such as the Federal Reserve's use of "considerable period" and "measured pace" a few years ago. At the Bank of Korea, the Governor sends signals about the future policy direction through a range of communication channels when the economic outlook is clear and it is necessary to maximise policy effects by influencing market participants' expectations. Such communications also present difficulties. As noted by the Central Bank of the Republic of Turkey, agreement on an interest rate outlook can strain even a collegial monetary policy committee.

6.4 Information on policy deliberations and dissent

A number of the contributions address the advantages and disadvantages of revealing information about policy deliberations, particularly dissent. Nearly half of the participants never reveal the votes behind policy decisions. Participants were also about evenly divided in terms of whether their central bank published minutes. Two thirds of the minutes reveal neither the views nor the votes of the board members. In two thirds of the cases, the minutes are released in four weeks or less after the policy meeting. The Federal Reserve has recently accelerated the release of its minutes by several weeks, in part because the minutes provide a more complete and nuanced explanation for policy decisions.

A number of central banks appear to see value in limiting information on dissent. The Bank of England does not attribute the views described in the minutes to individual DMB members (as is also true of most other central banks), in part in order to promote vigorous debate at the meetings. Several of the contributions from NCBs within the euro area deferred to the ECB for any discussion of communication about policy decisions or made explicit note of the Eurosystem policy to speak with one voice. Similarly, Bangko Sentral ng Pilipinas publishes the highlights of the monetary policy meeting discussion but not individual views or votes, seeking instead to portray the decisions as a consensus of the members. The People's Bank of China and the Bank of Thailand prepare minutes, but do not release them to the public. In nearly every case where the central bank publishes a forecast that represents the views of its DMB members, it publishes a consensus forecast.

By contrast, several of the central banks that published minutes, including the Bank of the Republic (Colombia) and Magyar Nemzeti Bank (Hungary), note as an advantage that the minutes provide a platform for dissenting views to be presented. Moreover, since June of 2007, the minutes of Sveriges Riksbank attribute views to the DMB members who expressed them. At present, only about 10% of the respondents attribute views to specific DMB members. Providing information on what was behind dissenting votes would also seem likely to help the public better understand what might lead a policy committee to change its views in the future, an objective for communications cited by several central banks.