Hawks and Doves: Deeds and Words

Economics and Politics of Monetary Policymaking

Edited by Sylvester Eijffinger and Donato Masciandaro

A VoxEU.org Book

CEPR Press

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Foreword

The importance of central bankers' deeds and words in advanced economies has increased significantly over the past two decades. This is evident from the way in which markets directly react to monetary policy changes as well as expected future stances of central banks. We know there is a clear link between central bank decisions and financial markets, but exactly how these two aspects of the economy interact is yet undecided. This eBook analyses two aspects of this story: how monetary policy decisions are reached, and how these policies can affect global markets.

The authors begin the eBook by exploring the relationship between central bank governance and monetary policy since the Global Crisis, looking at the 'New Classical Revolution' when economic theory started to play a major role in central bank policies. They then consider the evolution of central bank communication, which has become increasingly transparent since its inception. The editors find that the information they communicate is multidimensional, making it hard for markets to decipher clear signals from it. The main challenge for central banks is to ensure that it sends signals as clearly as possible to reduce any uncertainty and market fragility.

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Tessa Ogden
Chief Executive Officer, CEPR
February 2018

Acknowledgements

1   Introduction

Sylvester Eijffinger and **Donato Masciandaro**
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The role of the monetary policy decisions in influencing markets and economies has increased sharply over the past 30 years, mainly driven by the recommendations of economic theory and the efforts of policymakers to improve central banking institutions. Two recent evolutions in the research on monetary policy decisions are the analysis of the mechanisms that govern the *production* of such decisions*, and the analysis of their *distribution*, i.e. the fields of monetary policy *governance* and monetary policy *communication*. Deeds and words are two sides of the same coin.

On one side, the monetary policy setting has been characterised by the widespread establishment of monetary policy committees (MPCs), a process which started in the late 1990s. The issue of MPCs is related to various dimensions of monetary policymaking: differences between individual and committee decisions; strategic interactions among members; their potential differences in terms of preferences, private information, and goals; potential problems of free riding, and so on. One additional aspect that has recently been integrated into MPC decisions is behavioural economics.

On the other side, there is increasing evidence of the growing importance of the links between monetary policy decisions and communication in influencing the overall effectiveness of monetary actions in modern economies.

Up until the 1980s, central banks were very much shrouded in monetary mystique and secrecy. The development of the modern theory of monetary policy – based on the intertwined concepts of rules in policy on the one hand, and independence and accountability of the policymaker on the other – produced a natural change in communication prescriptions from secrecy to transparency. Discretion and ambiguity in monetary policy were abandoned in favour of monetary policy rules that are explicitly announced and motivated. Transparency became a key feature of central banking policy.

It has been increasingly stressed that the effectiveness of central banks in affecting the economy critically depends upon their ability to influence market expectations regarding the *future path* of monetary policy decisions, and not merely the current policy stance. Public understanding of current and future policy thus became critical for the success of policy. In other words, monetary policy increasingly became the art of managing expectations via effective communication strategies.

The aim of this eBook is to present the state of art of the economics and politics of modern monetary policy governance as a story of two parallel and intertwined tales: the tale of how monetary policy decisions are reached, and the tale of how such decisions can influence the shape of the markets via central bank communication policies.

Monetary policy and central bank governance

The first part of the eBook explores the relationship between central bank governance and monetary policy in the aftermath of the Global Crisis. Up until 30 years ago, economic theory did not attribute importance to the concept of central bank governance. Institutional arrangements became important when economic theory started to stress their role in determining macroeconomic performance, i.e. during the New Classical Revolution. The role of the central bank design and governance was further confirmed in the New Keynesian analysis of monetary policy, and a consensus was reached in the mainstream on the identification of optimal central bank governance.

At the same time, optimal central bank governance essentially has to be a two-sided coin. On the one side, the central banker has to be independent, in other words, the central bank must enjoy the ability to implement non-inflationary monetary policy without any external (political) short-sighted interference. The central banker becomes a veto player against inflationary monetary policies. On the other side, the central banker has to be conservative in terms of the importance that he/she assigns to price stability in relation to other macroeconomic objectives. Conservatism is a necessary step to avoid the central banker himself/herself becoming a source of macroeconomic distortions. Independence and conservatism become the conditions to implement credible, non-inflationary monetary policies.

On top of this, a conservative central banker is credible if he/she works in an institutional setting which guarantees independence and accountability, acting in a transparent way and implementing an effective communication policy. The relationship between independence and accountability came to be at the core of central bank governance.

Central bank governance became the institutional setting for implementing day-to-day monetary policy, which in turn represented the final outcome of the interaction between three main pillars: monetary institutions, central bankers' preferences and policy choices.

But then the Global Crisis came along, and today the crucial question is how these three pillars can be affected. The contributions in this eBook address this question, tackling in sequence the three different, but intertwined, issues.

The consequences for the first pillar are discussed in the first two chapters, by Goodhart and Lastra and by Issing, who speculate on the future of central bank independence. Both chapters review, in a complementary and effective way, first the evolution and then the establishment of the three cornerstones of central bank independence (at least prior to the Global Crisis) – namely, that the main goal of the central bank is to provide monetary stability, the central bank cannot finance public deficits and debt, and the central bank's involvement in financial regulation and supervision must be minimised.

As Issing correctly points out, the reputation of independent central banks increased during the Great Moderation and reached its peak during the Global Crisis, when central bankers were praised as the saviours of the advanced economies. But then the implementation of extraordinary ultra-expansionary monetary policies in all advanced economies led to growing strains and brickbats for their central banks.

In the area of monetary policy, the criticisms were directly or indirectly related to weak macroeconomic performance, as Issing notes, as well as to the 'three Ds' – distributional, directional and duration effects, as described by Goodhart and Lastra, that the unconventional monetary policies are likely to produce and that can weaken the position of the central banker vis-à-vis politicians, posing questions of the first and second cornerstones. In the area of financial policy, both chapters describe how central banks' involvement in supervision has sensibly been increased in the last decade. As a consequence, the political pressures on central bankers are also likely to increase, given

that the supervisory decisions usually involve more political oversight, again bringing into question the robustness of the first cornerstone (do we need a second goal for central banks, i.e. financial stability?) as well the third cornerstone, opening up the Pandora's box of a central bank with multiple goals and multiple tools.

The final expectation of Goodhart and Lastra is that demand for reforms to central bank independence may increase in the future. At the same time, Issing stresses the fact that the biggest threat to independence lies in possible actions by the central banks themselves. This threat is likely to increase the more the central bankers follow the use of instruments affected by the 'three Ds'. Yet, Issing stresses that the likelihood of actual reform to central bank independence depends on the legal status of the various central banks; in this respect, the position of the ECB is definitively more robust than that of the Federal Reserve System (Fed) or the Deutsche Bundesbank.

Moving ahead in the analysis of monetary institutional settings, the chapters authored by Eijffinger and Raes, Riboni and Ruge Murcia, Masciandaro, Bordo and Istrefi, Siklos, Lombardi and Amand, and finally Capie and Wood explore the recent field of the economics and political economy of monetary policy committees, with the investigation focusing on the different interconnections between governance rules and the personalities of central bankers.

In the literature, the first and second pillars of the modern monetary policy – i.e. monetary institutions and central bankers' preferences – are deeply intertwined.

The common starting point for all these chapters is an acknowledgement that monetary policy today is conducted by committees. It has been documented that the large majority of central banks use committees, a feature of central bank governance that deeply affects the definition of the monetary policy stance. Ultimately, monetary decisions become the endogenous result of a (sometimes complex) interaction between the rules of the game and the preferences of the different players involved, i.e. the board members.

The existing literature looking at the link between monetary policy decisions and board member diversity essentially focuses on two issues: i) how monetary policy committees work, given central bankers' preferences (the governance view); and ii) how the specific composition of committees can shape monetary policy outcomes, given the governance rules (the central bankers' preferences view).

Under both views, the most hotly disputed issue is the degree of activism, i.e. the 'dovish' attitude or otherwise of monetary policy decisions. In this context, a specific and widely used jargon has been coined: a *dove* is a policymaker that likes to implement active and/or accommodative monetary policies, while a *hawk* is a policymaker that dislikes such policies. Over time, the dovish/hawkish attitude has become one of the main focuses of the analysis of monetary policy board decisions. The issues of governance and preferences are both discussed in the eBook.

Eijffinger and Raes investigate the issue of central bankers' preferences, highlighting the importance of reliable estimates of such preferences in order to revisit a range of questions on the political economy of monetary policy, or to shed light on the drivers that can explain the heterogeneity of central bankers' views, such as regional affiliation, career experience or gender. Discussing the different procedures that can be used to obtain the preferences of the board members, they show how it is possible to provide a concrete ranking of committee members on a dove–hawk scale and then address questions regarding systematic differences in preferences.

The issue of central bankers' preferences is also the focus of the analysis by Bordo and Istrefi of the Federal Reserve System, again using a dove–hawk scale. They discover a third type of central banker: the *swinger* – a board member without persistent preferences over time. The authors highlight two important factors in shaping the policy preferences of Federal Open Market Committee (FOMC) members who have served in the past 60 years: ideology, and events that shaped their lives before joining the FOMC. In addition, having studied at a '*saltwater*' rather than a '*freshwater*' university seems to give cleaner answers to explain differences in preferences among the board members. However, since the late 1980s there has been a considerable convergence between the two schools of thought, with *saltwater* elements included in *freshwater* models, and vice versa. Ideological factors might also have become muted over time as the Federal Reserve, as with many central banks around the world, has converged to an understanding of the importance of price stability (and the use of flexible inflation targeting).

Siklos and co-authors focus their attention on the Bank of Canada, and ask whether the distinction between hawkishness and dovishness matters in this case. They argue that it does, for at least three reasons. First, *an inflation-targeting* monetary policy strategy

requires the central bank to be forward looking. Indications of policy leanings thus matter, and hawkish or dovish statements can be thought of as signals of the future direction of the stance of monetary policy. Second, there is always the risk that inflation exceeds or falls below the inflation target band for short periods of time, and actual inflation tends to be recursive – it will likely drift above or below the mid-point of the target. But deviations from the inflation target need not imply an imminent tightening or loosening of monetary policy. Finally, even if a policy rate change can take around two years to reach its full potential, the actual horizon is likely more variable.

Riboni and Ruge-Murcia instead discuss the issue of governance. Given the preferences of the committee members, and the likelihood of differences among them, the way disagreement is resolved depends crucially on the specific voting protocol that is explicitly or implicitly adopted. Examining and comparing the different protocols that are actually implemented in the main central banks, the relevance of specific procedures – such as the role played by the chairman – clearly emerges. An analysis of several ways of aggregating central bankers' preferences through voting shows that the different protocols have distinct time series implications for the nominal interest rate, including the possibility to explain a set of status quo policies whereby the committee keeps the interest rate unchanged (*monetary policy inertia*). Besides aggregating different preferences, monetary policy committees can be a device to manage the available information and influence the probability of policy mistakes.

Masciandaro offers another explanation of monetary inertia via a behavioural analysis of the monetary policymaking process. If loss aversion characterises the behaviour of central bankers – i.e. for every monetary policy choice, losses and gains are evaluated against the status quo to ensure that the former don't loom larger than the latter – a new type of central banker emerges between the doves and hawks: the *pigeon* – a central banker who prefers to postpone monetary policy decisions. The introduction of loss aversion into individual behaviour influences the monetary policy stance under three different, but convergent, points of view that consistently trigger greater interest rate inertia and which are independent of both the existence of frictions and the absence or presence of certain features of central bank governance.

The chapter by Capie and Wood goes in a completely different direction, suggesting that the history of monetary policymaking by central banks does not provide strong support

for policymaking by committee, and no support at all for the belief that attention to a so-called *communication strategy* – which is extensively analysed in the second part of the book - will improve policy outcomes. Rather, history suggests that good policy comes from the adoption of a straightforward rule, and further, that an appropriately framed rule can provide the private sector with a good guide to future policy. The authors of the chapter draw their evidence from only one central bank – the Bank of England – partly on grounds of space and partly because most central banks are comparatively modern creations, but it is hard to see why the conclusion should not generalise beyond that bank and the rule that guided it. They conclude that as well as attempting to improve inflation-targeting policy, there is a strong case for reconsidering rules-based policy. Inflation targeting has, by and large, done better than what went before, but the history of the gold standard offers a strong suggestion that rules might do even better.

Moving to the third pillar – policy choices – the three chapters by Blinder, Ehrmann, De Haan and Jansen, Cukierman, and Orphanides offer new insights into the drivers and effects of both *conventional* and *unconventional* monetary policy decisions that central banks took in order to address and fix the Global Crisis in the advanced economies.

Blinder and co-authors tackle the key question of whether the various changes in central bank policy that have been introduced during and since the crisis will turn out to be temporary, or whether they are here to stay. To shed light on this question, the authors conducted surveys among central bank governors and academic economists covering four themes: central bank mandates, central bank policy tools, central bank communication, and the relationship between central banks and governments. Focusing on the issue of central bank independence, academics in particular perceived that their central bank has received considerable criticism. They were also more concerned about changes to their central bank's independence from government, with almost 40% seeing a moderate or even substantial threat to independence, in contrast to the more than 70% per cent of central bankers who see little or no threat to independence. The overall results of the surveys suggest that most of these changes are here to stay. The authors expect the central bank of the future to operate with broader mandates, to employ a wider range of tools (especially macro-prudential tools) and to place even more emphasis on communication.

Two chapters are devoted to exploring the cases of the Federal Reserve System and the ECB, respectively.

Cukierman focuses his attention on Fed policy, documenting a dramatic decrease in the US conventional money multiplier since the downfall of Lehman Brothers and attributing it to the Fed's large-scale *quantitative easing* (QE) operations in conjunction with the sluggish growth of banking credit. This phenomenon, now almost ten years old, suggests that a shortage of reserves did not constitute a binding constraint on the expansion of banking credit since the start of the crisis. An important implication of this observation is that the transmission of expansionary monetary policy through the banking credit channel has weakened considerably since the outbreak of the Global Crisis.

Since the Fed is unlikely to quickly reduce the large balance sheet it accumulated during the crisis, the banking system will have substantial excess reserves for the foreseeable future, implying that reserves will not constitute a binding constraint on credit expansion for quite some time. As a consequence, the conventional *money multiplier* is likely to be of little use as a predictor of the transmission of monetary base expansions to banking credit in the foreseeable future.

Orphanides analyses the interaction between monetary and fiscal policies in the context of the European Union. Since the beginning of the Global Crisis, euro area governments have experienced greater fiscal stress than governments of advanced economies outside the euro area with weaker fiscal fundamentals. What has been the source of this fragility? How does it relate to the role of the ECB in exerting fiscal discipline in the euro area? How can it be corrected?

The author claims that the cause of the instability in euro area government bond markets can be traced back to a discretionary decision taken by the ECB Governing Council before the crisis, in the aftermath of the failure of the Stability and Growth Pact (SGP) – the mechanism of the Maastricht framework meant to ensure fiscal discipline by euro area governments. The decision effectively delegated the determination of collateral eligibility of euro area government debt to private credit rating agencies, and subsequently led to the compromising of the safe asset status of government debt. The chapter sheds light on the circumstances of this unfortunate decision and discusses how its consequences can be ameliorated with appropriate use of the ECB's discretionary authority, in accordance with its mandate.

Monetary policy and central bank communication

The second part of the eBook – containing the three chapters by Coenen, Ehrmann, Gaballo, Hoffmann, Nakov, Nardelli, Persson and Strasser, Takeda and Keida, and McMahon and Hansen – sheds light on the evolution of central bank communication as well as the growing importance of communication in influencing the overall effectiveness of monetary policy actions.

During the 1970s and 1980s – as Takeda and Keida, among others, remark – monetary mystique and secrecy characterised central banks' actions. The theoretical rationale for the lack of central bank transparency and communication was given by the theory of ambiguity, credibility and inflation under discretion and asymmetric information.

Transparency of central bank decision making increased rapidly from the early 1990s, beginning with the adoption of inflation targeting by the Bank of England, the Bank of Canada, the Reserve Bank of New Zealand and the Swedish Riksbank. Although the Federal Reserve System was officially not conducting inflation targeting, in practice it gradually shifted more or less to inflation targeting. The ECB adopted from its beginning a so-called *two-pillar strategy,* with a monetary pillar focusing on monetary aggregates like M3 (which it inherited from the Deutsche Bundesbank), and an economic pillar taking account of the drivers of inflationary expectations. Following the Global Crisis, however, the ECB moved more and more to an inflation target in practice.

Most central banks have put an increasing weight on their communication with the public. An important trigger for increased transparency has been the above-mentioned requirement for greater accountability of independent central banks. As central banks have become more independent over time, they have had to pay closer attention to explaining what they do and what underlies their decisions. More transparency and increased use of communication is partly a logical consequence of this development.

The starting point of Coenen and co-authors is the fact that during the Global Crisis, central banks stepped up their communication activities even more. In particular, once central banks had resorted to unconventional policies, they went to great efforts to publicly define the scope and implementation of these policies, as well as to build a common understanding of their limitations and their expected effectiveness. In addition,

many central banks also became more explicit in signalling the direction of their policies through various forms of *forward guidance* – at which point, communication reached the status of an explicit policy tool.

Further, the rising economic uncertainty caused by the financial crisis and the use of new tools increased *complexity* for policymaking. This came along with an increasing tendency for central bank committee members to disagree and a substantial increase in the length of the minutes of central bank committee meetings. This increasing complexity was also reflected in central banks' monetary policy statements. Here, the interactions between the first and second part of the eBook emerge even more clearly.

The authors argue that central bank reaction functions relate central bank actions to the evolution of the economy, and that central bank communication on its future actions is therefore naturally state-dependent. Furthermore, *state-contingent* forward guidance allows economic agents to endogenously adjust their expectations in light of new economic developments, thereby requiring fewer readjustments of central bank communication if these developments differ from the original expectations.

The chapter shows that such state-contingent forward guidance can work, using the example of inflation thresholds for the euro area. Going forward, providing guidance about the envisaged path towards removing monetary accommodation will be a key communication task for the ECB. However, given the complexity of the exit process in the presence of multiple tools, it will be important to lay out the central bank's reaction function in this different environment well in advance.

Takeda and Keida analyse central banks' communication strategies, focusing their attention on the Bank of Japan. The authors note that in terms of tactics for central bankers implementing a communication strategy, there are two dimensions: channels and messages. Central banks communicate with financial markets through the channel of information flows in market microstructures that embed institutional settings for policy announcements. However, whatever elaborate timing the central bankers may chose for their policy announcements for fear of bringing about unintended market impacts, the announcements could create noise among financial markets if the policy changes are expressed carelessly. Messages transmitted by central bankers and broadcast by some media are received by market participants eager to properly evaluate the policy in

order to make profits from their investments. In particular, in the exasperating course of unconventional monetary policy by some central banks, financial investors have become cautious about catching what follows the policy messages.

The authors explore the Bank of Japan's communication strategy using a natural language processing method, following the spirit of narrative economics. In spite of the Bank of Japan's message that policy would not change, as Governor Kuroda repeatedly emphasised, the empirical results imply that the Bank made a misjudgement in its communication strategy.

One possible interpretation of the implicit change in the Bank of Japan's communication strategy is its early consciousness of *exit* from the ongoing unconventional monetary policy. The authors' computer-based narrative analysis reveals the Bank might have followed a *cheap talk* strategy to manipulate expectations.

The final chapter elaborates on the relationship between central bank communication and market reactions. Although the above-mentioned trend for more central bank accountability justifies the tendency towards more transparency, and therefore more communication, it is less obvious that more central bank transparency is also beneficial from an economic point of view.

McMahon and Hansen acknowledge that the finding that central bank communication moves expectations of imminent monetary policy decisions is unsurprising. However, some of the empirical findings *are* surprising. For example, shocks associated with the announcement of monetary policy are shown to move (both nominal and real) long-maturity yields. While short-term monetary policy news should not affect real rates beyond the horizon after which prices are free to adjust, it has been shown that a monetary shock provides signals about economic fundamentals which have a long-term impact. Therefore, the authors set out a simple framework that captures numerous reasons communication has seemingly surprising effects, making two important points that highlight the potency of central bank communication across different yields. First, there is an identification problem that limits the ability of market participants to form accurate assessments of future interest rates, which will nonetheless be subject to uncertainty about the economy. Second, through helping to identify drivers of current

monetary policy, even shorter-term information can appear to drive longer-term yields in a way that may, at first, appear surprising.

The difficulty for markets is that central bank communication typically provides multidimensional information, which makes it hard to decipher all signals clearly. The current and future challenge for central banks is to ensure that they send signals as clearly as possible. It will be not easy.

Part One

Monetary policy and central bank governance

2 Potential threats to central bank independence

Charles Goodhart and **Rosa Lastra**[1]
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Initial conditions

Some 30 years ago, New Zealand introduced an arrangement combining operational independence and inflation targetry for the central bank. Although this regime change was introduced as one aspect of the reforms of the then Minister of Finance, Roger Douglas, to the governance of public sector institutions and industries as a whole, it rapidly caught on in the next few years as best practice for central banks around the world. There were several reasons for this. First, it helped to bring to an end the long-running and inconclusive debate between monetarists and Keynesians. Both could regard the new regime as an extension and improvement on their previous positions. The monetarists could see an inflation target as representing a monetary target after adjustment for the unforeseeable and unforecastable variations in velocity, which had complicated and confused the application of (pragmatic) monetary targets in the previous decade. On the other hand, neo-Keynesians could apply an inflation target in terms of a direct link between official interest rates and output and prices, along the lines later described by Woodford (2003).

There were also a number of additional important conditions which provided support to the adoption of this new regime. The first, and most important, was the general acceptance of the concept of the medium- and long-run vertical Phillips curve. In earlier decades, when most economists had believed in a downwards-sloping Phillips

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curve at all horizons, the choice of where to position oneself along this curve – with a trade-off between higher employment and lower inflation (right wing), or lower unemployment and higher inflation (left wing) – was patently a key political issue, as was evidenced in many countries in the 1950s and 1960s. The concept of the vertical Phillips curve allowed central bankers to declare with conviction that the adoption of a low inflation target had absolutely no longer term deleterious effect on growth, but actually reinforced it by removing the inevitable distortions within the economy that significant inflation introduced. This was crucial to the delegation of price stability to an independent central bank.

The new regime also, however, benefited from an additional new concept, that of time inconsistency. The idea that politicians would pledge to maintain price stability, but would seek, often covertly, to raise demand and real output above the natural equilibrium rate as elections neared was very attractive to economists, commentators and market analysts, despite having (in the UK at least) rather weak empirical support. What was more generally observable, however, was that markets were fearful that left-wing governments would choose to be more expansionary, deficit-prone and 'irresponsible' than right-wing governments. Accordingly, there was a generalised tendency for left-leaning governments to introduce central bank independence and operational independence in order to protect their flank against financial market disturbances. Besides New Zealand, the same syndrome could be observed in the UK, where CBI was introduced by Gordon Brown after having been rejected by both Thatcher and Major, and also in South Africa, where central bank independence was initiated by the ANC.

Besides this theoretical support, there were some empirical macroeconomic developments providing extra support for central bank independence. Around this time, public-sector debt ratios (i.e. debt/GDP) in many developed countries reached their minimum post-WWII levels. This meant that debt management, naturally a Treasury function, and monetary control could be separated much more easily than in earlier decades, when the two arms of policy were intimately connected. It also meant that occasions when the central bank would seek to raise interest rates, in order to constrain inflation, would be less worrying to ministers of finance concerned with controlling the overall size of the deficit and the burden on taxpayers.

Nonetheless, the independence of central banks was always limited by politics, the ability of government to redesign such arrangements (except the ECB), and politicians' control of top appointments.

Growing strains

This new regime was remarkably successful for much of its first two decades. These were the NICE years (non-inflationary continuous expansion) and the Great Moderation, during which central bank governors achieved remarkable status. But in recent years there have been increasing strains, notably after the onset of the Global Crisis. As a start, the empirical basis for continuing belief in the long-run vertical Phillips curve has weakened. Over the last two decades or so, levels of unemployment (the pressure of demand) have varied widely, but inflation has remained fairly stable at around 2%. The actual, empirical Phillips curve has become closer to horizontal than to vertical. While this is no doubt largely due to the success of central banks in maintaining their inflation targets, and public expectations thereof, it does raise questions about the fundamental understanding of inflation (Tarullo 2017) and their ability to control it, and also questions about whether the inflationary consequences of seeking to run the economy at a higher pressure of demand, for a time at any rate, would necessarily be so bad. Indeed, Janet Yellen of the Board of Governors of the Fed raised just such an issue in a speech in 2016. What may lie ahead is a clash between central banks – concerned for their price stability mandate as unemployment falls below the assessed, natural rate – and populist politicians committed to achieving faster growth.

Moreover, central banks, alongside most others, failed to foresee or head off the Global Crisis and their focus on a narrowly construed price stability-oriented monetary policy made them ignore or insufficiently calibrate the perils of financial instability, as discussed below. Although their immediate response in 2008/9 was exemplary, and did succeed in preventing another Great Depression, their record afterwards, from 2010 to 2016, was consistently one of failing to forecast the sluggishness of growth of either output or inflation, casting some doubt on their competence, economic understanding and capacities.

That said, central banks have at least sought to maintain an expansionary approach, at a time when fiscal policy has been reined back, for a variety of reasons, good or bad, while other (supply-side) policies have failed to make much of an appearance. So, given that central banks have often appeared to be 'the only game in town' (El-Erian 2016), one might have expected more praise combined with more criticism of the fiscal authorities. But that has not generally been the case.

Some of the brickbats flung at central banks have related to the slow tempo of the recovery; others to the possibility that one aspect of the unconventional measures – namely, negative nominal interest rates – may have had a counter-productive effect, for example by weakening commercial bank profitability. Perhaps the main general criticism is that the unprecedented low levels of nominal and real interest rates have been stimulating over-borrowing, a debt over-hang, which may encourage present expenditures but at the expense of future fragility and potential crises (i.e. borrowing from the future). But the main reasons for such attacks have related to distributional and directional effects.

Distributional effects have always happened as a result of changes in interest rates (for example, between creditors and debtors). But quantitative easing (QE) and unconventional monetary policies are now seen in the context of the winners and losers from globalisation. One reason may be that the trends in nominal and real interest rates over the last three decades have been so large and persistent. Earlier, it was probably believed that there would be swings and roundabouts but that inflation, and both nominal and real interest rates, would fluctuate around a norm, so temporary benefits to one side, or the other, would in the longer run wash out. This has not happened over the last three decades. While central banks claim, with justification, that the effects of their expansionary policies have not worsened, and may have improved, *income inequality*, their detractors have responded by claiming that such policies will have worsened *wealth inequality*, particularly between that section of the young whose parents can help them onto the housing ladder, and the remaining section who can get no such help.

Directional effects relate to QE and asset purchases having an impact on some particular sectors of the economy, such as the housing market, via purchases of mortgage-related securities. But the argument that central banks should only purchase (safe) government debt is historically naïve. Until the 1930s, under the real bills doctrine, the argument

was reversed; until then it was the short-term bills of exchange of trade and industry that should be the preferred instrument, not government debt. Oddly enough, if directional effects are held to be within the political province, there was no widespread suggestion that the central bank should decide on the quantum of base money to be injected into the economy and then pass it on to an intermediary, staffed and controlled by the politicians and the ministry of finance, who would then decide on whom the recipients should be.

There is, furthermore, yet another 'D' effect, *duration*, which has so far not figured much in discussion of central bank policies, but where we expect the discussion to become sharper. QE has drastically been reducing the duration of the consolidated public-sector debt, including the central bank within the public sector, just at a time when debt management precepts would have suggested that a country would have been well advised to lengthen the duration of its public-sector debt to take advantage of extraordinarily low interest rates. As interest rates start rising, and the central bank has to start paying out great wads of money to the banks holding massively expanded balances with themselves, this latter criticism may become much more vocal.

Of the three Ds – *distribution*, *direction* and *duration* – we expect concerns about the first two to slacken as policy becomes re-normalised, but objections to the third to grow. Imagine the populist outcry as rising nominal rates not only slow growth and employment and raise mortgage costs, but also seem primarily to benefit the cash-flow of banks via interest paid on massively expanded reserves at the central bank!

Moreover, debt ratios have been rising quite rapidly in almost all developed economies (except Germany) in the last few decades, but this has not led to higher debt service ratios because interest rates have been steadily declining over this same period. So, there has been no cause for conflict between the central bank, in pursuit of price stability, and the ministers of finance, concerned with deficits and tax burdens. But as re-normalisation takes place and interest rates rise, this continuing harmony is likely to fray. In addition, demographic changes bringing about worsening dependency ratios, and even in some countries a reduction in the available workforce, will reduce growth and the tax base, just at a time when the ageing of populations may cause a continuing increase in public-sector expenditures. Such underlying developments will tend to be inflationary, forcing central banks to raise interest rates, and putting them in greater conflict with politicians and Treasuries. Our expectation is that the politicians will

win. Central bank independence was nice while it lasted, but it owed a great deal to the supporting conditions that enabled it to achieve such great success in its early years. RIP.

Financial stability conditions

There is a further aspect to current concerns about central bank independence . This is that the Global Crisis has led all concerned – central banks, politicians, economists and commentators – to apply a further second objective to central banks, namely, financial stability. This has complicated the life of central banks in several respects. First, a single objective with a single instrument (interest rates) was much easier to manage, and to communicate, than a system with multiple objectives, which might at times require trade-offs. Second, inflation was relatively easily measureable (though the complications of measuring inflation have tended to be overlooked), and the use of such metrics allowed the central bank to be accountable and transparent. In contrast, financial stability is not – at any rate, not as yet – measureable, which makes it much more difficult for the central bank to be accountable and transparent in its pursuit of this objective. Furthermore, it is a goal that transcends geographic boundaries and institutional mandates. Third, some instruments whereby financial stability may be achieved, such as macroprudential measures, are largely untried, at least in large developed economies, and some of these instruments (for example, loan-to-value ratios and debt service ratios) can impact directly on non-financial actors, and could be described as outside the ambit of an independent central bank. Fourth, there is a concern in some quarters that delegating micro- and macroprudential to the central bank, in addition to their monetary policy operational independence, makes the power and influence of a non-elected technocratic body too great to be acceptable within a democratic society. In some cases, for example in Sweden, such measures are placed within a separate financial stability authority (the *Finansinspektionen*). But, if so, there remains an unhappy split between the ultimate responsibility that a central bank must bear for financial stability and the information, institutions and operating instruments which can be used to bear on the achievement of this objective.

Unlike the clarity of the regime introduced in New Zealand some 30 years ago, the newly widened regime, with multiple objectives and multiple instruments, is not clearly defined and perhaps even legally uncertain, and with expanded mandates there are concerns about adequate accountability and legitimacy.[2]

At a conference in 2017 to mark the 20th anniversary of the granting of central bank independence to the Bank of England, both of its initial political founders, Gordon Brown and Ed Balls, argued that in the realm of financial stability, decisions on policies should involve some political oversight, perhaps with the introduction of an oversight committee along the lines of the Financial Stability Oversight Committee (FSOC) in the US, which would be chaired by a minister but would include the central bank and any other financial supervisory institutions in the field.

Perhaps an alternative would be for the central bank to limit its macroprudential policies to those solely affecting the banking system, such as the counter-cyclical buffer ratio and limits on banking finance to housing and other risky fields. There are some signs that the Financial Policy Committee in the UK has this distinction in mind, since it applied its additional control on mortgage lending to banks alone, rather than to mortgages provided from any financial institution, whether bank, or non-bank. While limiting the focus of central bank macroprudential policies to banks alone might bolster their claims to independence, it does have the danger of running foul of border problems, whereby regulated financial flows move to unregulated non-banks, thereby making the overall riskiness of the whole system potentially worse rather than better. Again, we have warned about this problem in an earlier paper.[3]

While it is possible – but, as argued earlier, uncertain – that monetary policy may continue to be independently operated, at the same time as there is greater interaction between politicians and Treasuries, on the one hand, and central banks, on the other, in the field of financial stability, there is a possibility that the blurring of independence in the field of financial stability may also raise questions for central banks' independence more broadly.

We will see.

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2   For further discussion of several of these latter issues, see the second half of Goodhart and Lastra (2017).

3   Goodhart and Lastra (2010); see also Dabrowski et al. (2015).

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3 The uncertain future of central bank independence

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The evolution of independence

For a long time, the 'independence' of central banks was hardly a subject of discussion, either in academic papers or the media. Germany was an exception. The independence of the central bank, the Bank deutscher Länder (BdL), was imposed in 1948 by the Allies, more precisely by the Americans (the representatives of the UK and France were not in favour of the idea). Chancellor Konrad Adenauer strongly opposed the idea of giving the Bundesbank, the successor to the BdL, the same status of independence. However, in light of the high reputation the central bank had already earned during the short period of its existence, public opinion, and the strict position of the Minister for Economics Ludwig Erhard, the chancellor had no choice other than to give in. As a result, the Bundesbank Law of 1957 codified central bank independence.

The so-called Great Inflation of the 1970s sparked significant interest in the question of why major central banks – with the exception of the Bundesbank (Issing 2005, Beyer et al. 2008) – were not willing or able to keep inflation under control. A first paper by Bade and Parkin (1980) showed an inverse relationship between the degree of central bank independence and inflation. The fact that this article was never published illustrates the lack of broader interest in the question. Soon, however, a number of subsequent empirical studies confirmed the result, which provided substantial evidence in favour of central bank independence (for a survey, see Eijffinger and De Haan 1996). Around the same time, emerging new research offered deeper insights into the mechanisms of monetary policy. Kydland and Prescott (1977) discussed time inconsistency, Barro and

Gordon (1983) addressed credibility and the significance of rules versus discretion, and, finally, Rogoff (1985) shed light on the importance of personalities.

Later, Cukierman (1992) connected these different strands of theoretical and empirical work.

As a consequence, a broad consensus emerged that the optimal statute for a central bank should be founded on the principle of independence and a clear mandate for price stability or low inflation.

This consensus had a strong global impact on the legislation of central banks. While the index for central bank independence had remained low and stable between 1972 and the late 1980s, it enjoyed a boost thereafter, reaching its zenith before the financial crisis of 2008 (Masciandaro and Romelli 2015).

New interest in central bank independence

The propagation of independence around the world was widely followed by a period of low and stable inflation, satisfactory growth and employment. Some researchers interpret this development as due to a decline in exogenous shocks (Stock and Watson 2003), whereas for others (Romer and Romer 2002) improved macro policies, especially monetary policy, were mainly responsible for this 'Great Moderation'. While the jury on '*post hoc ergo propter hoc*' is still out, this favourable outcome has greatly strengthened the case for central bank independence. And the reputation of these independent central banks peaked in the course of the financial crisis of 2008, when they were praised as the rescuers of a global economy threatened by a depression of a magnitude similar to that of the 1930s.

In the meantime, the independence of central banks has again become a prominent subject in academia, politics and the media. However, this time, in contrast to the past, critical voices dominate. How can this turnaround in public opinion be explained? One possibility is excessive, unrealistic expectations about what central banks can achieve. The Bank for International Settlement's Annual Report (BIS 2016: 22) presents a concise assessment:

> *"And yet the extraordinary burden placed on central banking since the crisis is generating growing strains. During the Great Moderation, markets and the public at large came to see central banks as all-powerful. Post-crisis, they have come to expect the central bank to manage the economy, restore full employment, ensure strong growth, preserve price stability and foolproof the financial system. But in fact, this is a tall order on which the central bank alone cannot deliver. The extraordinary measures taken to stimulate the global economy have sometimes tested the boundaries of the institutions. As a consequence, risks to its reputation, perceived legitimacy and independence have been rising."*

Another reason for this change of mind on central bank independence can be found in the overburdening of central banks by an increasing number of responsibilities and competences. There are arguments for and against the concentration of banking supervision within the central bank. Actually, responsibility for financial stability has become a major challenge for central banks. In essence, this is true almost irrespective of whether or not the central bank has an official/legal mandate in this field. Should the central bank integrate financial stability concerns in its monetary policy geared towards containing inflation? How should this be managed? The concept of 'leaning against the wind' (Borio and Lowe 2002, White 2009) is under heavy criticism (e.g. Kohn 2007). After all the Tinbergen rule asks for a separate instrument. Yet, macroprudential policy as the solution to maintaining financial stability may not represent a panacea (Issing 2017b). At any rate, central banks face a variety of expectations that are prone to disappointment. The more they fail to be met, the more the status of independence will be called into question.

The biggest threat for independence lies in possible actions by the central bank itself. One comes from using instruments with distributional consequences, such as cheap credit to special groups, banks or companies. It is true that any monetary policy decisions will have distributional effects. However, in principle, these are unintended side effects of a monetary policy directed towards the goal of low inflation, whereas the measures just mentioned have deliberate discriminatory effects. Decisions of this kind must remain within the confines of politics, and thus voters. An independent central bank does not, and should not, have a mandate for such interventions.

A permanent threat for independence relates to the coordination with fiscal policies. In his impressive history of the Fed, Allan Meltzer analysed episodes in which the central bank gave in to political pressure or just followed directions given by the government (Meltzer 2014, 2014a, 2014b). Legal independence might still have prevailed, but in reality the central bank had sacrificed its independence. In more subtle cases, measures taken by the central bank are de facto acts of fiscal policy, which also raises doubts on its compliance with the status of independence.

In a democratic society, independence for the central bank can be justified only if actions are limited to fulfilling a specific mandate. On this basis, in the Maastricht Treaty, the ECB was endowed with independence by a unanimous decision, although President Mitterrand raised early objections (Issing 2017a). Criticism that the ECB had transgressed its mandate began immediately after its capital market intervention of May 2010, in the course of which it purchased government bonds of countries which otherwise would have experienced substantial increases in long-term interest rates. The exercise undoubtedly posed a dilemma for the central bank. On the one hand, by intervening in the market, it would be seen as conducting fiscal rather than monetary policy; on the other hand, the central bank felt the need to act because the fiscal policies of member states failed to meet their obligations. Despite the establishment of the European Stability Mechanism (ESM), the ECB's interventions – designed to prevent the government bond spreads of fiscally troubled countries from increasing – were widely interpreted as a guarantee for each country's membership and the existence of the euro itself. This notion was taken to extremes by the famous "whatever it takes" announcement of the ECB president. ECB monetary policy decisions that particularly benefitted distressed countries and banks further supported this view.

The decisions by the European Court of Justice and the German Constitutional Court have generally rejected the allegations that the ECB had exceeded its mandate and violated the Treaty. It is difficult to understand the economic logic behind the legal reasoning, but the mere fact that measures taken by the central bank were brought before the European Court of Justice and the German Constitutional Court undermines the reputation of the central bank. There is a high risk that future ECB actions may lead to new litigation.

Will independence survive?

Charles Goodhart has suggested that "[t]he idea of the central bank as an independent institution will be put aside" (Goodhart 2010: 15). He sees central banks as increasingly involved in interactions with governments on issues like regulation and sanctions, debt management and bank resolution. Add the arguments presented above, and the previous consensus on independence does not seem to hold anymore. These developments would suggest that independence cannot survive. To focus only on independence is, however, misleading. As explained before, the legal status is the basis on which a central bank can design a strategy and conduct a monetary policy which avoids the risk of time inconsistency and creates credibility. It is difficult to see how these conditions could be satisfied by a central bank that is more or less under the control of the government or politics in general.

In various ways, it is central banks themselves that have undermined the case for independence. How can legal (*de jure*) independence be justified when central banks *de facto* behave in a contradictory way (Cargill and O'Driscoll 2013)?

The conditions for abolishing the legal status of independence differ widely across countries. In this context, a comparison between the Fed and the Bundesbank is telling. The law on the Bundesbank could have been changed anytime by a simple majority in parliament. However, considering the outstanding reputation of the central bank, no politician ever had an incentive to take a corresponding initiative – quite the opposite applies. In contrast, the status quo of the Fed is permanently under threat. Those attacks have a long history. Between 1979 and 1990, for example, no fewer than 200 bills were submitted to the US Congress containing 307 proposals on 56 issues "that would alter the structure of the Federal Reserve System relating to its conduct of monetary policy" (Akhtar and Howe 1991).

In the case of the ECB, the status of independence is enshrined in a Treaty that can only be changed by unanimous decision of all member states, which requires ratifications by all parliaments and, in several instances, even referenda. Hence, for all intents and purposes, changing the legal status of the ECB seems like a hopeless endeavour.

The legal status of a central bank is one thing, support in public opinion is another. As a general observation, one might argue that irrespective of de jure independence, a central bank would run into deep difficulties maintaining de facto independence and defending monetary stability against a society of excessive demands (Issing 1993). However, it would be wrong to conclude that the legal status is irrelevant. Not giving independence to the central bank or, even worse, taking it away would open the door to higher future inflation – which in turn would restart a similar discussion as in the 1980s.

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4 Monetary policy committees: Voting and preferences

Sylvester Eijffinger and **Louis Raes**
Tilburg University and CEPR; Tilburg University

Central bankers serving in monetary policy committees (MPCs), sometimes (if not often) disagree on what policies to pursue. This is expected and, to some extent, even desired. Different backgrounds, different views of the world and different ways of processing information are pooled in a committee and could benefit the group (Blinder 2009). At the same time, there is substantial interest from academia, the media and the public in the drivers of disagreement.

If the disagreement among a given monetary policy committee shows some discernible patterns, there is a temptation by observers to classify monetary policy committee members as 'doves' or 'hawks'. Hawks are monetary policy committee members who tend to be reluctant to use accommodative monetary policy, while doves tend to be more willing to ease the monetary policy stance.

Such a classification is something which is not broadly appreciated among central bankers. An often-used quote to illustrate this is from Mervyn King (2010): *"Indeed, for ten years, I was, to my frustration, regularly described as a hawk. But I am neither hawk nor dove. Everyone on the Committee votes according to his or her judgement of the outlook for the economy. I have not changed. The Committee has not changed. Circumstances have changed."*

The frustration to which Mervyn King is referring is understandable. These labels have the flavour of an ideology. Central bankers oppose this because they see themselves as professionals, technocrats who want to conduct policy and fulfil their mandate in the best possible way.

On the other hand, the quote from King underestimates the approaches used by academics to discern the preferences of central bankers. The methods used typically do correct for changing circumstances, and if we observe persistent differences among central bankers after controlling for changing circumstances, this is worth discussing.

Furthermore, if we are able to construct reliable estimates of the preferences of central bankers, we can revisit a range of questions on the political economy of monetary policy, or investigate which factors affect the views of central bankers (regional affiliation, career experiences, gender, and so on).[1]

Using votes to estimate preferences

If we want to learn about the preferences of central bankers, we have different pieces of information to consider: we can study speeches given by central bankers, we can try to analyse transcripts of meetings, or we can study votes. There are advantages and disadvantages to each data type. Votes have the advantages of being unambiguous, simple to handle and relevant. This comes at an important cost – if we want to use votes, we need to be sure that they are sufficiently informative. There is substantial evidence – scholarly and anecdotal – that this not always the case. For example, some monetary policy committees are considered to be very collegial. This means that the committee aims to speak with a single voice and does not want to communicate much dissent. Such a committee might show more agreement in the formal voting records than could be expected if the committee were to emphasise individual accountability and put little value in achieving consensus.

In other words, only the voting records of committees which are sufficiently individualistic lend themselves to the study of the preferences.

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1   The literature on some of these issues is very extensive. One paper studying the importance of regional affiliations is Meade and Sheets (2005), a book by Adolph (2013) discusses research and evidence regarding central banker careers, while Masciandaro et al. (2016) discuss the importance of gender.

Different procedures

There are different procedures for obtaining the preferences of monetary policy committee members. A first approach is to link the votes of individual central bankers to a monetary policy rule. One can, for example, link individual votes on the policy rate to developments in inflation and the output gap. The intercept in such a *reaction function approach* is then thought to capture individual preferences for tighter or looser policy.

Another approach to obtain preferences from voting records is to use 'spatial voting' models. Such models assume that each central banker has a preferred policy rate and chooses, in every committee meeting, the policy rate which is closed to her preferred policy rate. So, it is as if all members of a monetary policy committee are confronted with a choice of (typically two) policy rates and they choose the one they prefer. Such models have been used extensively to analyse judicial votes and the ideology of politicians.

The Bank of England's MPC as a case study

Figure 1 shows the estimated preferences from a spatial voting model. It represents the preferences at the Bank of England's MPC as estimated by Eijffinger et al. (2017). The figure provides a historical ranking of MPC members on a dove–hawk scale. A dove in this context is someone who, in a given meeting, is more likely to prefer the lower policy rate proposal than a hawk. It shows that King, who we cited at the beginning of this chapter, ranks in the middle, maybe with a slight hawkish tilt. Because we cannot observe the preferences, the point estimates are accompanied by uncertainty intervals.

We can then use these estimated preferences to ask questions on systematic differences in preferences. For example, Eijffinger et al. (2017) argue that internal members tend to have more clustered, centrist preferences. In Figure 1, these are the MPC members whose preferences are indicated by hollow circles. External members, on the other hand, show a much wider spread in preferences.

Hix et al. (2010) also use a spatial voting model to analyse the MPC and find the British government has been able to move the median voter through its appointments to the committee.

Figure 1   Estimates of latent preferences of monetary policy committee members at the Bank of England

Revealed Preferences in the MPC
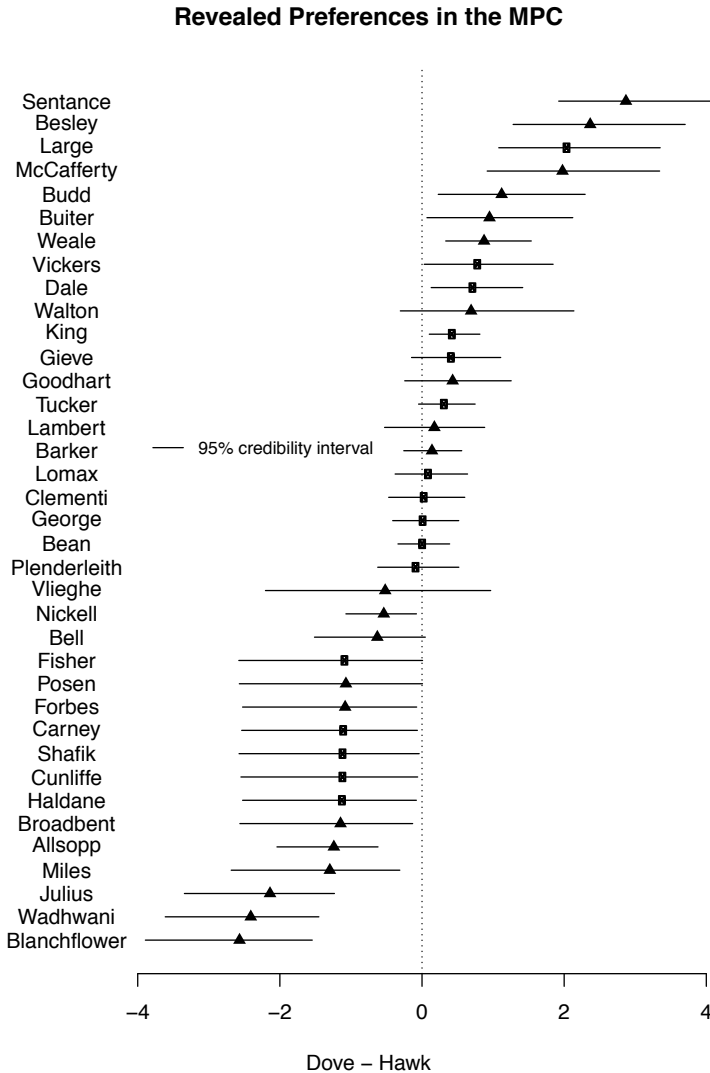
Notes: The hollow dots indicate internal members and the triangles indicate external members; the thin line is the 95% uncertainty interval.

Source: Taken from Eijffinger et al. (2017).

Other central banks

Monetary policy committees come in various forms. Blinder (2009) observed that this must mean that the crucial features of an optimal design have not been settled, or that the optimal design may depend on country-specific aspects. We agree with this take, and would add that this also means that one needs to study different monetary policy committees, treating each one as a relevant case study.

Eijffinger et al. (2015), for example, study the FOMC. Rather than using the voting record, they use preferences expressed by FOMC members during meetings. Since the work by Meade (2005), many authors have resorted to such an approach because the FOMC, especially under chairman Greenspan, is considered to be autocratically collegial and hence the official voting record is not sufficiently informative. Eijffinger et al. (2015) report that Board governors are, on average, more dovish than Federal Reserve Bank presidents, though the median preference in both groups has varied substantially over time. They find little effect of career backgrounds, nor evidence of a presidential appointment channel.

The literature has until now mostly focused on the Federal Open Market Committee and the Monetary Policy Committee at the Bank of England. There are two good reasons for this: the first is data availability, and the second is their importance. The ECB is an important central bank, but does not provide attributed voting records or transcripts of the council meetings. This means that aside from the FOMC and the MPC, researchers are turning their attention to smaller central banks for which voting records are available, such as the Riksbank, the Central Bank of Poland, the Czech National Bank and the Central Bank of Hungary.

Each of these central banks has particularities making it suitable for analysing some elements. For example, at the Riksbank, all members are internal full-time members, precluding the study of the internal–external dichotomy as in the Bank of England. The Central Bank of Hungary, on the other hand, has both internal and external members, with the external members holding a structural majority. An analysis of the voting records by Eijffinger et al. (2013) of the Hungarian central bank shows that Governor Járai has a substantially different voting record, underlining the institutional tensions at the time. This finding is in itself remarkable. Eijffinger et al. (2013) analyse the

position of the governor in different central banks and conclude that often, the governor tends to have a centrist position – as would be expected. They also look at differences in preferences according to appointment status and find that this often matters, for example in the case of the National Bank of Poland.

Final remarks

The study of central bank committees took off at the beginning of the 21st century (Blinder 2009). This is for good reason – central banks had moved *en masse* towards the use of committees of technocrats to decide upon monetary policy. It is therefore indispensable that we learn about what constitutes good practice in the design of such committees and about the impact of various features on decision making.

One way to do this is to study the preferences of central bankers. In this chapter, we have discussed the use of voting records to estimate preferences which can then be further analysed.

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5 Perceived FOMC: The making of hawks, doves and swingers

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Introduction

Dividing central bankers into inflation-fighting hawks or growth-promoting doves can be too simplistic. We agree. Yet, commentators on monetary policy, academics, even central bankers themselves, use these labels as a convenient shorthand to summarise or communicate complex information on certain aspects of monetary policy. We follow this approach, with the aim to understand what moulds those central bankers who are believed to lean more towards fighting inflation and those that are more concerned about unemployment. We study the case of the Federal Open Market Committee (FOMC) of the Federal Reserve using a hawk–dove index as quantified in Istrefi (2017).

The measure of Istrefi (2017) is based on narrative records in US newspapers regarding policy preferences of 130 FOMC members, serving from the early 1960s to 2015, comprising the FOMC under seven Federal Reserve chairpersons: William McChesney Martin, Arthur Burns, William G Miller, Paul Volcker, Alan Greenspan, Ben Bernanke and Janet Yellen. Perceived hawks or doves are followed over time consistently with respect to the dual objectives of the Federal Reserve: maximum employment and stable prices. Narrative records reveal that about 69% of FOMC members who served during 1960-2015 are perceived to have had persistent policy preferences over time, either as hawks (39%) or doves (30%). The rest are perceived as swingers, switching between types (24%), or remained an unknown quantity to markets.

What characterises a hawk, a dove or a swinger? The literature on political science and social psychology suggests that people form their core economic and political

beliefs during early stages of life, and keep them mainly unaltered thereafter. In this context, the historical-economic background when FOMC members grew up and the ideas or 'theories' in fashion at places where they studied could provide us some clues. In addition, as FOMC members are appointed to their positions, we explore the match of our types with the political or/and institutional philosophies of those who appointed them. While our focus is on determinants before joining the FOMC, the FOMC years are investigated to understand the conditions (either economic or political) under which some FOMC members changed their tune.

There are no clear-cut answers as to what makes a hawk or a dove. However, some tendencies are clear. The odds of being a hawk are higher when a member is born during a period of high inflation, graduated from a university linked to the Chicago school of economics ('freshwater'), and was appointed by a Republican president or by the board of a regional Federal Reserve Bank with established institutional philosophies. A dove is most likely born during a period of high unemployment, like the Great Depression, graduated from a university with strong Keynesian beliefs ('saltwater'), and was appointed by a Democrat president. Swingers share several background characteristics with the doves, but not always. Although swingers often follow the majority view, three main reasons seem to have sparkled the swing waves: i) serious economic issues facing the central bank (i.e. the Great Inflation of the 1970s), ii) intensified discussions about optimal monetary policy framework (the discussion on price stability and inflation targets in the early 1990s), and iii) a new understanding of the economy (following Greenspan's view in the late 1990s).

Who are the hawks, doves and swingers?

In revising the lessons from history in choosing a Federal Reserve chair, Romer and Romer (2004) suggested that certain background characteristics like education, job experience and political partisanship can be informative on the economic views that a future Fed chair might have. More informative, they stressed, are narrative records of their economic beliefs, as expressed in their writings, testimonies and speeches before joining the Fed. Unsurprisingly, this approach is the daily business of financial analysts and other people who do the watching of not only the Fed chair but of all the FOMC members, with the aim to forecast future policy moves. Istrefi (2017) collects the

perceptions of Fed watchers and other analysts as reflected in the US media and builds a measure of policy preferences (a hawk–dove index) of the FOMC. The narrative record in the media is used as a public source and a filter of all relevant information about these policymaker's backgrounds, their political interests and supporters and their economic beliefs. These beliefs are expressed in their writings, testimonies and speeches before joining and during their time at the Fed and in their policy actions (votes and dissents).

Istrefi's (2017) perceived hawk–dove index for the FOMC serving during the period 1963-2015 is presented in Figure 1.[1] This measure varies considerably over time, featuring hawkish and dovish majorities.[2] Overall, hawkish majorities in the FOMC are perceived predominantly during Arthur Burns', Paul Volcker's and Alan Greenspan's years as chairman.[3] Furthermore, dovish majorities are mainly perceived during the last years of several chairmen, i.e. the second part of the 1960s under Martin, the early 2000s under Greenspan and the late years of Ben Bernanke. Janet Yellen joined in 2014 an FOMC that was predominantly perceived as dovish. Istrefi (2017) shows that the evolution of the FOMC preferences matches well with narratives on monetary policy in the US, with voting patterns (dissents) of the FOMC and with preferred interest rates as measured by Chappell et al. (2005).

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1   Policymakers' preferences are not observed. In the literature, these preferences are mainly proxied by estimated reaction functions (i.e. of the Taylor rule type) or based solely on dissents on monetary policy decisions. Both approaches have their drawbacks. See Istrefi (2017) for a discussion.

2   The hawk/dove categorisation is relative to the FOMC on which the member sits. For example, *The Washington Post* in 1989 writes: "Of the seven Federal Reserve Board members, some are less tolerant of inflation than others, notably Wayne Angell and possibly Chairman Greenspan and the newest member, John P. La Ware, the only Democrat. Martha R. Seger, Manuel Johnson, H. Robert Heller and Edward W. Kelley Jr. have shown little or no commitment to reducing inflation to a negligible rate." ("Ridding America of Chronic Inflation", *The Washington Post*, 10 February 1989).

3   For those familiar with the history of great inflation during the 1970s, it probably comes as a surprise that the FOMC is perceived as being relatively hawkish during the Burns era. This episode is important to stress that the hawk–dove measure represents perceptions of the public and not necessarily the true preference of the policymakers. With regard to the 1970s, with the benefit of hindsight, one could say that the FOMC under Burns talked the talk but did not walk the walk (Istrefi 2017).

Figure 1   Perceived preferences of the FOMC
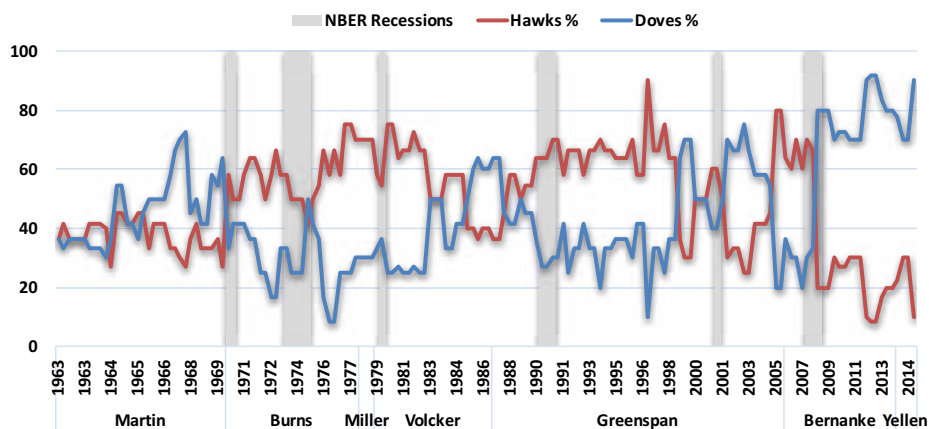
Notes: The share of perceived hawks and doves for each FOMC (voting members), from 1963 to 2015. Perceived preferences of 130 FOMC members are followed in "real time", where the assigned preference of FOMC members in a meeting m, year t is based on perceptions before meeting m. In the chart, the share does not always add up to 100, as it can be that the policy preference of one or more members is not known yet.
Source: Istrefi (2017).

An ex post observation of these preferences reveals that about 69% of FOMC members are perceived to have had persistent preferences over time, as either hawks (39%) or doves (30%). The rest are perceived as swinging camps (24%), or remained unknown (see Table 1).[4] Within the FOMC composition, Reserve Bank presidents are systematically perceived as more hawkish and the Board of Governors members as more dovish. Table 1 shows that about 60% of FOMC members have a doctorate degree (either a PhD in Economics or a JD Law). On relative terms, hawks form a slightly larger share among the members with a PhD in Economics, in contrast to those with a law degree where doves and swingers dominate (although the sample is too small for strong conclusions). When looking at education by subject, again hawks are in the majority among economists but not among members with an education in law, banking or management. Looking at religion (data only for the 48% of the sample), we observe that Protestants tend to be hawkish, Jewish slightly dovish and Catholics in the

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4   The group of swingers comprises FOMC members who often are considered as 'middle-of the-roaders' or 'centrists', switching camps either for some years or as having a complete 'change of heart'. The most recent example of a swing is that of Narayana Kocherlakota (FRB of Minneapolis, 2009-2015), who in 2011 made a (highly publicised) shift from being a noted hawk to becoming a dove.

Table 1 Summary statistics: Persistent hawks, persistent doves and swingers

	Hawk	Dove	Swinger	Unknown	% total
Gender					
Male	48	31	28	9	89.2
Female	3	8	3	0	10.8
Position in FOMC					
Board of Governors	14	31	12	0	43.8
Regional Fed President	37	8	19	9	56.2
Education, highest degree					
Ph.D.	28	23	17	1	53.1
J.D. Law	1	4	3	1	7.7
Education, Subject					
Econ./Pol. Economy	35	29	19	1	65.6
Other	15	9	12	8	34.4
Religion					
Mainline Protestants	16	5	9	4	26.2
Catholics	3	0	3	1	5.4
Jewish	8	9	4	-	16.2
Mormon	1	0	0	0	0.8
Last job prior to FOMC					
Federal Reserve	17	10	12	5	34.1
Government/public sector	15	12	8	1	27.9
Banking	6	9	5	2	17.1
Academia	4	5	3		9.3
Other (Industry, Army)	9	3	3		11.6
Tenure (in years)					
Min	1.3	1.4	3.8	1.1	
Median	6.7	5.3	10.8	2.3	
Max	24.5	23.0	20.3	8.1	
All (%)	**39.2**	**30.0**	**23.8**	**6.9**	

Notes: Summary statistics for a total of 130 members serving in the FOMC during the period of 1960 to 2015.

Sources: Data on background are collected mainly from: https://www.federalreservehistory.org/people. Data on religion are collected from different sources, like Wikipedia, newspapers, obituaries (where memorial ceremony took place), biography websites, in what church they got married, if they were members of religious group or from their charity supports.

middle.[5] In the following we discuss in more detail how these characteristics relate to the preference perceptions of FOMC members.

What factors could mould the type?

We start by investigating two main factors that might have moulded our FOMC members in the early years of their lives: ideology by education and life experience. In a next step, we look at the ideology (political and institutional philosophies) of those who appointed these members, which brings into discussion partisanship in monetary policy. Finally, for swingers especially, we explore in detail some background characteristics and the economic environment during FOMC to understand when swings occur.

Ideology by education

As Rodrick (2014) puts it, "the role of ideas in determining preferences has crept into various strands of research in economics". In many of these works, preferences are not determined exogenously but through exposure to societal outcomes, media or early childhood experiences.[6] Importantly, such influence is believed to happen during the early stages of life, further suggesting that as people grow up they become inflexible in their core beliefs. Given that FOMC members are considered as technocrats, the institutions where these people studied (including the influence of teachers/mentors they had) could be natural habitats where their core economic ideas are formed.[7] Indeed, several interviews with Nobel Laureates in Economics show that it was the

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5   This categorisation lines up with voting in US presidential elections. The subtleties of denomination would give a more nuanced picture.

6   See Rodrick (2014) for a discussion.

7   Interview with Friedman in Snowdon and Vane (1997): "When you were a graduate student at Chicago, what interpretation did your teachers put forward to explain the Great Depression? Well that's a very interesting question because I have believed for a long time that the fundamental difference between my approach to Keynes and Abba Lerner's approach to Keynes, to take a particular example, is due to what our professors taught us. I started graduate school in the fall of 1932 when the Depression wasn't over by any means. My teachers, who were Jacob Viner, Frank Knight and Lloyd Mints, taught us that what was going on was a disastrous mistake by the Federal Reserve in reducing the money supply." Abba Lerner (1903–1982) was a Russian-born British economist who was taught by John R. Hicks, Lionel Robbins, and F. A. Hayek at LSE. He was considered an avowed Keynesian.

time during their university or graduate studies that marked their paths as an economist. More specifically, in a summary of these interviews, Horn (2009) refers, among others, to James M. Buchanan and Gary S. Becker, stating that it was studying at the University of Chicago that "turned them around" from their initial (socialist) beliefs.

Along these lines, one can think that FOMC members, and especially those that received a PhD in Economics, by training, hold certain assumptions about how the world works that might be influenced by the economic thinking of the institution they graduated from. Since graduate studies are usually done around the mid-twenties of age, one can think of beliefs formed in these institutions as persisting for a long time.[8,9] We look at the ideology by education in relation to 'freshwater' and 'saltwater' schools of thought, over which there is a long debate in macroeconomics.[10] The debate was especially heated during the 1970s following an even older division between the monetarists and the Keynesians.[11] In the 'freshwater' group we have universities like Chicago, Carnegie Mellon University, UCLA and Johns Hopkins University, while in the 'saltwater' group we have Harvard, Yale, MIT, and Berkeley, among others in each group.[12] About half of the FOMC members (53%) hold a PhD in Economics, all having graduated between 1928 to 1990, years when the divide between the two schools was certainly more important than today.[13]

Figure 2 shows a good match between the types and the economic thinking of the institution they graduated from. Most 'freshwater' PhD graduates are perceived as hawks, in line with the ideology of the Chicago school and its 'off shoots' where Milton

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8   The average age at entry to a US PhD programme is 25-27 years (Stock and Siegfried 2001, Stock et al. 2011).

9   Keynes (1936: 383-384) on ideas and age: "There are not many who are influenced by new theories after they are twenty-five or thirty-years of age".

10 These categories relate to the geographical location of universities with different views in macroeconomics ('freshwater' being closer to the Great Lakes in the US than to an ocean, and 'saltwater' being closer to an ocean).

11 Hall (1976) was first to refer to the divide between 'freshwater' and 'saltwater' macroeconomists. As he wrote at the time: "As a gross oversimplification, current thought can be divided into two schools. The freshwater view holds that fluctuations are largely attributable to supply shifts and that the government is essentially incapable of affecting the level of economic activity. The salt water view holds shifts in demand responsible for fluctuations and thinks government policies (at least monetary policy) is capable of affecting demand."

12 The geography of some schools has shifted over time, as there are several exports from one school to another.

13 The majority graduated at a 'saltwater' university, owing to the high number of graduates from Harvard (true for the non-PhDs too).

Friedman, Robert Lucas, Karl Brunner, Allan Meltzer and many others taught. The 'saltwater' PhD graduates appear rather balanced in type compared with 'freshwater' graduates. Nevertheless, we notice a clear dovish and swinging bias, in line with the thinking of this school of thought where Paul Samuelson, Robert Solow, James Tobin and Arthur Okun, among many others, taught. These matches are not as striking for the non-PhD group (bachelor's, master's, MBA), where most are perceived as hawks irrespective of the school type. Nevertheless, doves have a larger share within the 'saltwater' schools, and swingers within the 'other' universities group.

Figure 2   Ideology by education/schools of thoughts
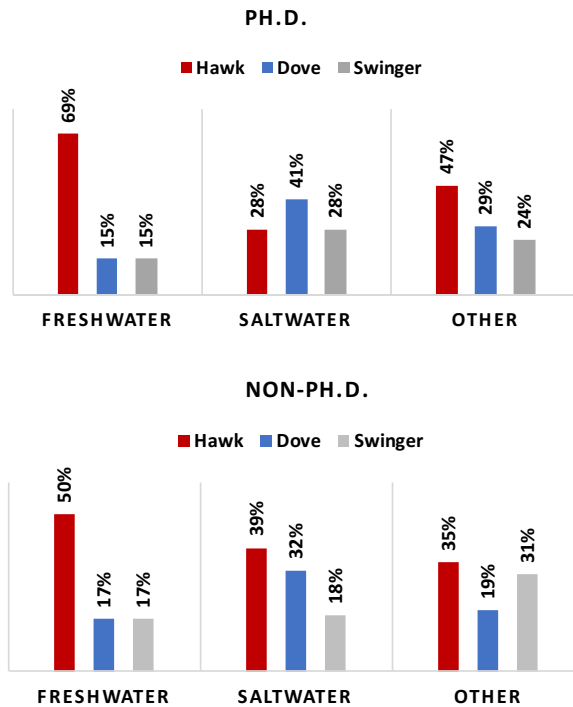
Life experience: Great Depression and Great Inflation memories run deep

The role of one's environment on subsequent intellectual development is hardly any surprise. Great events leave great marks on people. For instance, it was the traumatic impact of the Great Depression that led several Nobel Laureates to pursue economics. In this regard, Friedman said: "Put yourself in 1932 with a quarter of the population unemployed. What was the important urgent problem? It was obviously economics and so there was never any hesitation on my part to study economics."[14] Along these lines, Samuelson, Phelps, Solow and many others considered the Great Depression as the most serious economic catastrophe they experienced (Horn 2009). Unsurprisingly, times of economic hardship also influence preferences for social and economic policy. Research shows that growing up in a recession affects people's preferences towards more government redistribution and support for left-wing parties (Giuliano and Spilimbergo 2014). Importantly, Greider (1987) argues that the memories of the Great Depression pushed policymakers towards pursuing economic expansion and accepting the risk of inflation. Similarly, DeLong (2000) concludes that the Great Depression memories are the "truest" cause for the great inflation.[15]

 Likewise, the Great Inflation of the 1970s had its own influence on central bankers who lived through it. Janet Yellen in 2009 told how just about every member of the FOMC committee was schooled on the experience of the Great Inflation. This was a formative event for her and for most of her colleagues that made them want to go into the field of central banking.[16] Beyond the intellectual choice, inflation experiences are found to also influence monetary policy views and the stated beliefs of these central bankers about

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14 Interview with Milton Friedman in 1996 in Snowdon and Vane (1997).

15 The shadows of the Great Depression are also observed in the discussions of FOMC members. An article in the *Wall Street Journal* in 1974 cites a speech by Fed Governor John E. Sheehan as he refers to Friedman blaming the Federal Reserve for inflation. "Mr. Sheehan didn't argue with this [the economists'] analysis. "There isn't any lack of understanding on our board, nor lack of courage either," he said heatedly. But he added that a sharp cutback in money expansion would stall the economy and "would result in 15 to 20 percent unemployment by year-end, with 35 to 40 percent black unemployment and zero employment for black teen-agers. 'Milton could go to his farm (in Vermont) and sit this out but when he comes back he will find the cities burned down and the University of Chicago along with them," said Mr. Sheehan." ("Fed's Sheehan Warns Against Big Effort to Squeeze Inflation", *Wall Street Journal*, 29 March 1974).

16 "Inflation memories run deep at central banks", Reuters, 29 July 2009.

future inflation (Malmendier et al. 2017). Using an estimated adaptive learning rule based on the lifetime inflation data of FOMC members since 1951, Malmendier et al. (2017) show that experience-based inflation forecasts have significant predictive power for members' FOMC voting decisions, the hawkishness of the tone of their speeches, as well as the heterogeneity in their semi-annual inflation projections.

How does life experience prior to serving on the FOMC square with the hawkish and dovish preferences of our FOMC members? In our sample, birth years of FOMC members fall between 1892 and 1970. To begin, we take the Great Depression as the main reference point and examine members with birth dates before, during and after this event. Several studies have shown that the life pattern of children born during the Great Depression differed significantly from those born one or two decades earlier.[17] This literature emphasises the role of time, place and *linked* or interdependent lives in explaining their life experience. Regarding *linked lives*, Elder (1998) argues that the influence of Great Depression on children born during these years could be only understood through the hardship adaptations of people who were important in their lives.[18] For instance, Fed Governor Martha R. Seger, a baby of the Great Depression, recalls her memories as a child making deliveries with her mother and sister and listening to the difficult stories of defeat and destruction during the Great Depression.[19] Figure 3 (top panel) displays the share of hawks, doves and swingers born before, during and after the Great Depression (corresponding to 59, 14 and 57 members, respectively). Indeed, the share of doves and swingers rose within the cohorts that were born during the Great Depression and after it, compared with the pre-Great Depression period.[20]

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17 Elder (1998) compares the lives of American children participating in two longitudinal studies, the Oakland Growth Study (birth years 1920-1921) and Berkeley Guidance study (birth years 1928-1929), and finds that Berkeley children were more adversely influenced by the economic collapse of the Great Depression than were the Oakland adolescents.

18 Elder (1998) argues that indebtedness, income loss and unstable work increased the felt economic pressure of families, in turn affecting the quality of marriages and parenting.

19 "Family Tradition", *Contact Magazine*, alumni magazine of Adrian College, Fall 2013, p. 31.

20 Pre-Depression children as Federal Reserve chairs: Martin (hawk), Burns (hawk), Miller (dove), Volker (hawk) and Greenspan (swinger). Post-Great Depression children: Bernanke (dove) and Yellen (dove).

Figure 3   Great Inflation and Great Depression memories run deep

BIRTH YEARS

IMPRESSIONABLE YEARS (18-25YR)
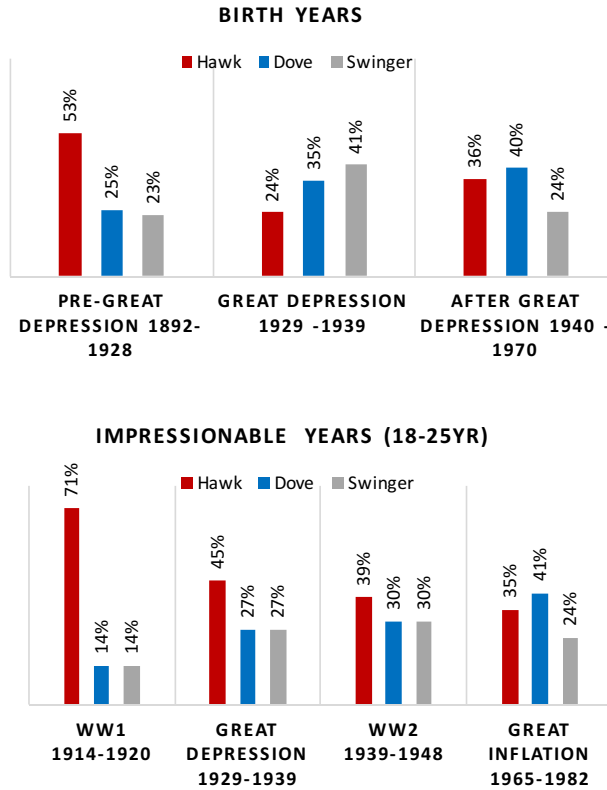
Note: WWI (1914-1924) and WWII (1939-1949), each period includes the years of the war plus post-war inflation years. Top panel: all FOMC members (n=119, excluding the unknown types); bottom panel: only FOMC members with impressionable years in the defined periods (n=89). The impressionable years are defined as ages of 18 to 25.

Next, we look at FOMC members with 'impressionable years' in one of the four great events: WWI, the Great Depression, WWII and the Great Inflation.[21] This investigation is once more motivated by the literature in political science and social psychology which suggests that people form their core economic and political beliefs mostly during the early stages of life (age 18 to 25), which then remain fairly unaltered for the rest of their

21 Some members have impressionable years both during WWI and the Great Depression. This calculation includes only those that have unique impressionable years during the Great Depression.

lives.[22] Figure 3 (bottom panel) shows that the share of hawks is highest within cohorts with impressionable years during WWI (1914-1924). Further, the share of hawks drops while the share of swingers and doves increases within cohorts with impressionable years during the Great Depression. A build-up in the share of swingers and doves is also observed both within the WWII and the Great Inflation cohorts.

Table 2 shows that the WWI period corresponds to years when the inflation rate reached 23.7%, the highest rate of the 20th century, while during the Great Depression the unemployment rate escalated to 25.2%. The WWII and Great Inflation periods both displayed a combination of high inflation and unemployment, raising the importance of inflation-unemployment trade-offs.[23] However, the rates of inflation and unemployment reached during these events were lower than experienced before.

Table 2   Inflation rate and unemployment rate over the four great events (%)

	WWI 1914-1920	Great Depression, 1929-1939	WWII, 1939-1948	Great Inflation, 1965-1982
Inflation rate				
Mean	11.6	-1.9	6.2	6.6
Max	23.7	5.6	19.7	14.8
Unemployment rate				
Mean	4.8	18.1	5.5	5.9
Max	11.7	25.2	17.2	10.8

Note: WW1 (1914-1924) and WW2 (1939-1949), each include the years of the war plus post-war inflation years.

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22 Among others, see Newcomb et al. (1967), Sears (1975) and Krosnick and Alwin (1989 for documentation on how political preferences formed during impressionable years are long lasting and difficult to change later in life.

23 Schuman and Scott (1989) conducted a study on generations and collective memories of American citizens in 1985. In a survey, a sample of 1,410 Americans were asked to report some important events in the last 50 years. The most recalled event was WWII, followed by the Vietnam War. The Great Depression ranked in the 8th position while the great inflation of the 1970s ranked in 15th position. They also show that these memories are structured by age, with WWII or the Great Depression being more recalled by those that experienced them in their teens or early 20s.

The ideology of the party or the bank which appointed the FOMC member

FOMC members are appointed in their positions. Governors are appointed by the US president, with the approval of the US Senate, for 14-year terms. Each Reserve Bank president is appointed for a five-year term by his/her Bank's board of directors, with the approval of the Board of Governors. The appointment procedures of FOMC members are designed to minimise the influence of politics. However, those commenting on monetary policy always look at the ideology of the appointer to guess the policy leanings of their appointees. After all, at least with respect to politics and macroeconomic policies, there is a large literature on partisanship of monetary policy that might justify looking for clues in this direction. The perception of partisanship would suggest that Republican administrations prefer tighter monetary policy and place more emphasis on fighting inflation, while Democrats prefer easier monetary policy to support economic growth.[24]

What types have the Republican and Democrat presidents picked for the Board? In our sample, we have 57 Board governors, 54% of whom are nominated by Republican presidents and 46% by Democratic presidents. The Republican nominees can be further divided in two groups, the traditional Republicans and the supply-side Republicans, the latter corresponding to the Reagan presidency, which nominated about 14% of total Board members.[25] Indeed, Democratic nominees have been mostly perceived as doves and very few as hawks. The share of hawks does appear higher within Republican nominees, but a slightly higher share of them is also perceived as doves (top panel of Figure 4).[26] For instance, President Bush nominated eight Board members, four of

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24 This view is known as the 'Partisan theory' of monetary policy. It was first formulated by Hibbs (1977), who argued that leftist parties in Europe and the Democratic Party in the US have been more likely to choose a point on the Phillips curve with higher inflation and less unemployment than conservative parties in Europe and the Republican Party in the US. This view has found empirical support in Beck (1982), Stein (1985) and Alesina and Sachs (1988), among others.

25 Havrilesky and Gildea (1991a, 1991b) divided the Republican nominees into these two groups. Looking at FOMC dissents, they found the 'supply-side' nominees of Reagan to lean towards easier monetary policies.

26 Blinder and Reis (2005) argue that "a generation ago, monetary policy decisions had a clearly partisan cast: Democrats were typically softer on inflation than Republicans, who in turn seemed less concerned than Democrats about growth and employment. Those days are long gone now—and good riddance. While the FOMC has had its 'hawks' and 'doves', these labels have not correlated with the members' party affiliations in recent decades."

which are perceived as doves, two as hawks and two as swingers. Furthermore, the supply-side President Reagan nominations were perceived mostly as swingers and doves. When looking at Regional Fed presidents (Figure 4, bottom panel), we observe a high share of hawks irrespective of the president's party. If not a hawk, then the most probable is the swinger type, predominantly falling under a Democrat or supply-side Presidents.

Figure 4   Political or institutional philosophies get checked at the door?

BOARD OF GOVERNORS & U.S. PRESIDENTS

REGIONAL FED & U.S. PRESIDENTS
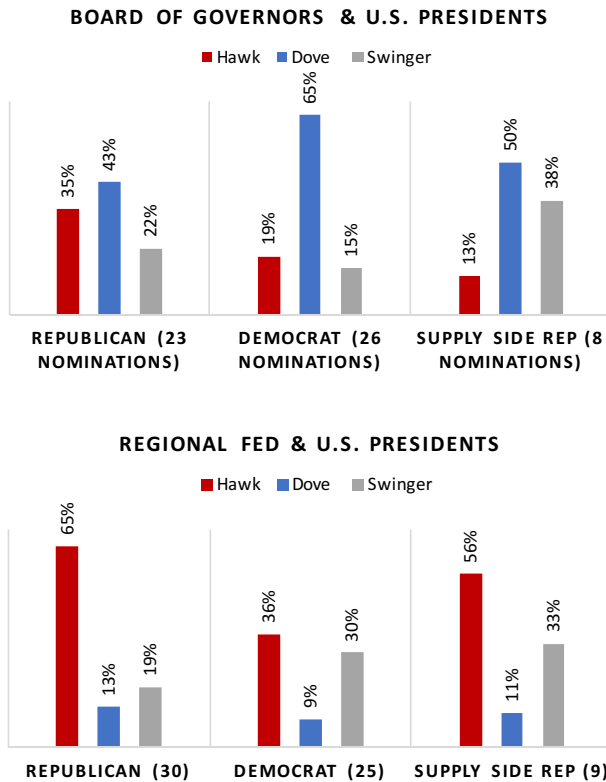
Note: We consider only regional Fed presidents for which a policy preference is known (perceived).

Regional Fed presidents are appointed by their Bank's board of directors, and as such these appointments are not followed closely in relation to politics. Given that the Board of Governors approves these nominations, political influence on the choice could be transmitted indirectly through this link. However, this link could be weak, especially

for regional Feds that have a long tradition of institutional ideology that they follow. For instance, the Federal Reserve Bank of St. Louis is often cited as the 'symbol of the monetarist school of economics' or the Cleveland Fed as having 'outspoken, inflation-fighting roots'.[27] In this respect, Fed presidents are often discussed as being picked for having beliefs that go in line with those of the regional Fed they represent. When the beliefs of Fed presidents are hard to pin down *ex ante*, the first guess is that they might follow the line of ideology or the tradition of the appointer.

Figure 5 shows that several regional Feds have had presidents predominantly perceived as hawks: the Cleveland Fed, the Dallas Fed, the Minneapolis Fed, the New York Fed and the St. Louis Fed. Swingers, the most common type after hawks, are mainly perceived in the Atlanta Fed and the Kansas City Fed. Beyond the ideology, several other factors could explain this distribution of types, such as the ties of the regional Fed with the Board of Governors (which is believed to have become more influential over time in choosing Fed presidents), how strong the ties of the regional Fed with the commercial banks of the region are, or the conservative versus liberal tendencies of regions.

Figure 5   Ideology in the regional Fed presidents
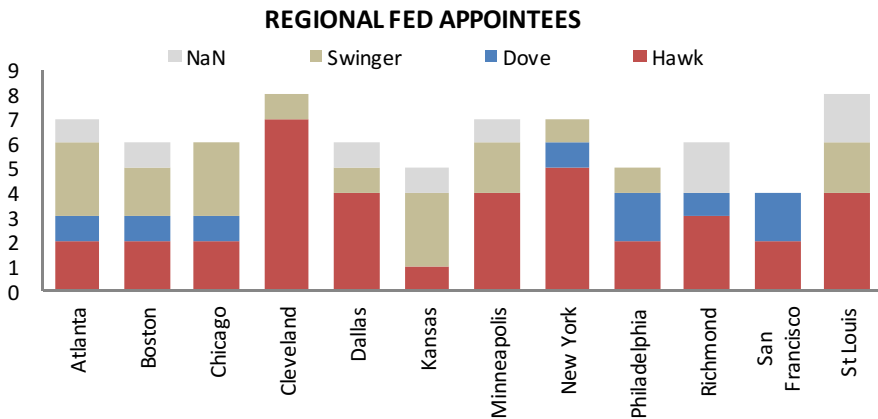
Note: A total of 74 Fed regional presidents, including those that moved from a Fed president to a Board of Governor position like Volcker, Coldwell and Yellen.

27 Back in the 1960s, the St. Louis Fed was considered the research arm of the University of Chicago. Milton Friedman was a student of Homer Jones, who was the research director and later senior vice president at the St. Louis Fed during 1958-1986.

Swingers: Education, tenure and experience in FOMC

An interesting breed of central bankers comprises those perceived to be in the swinging camp. Does the swing reflect a healthier approach to monetary policy, where members behave pragmatically, giving different weights to the dual objective of the Fed as the economy evolves? Or do swingers go with the flow, following the camp that convinces them more? Further, a 'change of heart' takes time – have swingers spent longer in the FOMC than persistent hawks and doves?

Training/education and tenure

In relation to economic training, one could argue that non-economists hold less strong views on how the economy works, and therefore side more often with the majority view (the '*go with the flow*' hypothesis). Indeed, the share of swingers within the non-economist group is higher (33%) than within the economist group (23%). Furthermore, the share of those that never disagree with the majority on monetary policy decisions is higher for the non-economists group (60%) than the economists group (34%). Generally, non-economists seem to favour consensus, although within this group there are also 'rebels' with 13 to 25 dissents, a rate of dissent comparable to the most rebellious economist (26). Within the non-economist group, most dissents are from hawks and doves (about 56%). Regarding tenure, it is true that swingers have spent more years at the FOMC (in terms of minimum and median years). Nevertheless, we also observe that the hawk or dove perception is persistent even for those that had more than 20 years in the FOMC (see Table 1).

Economic developments during time spent at the FOMC

Figure 6 shows the distribution of swingers over time within the FOMC (the share of members who were perceived to shift from doves to hawks is in red, and the share of members who were perceived to shift from being hawks to doves in blue). While the 'true' swing of an FOMC member might have happened earlier, Figure 6 reports the time when the switch is generally perceived and considered. Overall, we observe regular swings of one or two members in both camps, but also several periods when

over 20% of the FOMC comprises swingers. Most striking are the perceived swings during the early to mid-1970s and during the 1990s to the mid-2000s.

Figure 6   Swingers in the FOMC over time
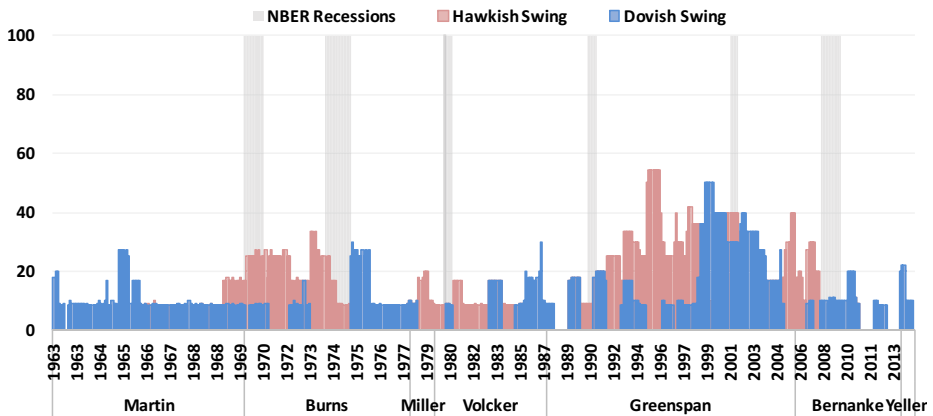
The hawkish swing perceived in late 1969 to 1974 corresponds with a period where inflation increased from an average of 1.3% during the first part of 1960s to 6% in 1970, and to 12% by 1974. By 1975, with inflation still at double-digit levels, a dovish swing is perceived for some outspoken anti-inflation hardliners. During this period, their actions did not match their words, as they supported an easier monetary stance than the majority. The second wave of hawkish swingers is perceived during the 1990s, a period where inflation rose to 6% and there were intensified discussions on the importance of price stability and aiming for zero inflation.[28] In 1989, a congressional bill (H.J. Res. 409) called on the Federal Reserve "to adopt and pursue monetary policies leading to, and then maintaining, zero inflation." The view on "removing inflation from the economic equation" was endorsed by many FOMC members, including several doves who constitute the hawkish swings during this period. The hawkish swing of the early 1990s was soon followed by a dovish swing in the late 1990s and early 2000s. These years correspond with Greenspan maintaining the line that the observed productivity

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28 The Reserve Bank of New Zealand introduced inflation targeting in 1989, with annual inflation target of 0% to 2%. Later, in 1991, the Bank of Canada and the federal government agreed on an inflation-targeting regime, with initial targets for the inflation rate of the midpoint of 2%-4%.

trend in the 1990s had increased the potential for non-inflationary growth. This view was soon endorsed by some previously hawkish members in the FOMC. During this period, Greenspan too was part of the swingers, perceived to have switched from a hawk to a dove.[29]

Conclusions

In this chapter, we highlight two important factors in moulding the policy preferences of FOMC members who have served in the past 60 years: ideology, and events that shaped their lives before joining the FOMC. Obviously, there are other factors that we have not discussed. We find that having studied at a 'saltwater' rather than a 'freshwater' university seems to give cleaner answers to explain differences in preferences among these members. However, since the late 1980s there has been a considerable convergence between the two schools of thought, with 'saltwater' elements included in 'freshwater' models, and vice versa. We suspect that if we were to do the same analysis 20 years from now, we may not observe such divisions.

Ideological factors might also have become muted with time because the Federal Reserve, as is the case with many central banks around the world, has converged to an understanding of the importance of price stability (and the use of flexible inflation targeting). Moreover, since the financial crisis, the debate has largely been over financial stability, not price stability. Financial stability has become a growing concern of central banks, and a key difference among them is on exactly what role the financial stability objective should play in their policymaking. Should central banks 'lean against the wind' of asset price booms, or 'clean up the mess' after the boom bursts? And if central banks lean against the wind, what tools should they use – macroprudential regulation or their policy interest rates? Although it is too soon to tell, ideology could still play a role.

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29 Blinder and Reis (2005) discuss also the case of Greenspan: "Of course, Greenspan's initial image was not that of an inflation 'dove.' In fact, he was typically portrayed by the media as an inflation 'hawk' in the early years of his chairmanship. It took the media almost a decade to catch on to the fact that, relative to the center of gravity of the FOMC, Greenspan was actually a dove—which became crystal clear when he repeatedly restrained a committee that was eager to raise rates in 1996- 1997. But it should have been evident earlier."

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6 Making sense of hawkish and dovish monetary policy in an inflation-targeting environment: Lessons from Canada

Domenico Lombardi,[1] **Pierre L. Siklos**[2] and
Samantha St. Amand
Banca di San Marino; Wilfrid Laurier University, Balsillie School of International Affairs and CIGI; CIGI

Canada was one of the first countries to adopt an inflation-targeting (IT) policy framework in 1991. By 1995 the Bank of Canada (BoC) and the government agreed to an objective of 2% inflation in the consumer price index (CPI) with a tolerance region of ±1%. That mandate has not been changed since. The duration of the current IT regime is impressive – it has outlasted the Bretton Woods system and monetary targeting. Only the Gold Standard (which took various forms) was in effect for a longer period than the current regime (e.g. Bordo and Siklos 2018).

Figure 1 shows the record of IT in Canada since 2003 through monthly inflation gaps – deviations of observed inflation or the one-year-ahead Consensus Economics inflation forecast from the unchanging 2% inflation target. The IT framework has largely been successful, as inflation has, for the most part, remained within the 1% to 3% band.

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1   Domenico Lombardi was at the Centre for International Governance Innovation when this chapter was written.

2   Pierre L. Siklos has been a member of the C.D. Howe Institute's Monetary Policy Council since 2008, but receives no direction or funding from the C.D. Howe Institute for participating in this group. All members of the Council provide an independent opinion on monetary policy issues.

Figure 1   Inflation gap in Canada, 2003-2016
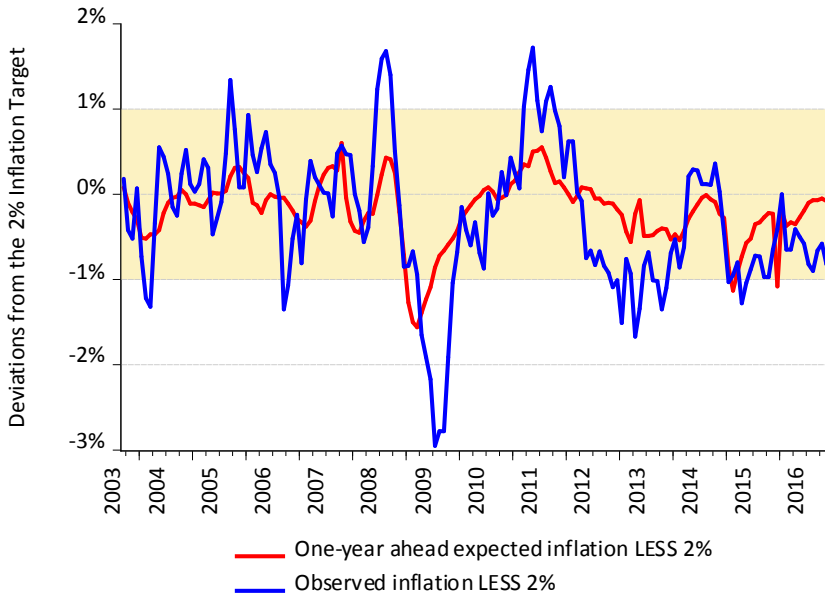
Note: Observed inflation is the percent change in headline CPI. Expected inflation is the one-year-ahead fixed-horizon forecast from Consensus Economics.

Since the BoC is accountable for meeting a fairly narrow target range for the inflation objective, does the distinction between 'hawkishness' and 'dovishness' matter? We argue that it does, for at least three reasons. First, an IT monetary policy strategy requires the central bank to be forward looking. Indications of policy leanings thus matter, and hawkish and dovish statements can be thought of as signals of the future direction of the monetary policy stance. Second, there is always the risk that inflation exceeds or falls below the IT band for short periods of time (as seen in Figure 1), and actual inflation tends to be persistent – it will likely drift above or below the mid-point of the target. But deviations from the inflation target need not imply an imminent tightening or loosening of monetary policy; for example, the BoC raised the policy rate twice in the third quarter of 2017 despite inflation remaining persistently below target. Finally, even if a policy rate change can take around two years to reach its full potential, the actual horizon is likely more variable. The governor of the BoC has also expressed a flexible approach to pursuing its medium-term target (Poloz 2015).

This chapter explores the relevance of the hawkish/dovish distinction in an IT framework by exploiting the rich set of information released by Canada's Shadow Monetary Policy Council (SMPC). The next section describes the SMPC and our empirical approach, the following section provides the results, and the final section concludes.

The Governing Council and Shadow Monetary Policy Council

The extant literature generally compares statements made by senior officials over time and assesses whether the content of the messages, or the direction of policy actions taken, can be likened to a preference for a tightening (hence, hawkish) or loosening (hence, dovish) of monetary policy (e.g. Appelbaum 2013, Eijffinger et al. 2015, Shubber 2015).

Formed in 2003, Canada's SMPC consists of a group of monetary experts and professional economists, unaffiliated with the BoC, that provides an unofficial 'second opinion' on monetary policy.[3] The SMPC is hosted by the C.D. Howe Institute, an independent not-for-profit and non-partisan Canadian think tank. Critically, the SMPC is tasked with providing a recommendation, not a forecast, for the policy rate the BoC sets the following week.[4] Readers are referred to Neuenkirch and Siklos (2013, 2014), and Siklos and Neuenkirch (2015) for a fuller discussion of the composition, operations and purpose of the SMPC.

There are two additional reasons why the perspective of an SMPC can be useful in Canada. First, while the BoC's Governing Council nominally makes monetary policy decisions, the governor of the BoC is statutorily alone responsible for making them. Second, minutes or votes of Governing Council meetings are not released. Therefore, it is unclear whether any statements by the BoC represent a consensus view or one espoused by the governor.

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3   Details of the membership of the SMPC are relegated to an unpublished appendix available on request. A spreadsheet of all recommendations made by SMPC members is also available on request.

4   The SMPC meets the Thursday prior to the BoC's Governing Council meeting on the following Wednesday, when the decision on the target for the overnight rate is normally announced.

In contrast, the SMPC releases individual members' policy recommendations, as well as recommendations about the likely future stance of monetary policy up to one year ahead. The SMPC thus provides opinions similar to the US Federal Reserve's dot-plot projections about the anticipated future direction for the federal funds rate published as part of its semi-annual Monetary Policy Report. While there is no Canadian equivalent, if the Governing Council and the SMPC display similar preferences, then the forward path of the policy rate can provide additional hints of policy leanings (Siklos and Neuenkirch 2015).

While interpreting hawkish/dovish statements can be very much in the eye of the beholder, exploring individual preferences within the SMPC can serve as a novel way to explore whether hawkish and dovish policy leanings are relevant when setting monetary policy in an IT framework. The Canadian example also serves to illustrate that labels such as 'hawkish' and 'dovish' are relative concepts and are not absolute terms , since they require a benchmark against which the stance of policy is interpreted (e.g. Owyang and Ramey 2004).

Figure 2 plots the evolution of the policy interest rate target – the overnight rate – set by the BoC, as well as the policy rate recommendations of the SMPC. Except for a few deviations, the two series closely follow each other.[5] As already suggested, because the SMPC demonstrates similar preferences to the Governing Council, the information released by the SMPC can potentially be used to reveal information about decision making at the BoC (see also Lombardi et al. 2017). Canada can also serve as good case study for evaluating hawkishness/dovishness in an IT framework because the overnight rate remains the principal instrument of monetary policy (meaning Canada did not engage in quantitative easing). And except for the period from April 2009 to April 2010, which was accompanied by forward guidance, the BoC also avoided the zero lower bound.

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5   Note that regardless of disagreement between the SMPC's previous recommendation and the BoC's policy setting, the SMPC always debates what the appropriate policy rate should be conditional on the actual policy rate.

Figure 2   Policy rate setting and SMPC recommendation in Canada, 2003-2016
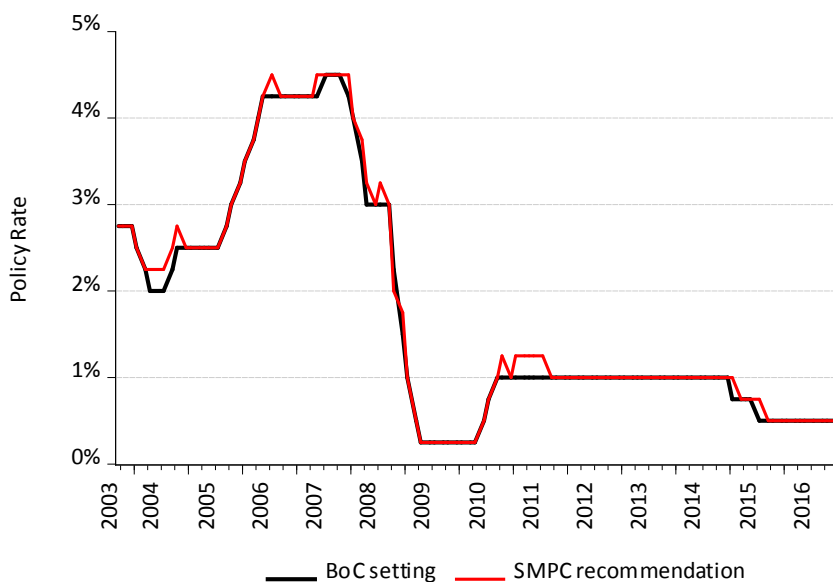
Note: The policy rate is the target for the Bank of Canada's overnight interest rate. Data are from the July 2017 edition of the International Monetary Fund's International Financial Statistics. Data for the SMPC recommendations are from the C.D. Howe Institute.

Identifying hawkishness and dovishness: The Canadian case

Figure 3 shows the range of policy recommendations of SMPC members; a single line implies no disagreement among members of the council. Disagreement appears to be common, especially when rates are changing. However, there was no disagreement during the height of the Global Crisis in 2009, or in 2006 when inflation was rising (see Figure 1). A financial crisis might make the distinction between hawkishness and dovishness less meaningful. Also, note that the spread between the lowest and highest recommended policy rate is often only 25 basis points.

Figure 3   Range of SMPC policy rate recommendations
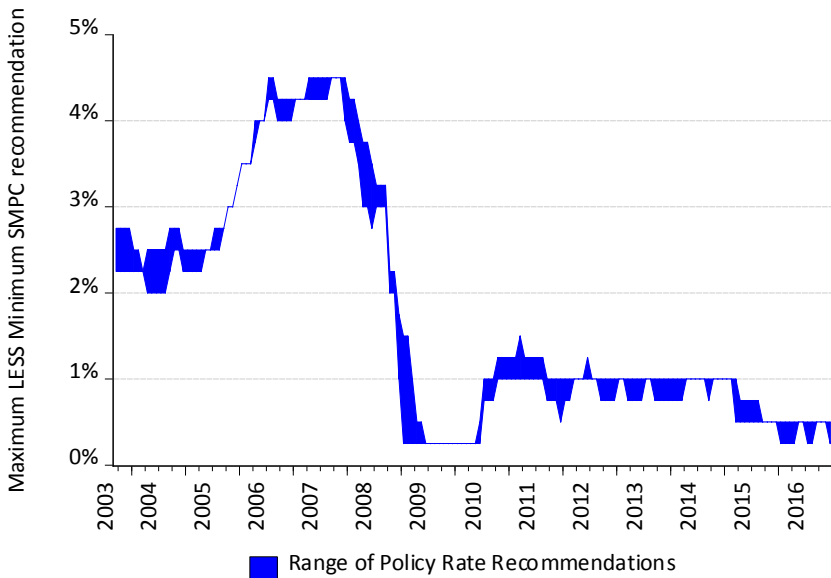
Note: Data are from the C.D. Howe Institute. The range represents the highest and lowest policy rate recommendation among SMPC members for the upcoming BoC policy rate setting.

Figure 4 provides two different interpretations of hawkish versus dovish policy recommendations. The first asks: what is the proportion of SMPC members whose recommendation for the upcoming overnight rate setting diverge from the BoC's eventual policy rate setting? The other is the share of members whose recommendation diverges the eventual (median) recommendation made by the SMPC. The two lines are not coincident. As with disagreement within the council, divergences vis-à-vis the BoC tend to take place when the policy rate begins to change direction.

Figure 4   Hawkishness and dovishness of the SMPC
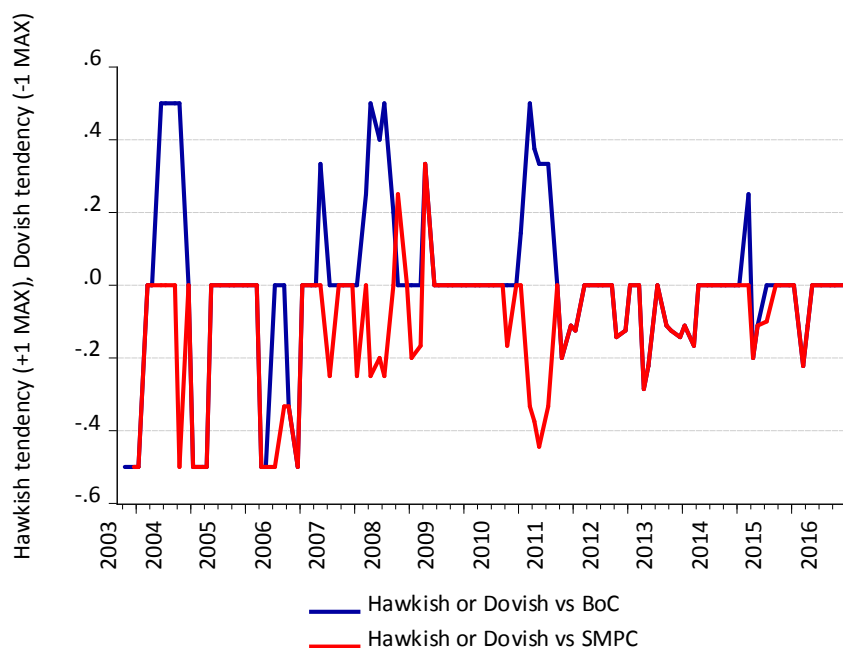
Note: Shows the fraction of SMPC members who recommend a policy rate that is higher (hawkish) or lower (dovish) than either the median SMPC or actual BoC policy rate setting. Data are from the same sources as Figure 2.

We can provide more formal information on hawkishness and dovishness in SMPC rate recommendations. In Table 1 we regress the gap between the current BoC setting and the SMPC's one-year-ahead policy rate recommendation on the inflation gap (see Figure 1) and output gap, proxied here by the change in the forecasted one-year-ahead real GDP growth rate.[6]

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6   Results are comparable when an estimated output gap, using Hamilton's (2017) filter, is used. We also used the gap between the one-year-ahead recommendation and the current SMPC median recommendation. The one-year-ahead SMPC policy rate recommendation begins in late 2009.

Table 1   Recommended changes in future policy rate settings: The SMPC's view

Dependent variable: One-year ahead recommended policy rate setting LESS current BoC setting	
Sample: 2010.01-2016.12; Obs.: 56; No. cross-sections = 12; Total No. observations = 450	
Variable	Coefficient
Constant (s.e.) t-stat	0.65 (0.03) 23.26
Expected Inflation Gap (s.e.) t-stat	0.33 (0.03) 9.47
Expected Real GDP Growth (s.e.) t-stat	0.61 (0.20) 3.10
Fixed Effects (Cross)	
M1--C	-0.03
M2--C	-0.15
M3--C	-0.53
M4--C	-0.24
M5--C	0.51
M6--C	-0.33
M7--C	0.18
M8--C	-0.15
M9--C	-0.04
M9--C	-0.23
M10--C	0.04
M11--C	0.08
Adjusted R-squared	0.29
F-statistic (p-value)	14.81 (0.00)
Test: redundant fixed effects (F)	df (11, 436): 6.62 (0.00)

Notes: Least squares estimates. The expected inflation gap is explained in the text and shown in Figure 1. Expected real GDP growth is the one-year ahead growth rate for Canada from Consensus Economics (a fixed event forecast converted to a fixed horizon forecast). M1 to M11 represent fixed effects identifying members of the SMPC.

Table 2   Hawkish and dovish SMPC recommendations (post-crisis)

(a) Hawkish series

Dependent Variable: Most hawkish one-year ahead recommendation LESS Current BoC policy rate				
Sample: 2010M01 to 2016M12; Included observations: 56 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	1.27	0.10	12.48	0.00
Expected Inflation Gap	0.57	0.12	4.54	0.00
Expected Real GDP Growth	0.70	0.70	1.01	0.32
Adjusted R-squared	0.26			
F-statistic (p-value)	10.73 (0.00)			

(b) Dovish series

Dependent Variable: Most dovish one-year ahead recommendation LESS Current BoC policy rate				
Sample: 2010M01 to 2016M12; Included observations: 56 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.28	0.06	4.57	0.00
Expected Inflation Gap	0.28	0.08	3.68	0.00
Expected Real GDP Growth	0.90	0.42	2.13	0.04
Adjusted R-squared	0.22			
F-statistic (p-value)	8.86 (0.00)			

Note: See explanations under Table 1 for details.

The cross-sectional analysis suggests that the SMPC recommends higher future policy rates whenever the expected inflation and one-year-ahead forecasted real GDP growth rates rise. The results in Table 2 compute the same one-year-ahead policy rate recommendation gap using the most hawkish (i.e. highest policy rate recommendation) and most dovish (i.e. lowest policy rate) proposal. As shown, the hawkish recommendations respond only to the inflation gap. In contrast, the dovish recommendations respond much less strongly to the inflation gap but significantly to the change in expected real GDP growth. Indeed, the dovish series of recommendations is half as responsive to a rise in the inflation gap as the hawkish series of recommendations.[7] It is also worth pointing out that since the constant term – that is, the neutral real interest rate – is significantly lower for the dovish series, this represents another distinction between the two series and may play a role in a debate on the stance of monetary policy.

Conclusions

The analysis demonstrates how a distinction between hawkishness and dovishness in deciphering monetary policy actions remains useful for a central bank that has been largely successful in pursuing an IT framework. During a financial crisis such as the one experienced in 2008 and 2009, the distinction loses its significance, as disagreement among members of the SMPC appears to temporarily disappear. Finally, hawkish and dovish leanings are distinguished by the emphasis of the former series on inflation developments while the latter reveal a softer response to inflation shocks. Only the dovish series reacts to real economic outcomes. In this sense, hawkish and dovish policy recommendations behave as conventional analysis would predict.

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7   The results for the one-year-ahead case match the one-year horizon in the inflation and output gaps. We consider different horizons: when the forward horizon shrinks, the sample can be expanded back to 2003. The conclusions remain unchanged (results not shown).

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7 Monetary policy committees: Voting and deliberation

Alessandro Riboni and **Francisco Ruge-Murcia**
Ecole Polytechnique and CREST; McGill University

The view that committees aggregate diverse viewpoints and ensure moderate and informed decisions is now widely accepted. This explains why, in virtually all democratic countries, monetary policy decisions are made jointly by a group rather than by a single central banker. This means that understanding collective decision making has become essential to explain monetary policymaking.

Members of monetary committees differ along various dimensions and, consequently, are likely to prefer different interest rates. The way disagreement is resolved in committees depends on the voting protocol that is adopted, either implicitly or explicitly. To explain monetary decisions, it is important to first examine the formal procedures employed by monetary committees to arrive at a decision (e.g. Fry et al. 2000, Aldrige and Wood 2014). According to their statutes, most monetary committees make decisions by majority rule, with the governor having a tie-breaking vote. Some central banks, such as the Bank of Canada and the Reserve Bank of New Zealand, do not hold a formal vote and instead make decisions by consensus. However, the distinction between these two protocols in practice is ambiguous because consensus appears to play a role in committees that (on paper) make decisions by simple majority rule. The ECB is a case in point. As put by Wim Duisenberg, former president of the ECB: "I try to forge a consensus …. If a discussion were to lead to a narrow majority, then it is more likely that I would postpone a decision".[1] Committees also seem to differ with respect to the role played by the chairman. In the committees that hold a formal vote, the chairman can exert leadership, in particular by deciding the content of the

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1 *New York Times*, 27 June 2001.

proposal that is put to a vote. For example, a prevalent view is that under the mandate of Alan Greenspan, agreement within the Federal Open Market Committee (FOMC) was largely dictated by the chairman. Blinder (2004: 47) remarks that "each member other than Alan Greenspan has had only one real choice when the roll was called: whether to go on record as supporting or opposing the chairman's recommendation, which will prevail in any case". More recently, under the chairmanships of Ben Bernanke and Janet Yellen, the general view is that FOMC decisions have become more consensus driven.

In order to investigate the implications of group decision making on monetary policy, in Riboni and Ruge-Murcia (2010) we analyse several ways of aggregating preferences through voting in monetary policy committees: a consensus model, where a supermajority is required to reach a decision; an agenda-setting model, where decisions are taken with a simple majority rule but the agenda is set by the chairman of the committee; a dictator model, where the chairman decides the interest rate; and finally, a simple majority model, where the decision is taken by the median voter. These procedures have distinct time series implications for the nominal interest rate, making it possible to empirically distinguish among them using data from actual policy decisions. More specifically, the consensus and agenda-setting models predict an 'inaction region', that is, a set of status quo policies where the committee keeps the interest rate unchanged. Conversely, in the median and dictator models, regardless of the status quo policy, the committee will adjust the interest rate to the value preferred by the median and the chairman, respectively. We estimate these models by the method of maximum likelihood using data from five central banks (the Bank of Canada, the Bank of England, the ECB, the Swedish Riksbank, and the US Federal Reserve) and find that the consensus model fits actual policy decisions better than the alternative models. This is observed even though all central banks considered in the sample, except for the Bank of Canada, do not formally operate under a consensus (or supermajority) rule. This means that in addition to the formal rules under which monetary committees operate, their decision making is also the result of unwritten rules and informal procedures that deliver observationally equivalent policy decisions.

The reason why the consensus model provides a better fit than the median and dictator models is that it can explain the relatively large number of instances where monetary committees keep the interest rate unchanged despite the fact that fundamentals have

changed. Moreover, the consensus model predicts substantially fewer policy reversals than the other models. This result also contributes to the empirical success of the consensus model because policy reversals are rare events in the actual data. Finally, the consensus model is preferred to the agenda-setting model because the latter model overstates the power of the chairman, at least for some central banks. In fact, in the data, deviations from the median's preferred policy are not systematically in favour of the chairman's preferred policy. This suggests that even though the chairman has proposal power, he or she often has to compromise and choose a policy proposal that takes into account the preferences of other committee members.

Figure 1   Relationship with committee characteristics
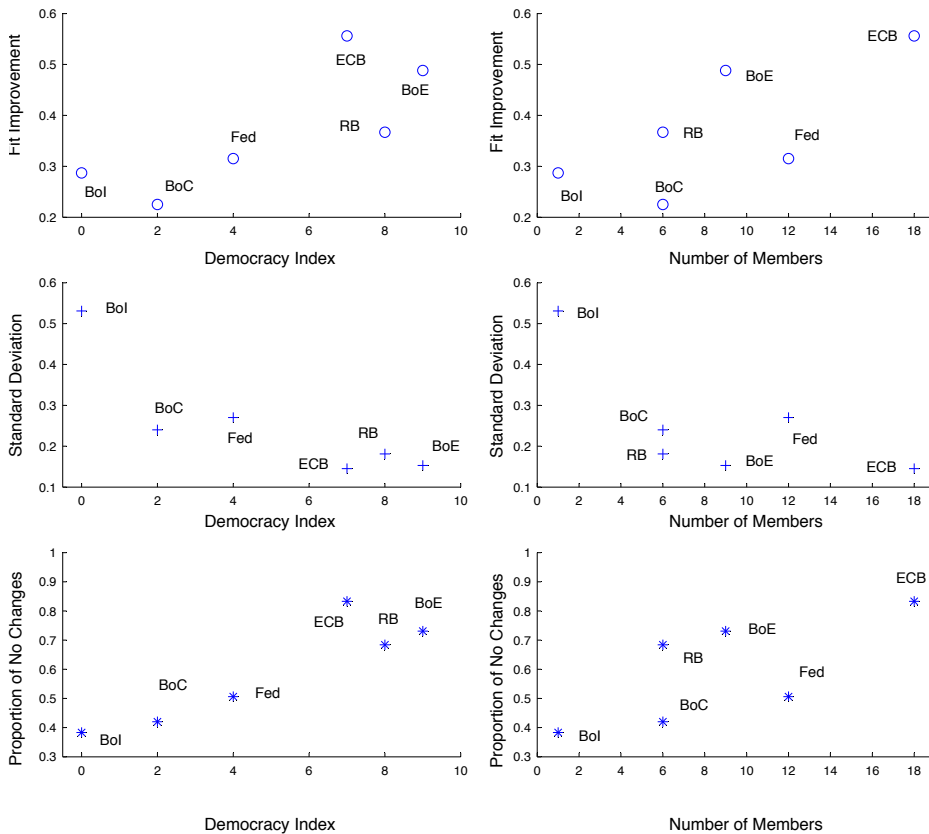
For each protocol, we compute various measures of fit which capture the degree to which these protocols track actual interest rate decisions. The top two panels of Figure 1 report the improvement in fit (i.e. the difference between fit measures) of the consensus model over a model without political frictions using data from the above-mentioned five monetary committees and the Bank of Israel, which had a single central banker at the time of the analysis. We relate the improvement in fit to the size of the committee and to the democracy index constructed by Alan Blinder (Blinder 2007), which ranks monetary policy committees according to the level of 'democracy' in their decision-making process. The figure shows that the improvement in fit is greater for central banks that are very democratic according to Blinder and/or have relatively larger committees. The improvement is smallest for the Bank of Canada, which has a low democracy index and a relatively small committee. The other panels of Figure 1 plot two measures of status quo bias (the standard deviation of policy decisions and the percentage of meetings with no change) and show that the status quo bias is positively correlated to the size of the committee and its democracy index. Overall, these results provide empirical evidence for the common view that committee decision making is more inertial. At the same time, in contrast to another prevalent view, we find that policymaking by committee is not necessarily more moderate – when decisions are made by consensus, relatively 'extreme' policies might remain in place although a majority of policy-makers would like to change them. Indeed, looking at voting rolls from the monetary policy committees at the Federal Reserve, the Riksbank and the Bank of England, we find that most dissenting votes take place when the committee decides to keep the interest rate unchanged, which is further evidence of a bias in favour of the status quo (Riboni and Ruge-Murcia 2014).

In recent work, we confirm the results that committees are inertial by exploiting, as a natural experiment, a change of the institutional framework at the Bank of Israel (Ruge-Murcia and Riboni 2017). In 2010, the Bank of Israel switched from a setup where the governor had full responsibility of policy decisions to one where decisions are made collectively by a committee under majority rule. Empirical results show that interest rate decisions are different across the two regimes and that transferring monetary policy to a committee has led to a larger status quo bias.

Besides aggregating different preferences, another presumed advantage of committees is that they help to aggregate information. Since available information is often dispersed and is interpreted differently by different individuals, groups are believed to make fewer mistakes than a single decision maker (de Condorcet 1785). There is now a growing empirical literature on these topics. For instance, Schonhardt-Bailey (2013) and Lopez-Moctezuma (2015) find that in the FOMC, deliberation matters and often dominates private information. To assess whether the effect of deliberation is welfare improving (i.e. leads to a reduction of policy mistakes), we believe that it is important to understand what committee members maximise. When they vote, do committee members want to choose the 'right' policy for the economy (i.e. low inflation and low unemployment) or do they maximise their reputation by choosing an action that makes them look smart or well informed? The incentives to disclose private information, to learn from others during deliberation, and to change one's mind might be very different depending on the answer. Future research, possibly using textual analysis of FOMC transcripts, should shed light on these issues.

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8 Doves, hawks, and pigeons: Monetary policymaking and behavioural biases

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"Too little, too late", or "wait and see"; these are comments that the media frequently use in observing the central bank tendency to postpone and/or delay interest rate decisions. The recent behaviour of the Federal Reserve System is paradigmatic.

In the aftermath of the severest recession since WWII, the Fed faces extraordinary challenges in designing and implementing monetary policy. The overall result has been massive monetary accommodation with interest rates close to zero, coupled with an exceptional expansion of the Fed's balance sheet. The Great Recession ended in June 2009 but eight years on, the Fed is still delaying the process of going back to normal. Expansionary monetary policy has been implemented long after the recession ended, raising questions regarding the drivers and consequences of monetary inertia – in this case, a reluctance to leave the ultra-expansionary monetary status quo and start a policy of interest rate normalization.

But the discussion over the (delayed) lift-off in US monetary policy is just the latest episode in a long-lasting debate: how can inertia in monetary policy be explained? In several cases over the last two decades, central banks have showed reluctance to leave the monetary status quo, raising questions over the rationale that can justify such a stance. As has been insightfully pointed out (Orphanides 2015), at least in the case of the US monetary policy, a period of monetary inertia after the end of a recession is not uncommon. At the same time, cases of monetary inertia have been registered for some time after the end of an expansion. While this inertial feature of central bank behaviour has been especially noted in the case of the Fed, it has characterised the

behaviour of many other central banks (Goodhart 1996, 1998, Woodford 1999, 2003). The bias towards the status quo has recently been highlighted in relation to the Bank of England's Monetary Policy Committee (Barwell 2016).

So far, the economic literature has offered two different explanations: information inertia and governance inertia.

Originally, monetary inertia was motivated by observing that the central bank's decisions depend on information on the state of the economy, as well as on the recognition of the long and variable lags in the transmission of monetary policy. Therefore, monetary inertia can be considered a rational strategy to avoid tough stop-and-go policies and their consequences in terms of negative macroeconomic spillovers. The tendency of central banks to adjust interest rates only gradually in response to changes in economic conditions can thus be considered optimal (Woodford 1999, Driffil and Rotondi 2007, Consolo and Favero 2009). More recently optimal monetary policy has been derived by departing from the rational expectations hypothesis, i.e. by assuming that individual agents follow adaptive learning (Mohnar and Santoro 2014).

Under a different perspective, the case of monetary policy inertia has been analysed by exploring the role of central bank governance. In this respect, two studies focusing on monetary policy committees (MPCs) seem particularly interesting:

- Dal Bo (2006) shows that a voting procedure requiring a supermajority (a 'consensus setting') leads an MPC to behave as a conservative central banker *à la* Rogoff (1985). The supermajority rule mitigates issues of time inconsistency and introduces a status-quo bias in monetary policy decisions.

- Riboni and Ruge-Murcia (2010) analyse four different frameworks in central banking governance, comparing the simple majority (median voter) model, the consensus model, the agenda-setting model (where the chairman controls the board agenda), and the dictator model (the case of an influential chairman).

While the simple majority model and the dictator model are observationally equivalent to a one-man central bank, the consensus model and the agenda-setting model are different, creating something like a persistent status quo monetary policy. In the first two models, the MPC adjusts the interest rate taking into account the value preferred

by the key members – the median voter and the chairman, respectively - regardless of the initial status quo. In the other two models, the MPC can keep the interest rate unchanged in the 'inaction region' – in other words, monetary inertia can occur. Further, the agenda-setting model predicts larger interest rate increases than the consensus model when the chairman is more hawkish than the median member. In other words, inertia in the interest rate decisions can be associated with features of central bank governance (*governance inertia*).

But now, what happens if we assume that psychological drivers can influence the decisions of the central bankers? Recently, my co-author, Carlo Favaretto, and I studied a monetary policy setting with three different kinds of central bankers (Favaretto and Masciandaro 2016).

The members of the MPC – i.e. central bankers – can be split into three groups, depending on their monetary conservativism: doves, pigeons, and hawks. In the monetary policy literature, a specific jargon has been coined: a "dove" is a policymaker who likes to implement active monetary policies, including inflationary ones; a "hawk" is a policymaker who dislikes such policies (Chappell et al. 1993, Jung and Kiss 2012, Eijjfinger et al. 2013a and 2013b, Jung 2013, Neuenkirch and Neumeier 2013, Jung and Latsos 2014, Wilson 2014, Eijffinger et al. 2015). "Pigeons" fall in the middle. Throughout time, the dovish/hawkish attitude has probably become one of the main focuses of the analysis of monetary policy board decisions.

The model introduces sequentially the assumptions (i) that each central banker is a high-ranking bureaucrat – i.e. a career concerned agent – with his/her conservativism, (ii) that an MPC formulates monetary policy decisions voting with a simple majority rule, and finally (iii) that loss aversion characterises the behaviour of the central bankers – i.e. for every monetary policy choice, losses loom larger than gains, and both are evaluated with respect to the *status quo*.

The framework shows that, given the three types of central bankers (doves, pigeons, hawks), the introduction of loss aversion in individual behaviour influences the monetary policy stance under three different but convergent points of view.

- First of all, a *moderation effect* can emerge whereby the number of pigeons increases. More loss aversion among MPC members reduces the distance between their monetary policy positions. On the one side, the doves overestimate the losses due to an inflationary choice, so they limit their dovishness. On the other side, the hawks overestimate the losses due to a conservative choice, and therefore their hawkishness is dampened. As the central bankers become more loss averse, pigeons increase in number and inertia in setting the interest rate is likely to increase.

- At the same time, a *hysteresis effect* can also become relevant whereby both doves and hawks soften their stances. Given the existing monetary policy stance, if loss aversion characterises a central banker's behaviour, the status quo is more likely to remain; any central banker – either a dove or a hawk – will overestimate any losses due to a change in strategy.

- Finally, a *smoothing effect* tends to stabilise the number of pigeons – in the case of a shock to the level of conservativism among central bankers, only large shocks can trigger a change in the monetary policy stance.

The three effects consistently trigger higher interest rate inertia, which is independent of both the existence of frictions and the absence or presence of certain features of central bank governance.

Loss aversion can explain delays and lags in changing the monetary policy stance, including the fear of lift-offs after recessions. Needless to say, the behavioural motivation doesn't rule out the other motivations already stressed in the literature.

The results shed light on the fact that central bankers are individuals who are subject to the same sources of behavioural bias that all individuals face. In the presence of behavioural bias, the outcome of different information sets and/or governance rules can be quite different with respect to the standard case.

In other words, central bankers can justify their lack of active choices using informational reasons ("we adopted a data dependent strategy") or governance drivers ("we need to reach a larger consensus"), but being both bureaucrats – i.e. career concerned players – and humans, other perspectives need to be explored, namely, that central bankers

can act consistently with behavioural biases. Such a perspective deserves attention in designing and implementing central bank governance rules.

In fact, governance rules are defined assuming the existence of a principal agent framework between citizens and central bankers as bureaucrats, where the bureaucrats are rational players. Therefore, the governance problem is to design rules of the game that can produce optimal interest alignment between society and central bankers. But the less central bankers act as rational individuals in the traditional sense, the more the design of governance procedures must take into account the possibility of behavioural bias. In other words, the simple assumption that central bankers are career-motivated players who care about prestige is not sufficient when behavioural biases – such as loss aversion – can emerge systematically. In calculating the benefits and losses of different monetary policies, behavioural central bankers make choices that are quite different with respect to 'standard' central bankers.

It is worth noting that loss aversion is just one source of behavioural bias. All in all, cognitive psychology can be usefully employed in understanding the intertemporal challenges embedded in monetary policy analysis.

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9 Stability, governance, and rules: Monetary policy without committees

Forrest Capie and **Geoffrey Wood**
Cass Business School; Cass Business School and University of Buckingham

Monetary policy is currently set by committee in numerous countries. Notable examples are the UK, the US, and the ECB for that collection of countries which comprises the Eurozone. The reasons this occurred vary from country to country. In the UK, the notion was at least in part to reduce the power of the governor of the Bank of England, but this was certainly supported by the idea that a committee of people knowledgeable about monetary economics would lead to improved policymaking. In the US the idea, when policy started to be made by the Federal Open Market Committee in 1933-1935,[1] was to dilute the influence of Washington-based policymakers and to maintain, through the regional Federal Reserve banks, not just the influence and knowledge of other parts of the US but also, through the appointment process for Federal Reserve bank presidents, at least a vestigial influence of the private banking sector. As for the ECB, a committee was needed so that the influence over the decision of every country in the Eurozone was overt – a political necessity thus produced a monetary policymaking framework.

In other words, despite the arguments of economists suggesting that committees might have economic benefits, the primary reasons for the policy by committee that we now see are political, not economic. Another feature that these committees have in common is that they are concerned with their 'communication strategy' – with how they explain

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1 The FOMC was founded in the Banking Act of 1933, members of the Board of Governors were given voting rights in the Banking Act of 1935, and that act was itself amended in 1942 to give the current voting structure of twelve members voting, and the balance giving a view but not voting.

their actions, and, to an increasing extent, how they suggest what they are going to do next.[2]

In this chapter, we suggest that the history of monetary policymaking by central banks does not provide strong support for policymaking by committee, and no support at all for the belief that attention to communication strategies will improve policy outcomes. Rather, history suggests that good policy comes from the adoption of a straightforward rule, and further, that an appropriately framed rule can provide to the private sector a good guide to future policy. We draw the evidence from only one central bank, partly on grounds of space and partly because most central banks are comparatively modern creations, but it is hard to see why the conclusion should not generalise beyond that bank and the rule that guided it.

The Bank of England was founded in 1694 to assist the government of the day in raising revenue. At the time, sterling was convertible into both silver and gold. Britain drifted on to a gold standard, initially *de facto* following Newton's establishing a new mint ratio between silver and gold that had the effect of driving silver out of circulation. Britain moved to a *de jure* gold standard in 1821.[3] We start our historical examination not from that date, but from the outbreak of the Revolutionary Wars and the Bank's suspension of its obligation to convert sterling into gold in 1797. The convertibility obligation was resumed in 1821, six years after the defeat of Napoleon.

How did the Bank behave with the suspended constraint, and then with the constraint resumed? During the suspension, the Bank's profits certainly increased and some of that was attributable to the substantial increase in its note issue, in turn a consequence of not having to back the issue with gold. And there was inflation. On the formal re-establishment of the gold standard in 1821, the Bank did not have either an inflation or a price-level target, but the gold standard made it operate as if it had. When an upward movement in prices appeared, exports would tend to fall and imports to rise. If the pressure on the exchange rate then reached the point where gold began to flow abroad,

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2   Some central bankers have resisted the urge to predict their own actions. Lord King, when governor of the Bank of England, observed on more than one occasion that if he knew what would have to be done next, he would do it.

3   See Fetter (1965) for a detailed description and discussion of these developments.

the Bank would take action to protect its reserves and raise interest rates. An inward flow of gold would be treated in the opposite direction. Price level stability would follow.

Figure 1 confirms this expectation. The CPI gradually stabilised after war and resumption of gold, and thenceforward fluctuated within a narrow range. In the same figure, we see the effect of this on the yield on government stock. The yield shown there is a nominal yield. This fell steadily after gold resumption, and fluctuations tended to become smaller over time, although of course with the occasional increase. This decline in level, and tendency to decline of volatility, was the result of the nominal component – the inflation expectations component, stabilising and falling, leaving only fluctuations in the real rate as important. (As has been seen for many years now, fluctuations in long bond yields are generally dominated by the expected inflation component in the Fisher equation.)

Thus, we had both an effective policy for price stabilisation and an effective communications policy, for the gold standard achieved both. In further evidence, note the decline in the yield after gold resumption.

This outcome was achieved not by decision by committee, but by a simple guiding rule – the gold standard – and by simple and publically observable operating procedures. There was some public debate as to how the Bank should respond to drains of gold, to what signals in addition to simple gold movements, and the Bank behaved as it was expected to after the outcome of these debates.[4]

Not only was price stability achieved. Certainly, there were economic fluctuations – the behaviour of harvests, for example, was an important influence in an economy with a still substantial agricultural sector. But there were neither booms caused by unexpected surges in money growth, nor major slumps, whether induced by banking failures or for any other reason.

While banks did continue to fail, such failures were idiosyncratic, and by the third quarter of the 19th century were contained by lender-of-last-resort action. Not only

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4   For a detailed discussion of these 19th century debates, again see Fetter (1965).

was this action effective in containing failures largely to the originating bank, but by its actions, and by its commitment to action, the Bank of England essentially removed the fear of contagion from one failure damaging a significant part of the banking system.[5]

Figure 1   Prices and bond yields
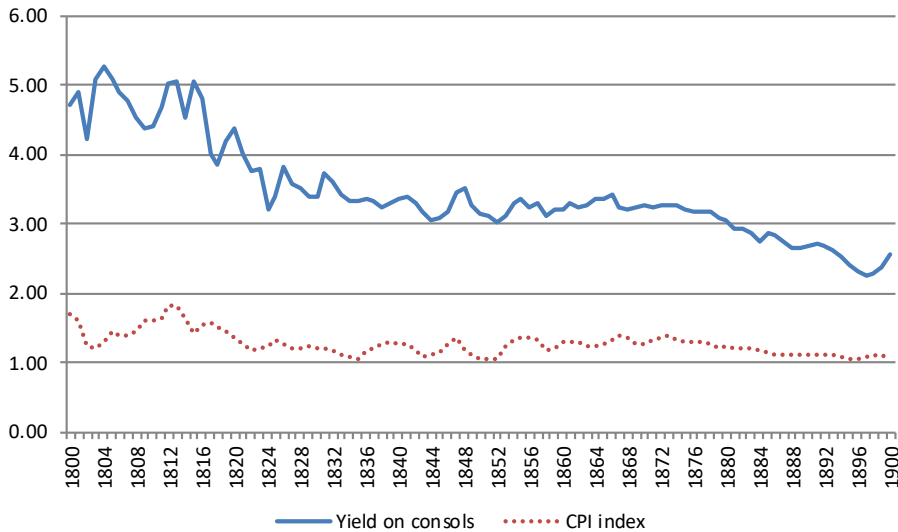
There is no need to argue that the resulting real stability and low and stable inflation were desirable – they are accepted as desirable in modern monetary policy discourse. The only dispute in that discourse is over the level of inflation desired.

That observation leads us to an earlier discussion of rules versus independent central banks with inflation targets (Friedman 1962):

   "The device of an independent central bank embodies the very appealing idea that it is essential to prevent monetary policy from being a day-to- day plaything ... of the current political authorities" (p. 178).[6]

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5   For elaboration of these points, see, for example, Schwartz (1986).

6   All page references to this Friedman article are to the 1968 reprint.

He went on:

> *"A first step in discussing this notion critically is to examine the meaning of 'independence' of a central bank. There is a trivial meaning that cannot be the source of any dispute about the desirability of independence. In any kind of bureaucracy, it is desirable to delegate particular functions to particular agencies"* (p. 179).

What he called a more basic meaning of independence is that "*...a central bank should be an independent branch of government coordinate with the legislative, executive, and judicial branches, and with its actions subject to interpretation by the judiciary*" (p. 179).[7]

That is the meaning which most writers have implicitly applied to the concept of an independent central bank.[8] If the central bank is to be independent in that sense, then it requires a set of instructions to follow. The set of instructions – often called the mandate – given to many central banks was the objective of low inflation, to be achieved by the control of monetary policy.

Friedman considered this, and foresaw problems with it. In particular, he observed that the central bank would have been given an unenforceable mandate, for the central bank does not control inflation. It can, to a degree sufficient to control the trend of inflation, control money growth. But it has no short-term control of money, and no short-term control of inflation; in the short term, many factors influence the measured inflation rate.

The neglect of that basic point has led to the modern industry of central bank watching, to attempting to guess what the central bank will do next.

But the evidence from the gold standard under which the Bank of England operated is that rules can do better – better in terms of outcomes, and better in terms of stabilising expectations.

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7   Recently both the ECB and the Bank of England have had their actions reviewed by the judiciary, albeit over very different issues.

8   There have been occasional (e.g. Cobham et al. 2008) discussions of informal arrangements.

The conclusion of this chapter is not that the world should return to the gold standard. Whether that is either desirable or feasible is not a subject for this chapter. But it can be clearly concluded that as well as attempting to improve inflation-targeting policy, there is a strong case for reconsidering rules-based policy. Inflation targeting has by and large done better than what went before (Capie and Wood 1991, 1992), but there is in the history of the gold standard a strong suggestion that rules might do even better.

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10 Central bank policies after the crisis

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Princeton University; ECB; De Nederlandsche Bank; De Nederlandsche Bank

Ten years after the financial crisis, a key question is whether the various changes in central bank policy that have been introduced since will turn out to be temporary, or whether these changes are here to stay. To shed light on this question, we have conducted surveys among central bank governors and academic economists covering four themes: central bank mandates, central bank policy tools, central bank communication, and the relationship between central banks and government.[2]

Central bank mandates

Several central banks have seen their mandates expanded after the global financial crisis. This tendency is also reflected in the survey results, which show that a majority of respondents (62% of central bankers and 54% of academics) have reconsidered the mandate of their central bank, in countries affected by the crisis and in non-crisis countries alike. Moving away from the predominant pre-crisis view that central banks should mainly be concerned with price stability, many respondents in our surveys mention that financial stability considerations should also be part of the central bank mandate.

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1   The views expressed here are those of the authors and do not necessarily represent the views of the European Central Bank, the Nederlandsche Bank or the Eurosystem.

2   See Blinder et al. (2017). The surveys were conducted between February and May 2016. Responses were received from 55 central bank heads and 159 academics. The latter are members of the NBER and CEPR research networks. While the central bank responses are highly dispersed geographically, most academic respondents are from the US, the UK and the euro area.

Policy instruments

Confronted with a massive financial crisis and its repercussions, as well as stubbornly low inflation rates, central banks have resorted to a large number of new policy tools. The survey has covered respondents' opinions about the most important ones – namely, low policy rates, negative policy rates, asset purchase programmes, macroprudential measures, and forward guidance. Figure 1 provides the corresponding responses. Central bank governors are typically more cautious in their responses than academics, often finding it too early to come to a final assessment of a particular tool. A more detailed analysis reveals, however, that those central bank governors who have previously deployed a particular tool are more likely to think that this tool should remain in the central bank's toolkit, be it in its current or a modified form (for details, see Blinder et al. 2017). Academic economists, in contrast, tend to have made up their mind and favour keeping most of the new tools. The area where both respondent groups are in greatest agreement is macroprudential policy, with large majorities proposing its further usage.

Figure 1   Views on the future of central bank policy tools
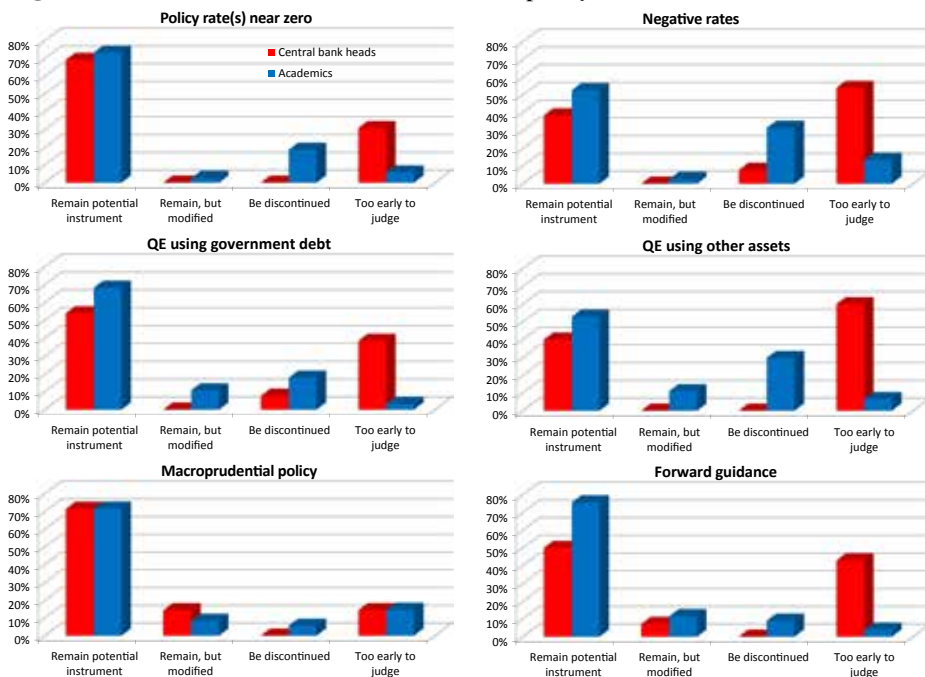
Notes: The figure reports response shares obtained from academic economists (blue bars) and from central bank heads in advanced economies (red bars).

Source: Blinder et al. (2017)

Central bank communication

Before the financial crisis, central bank communication had already evolved into a major instrument in central banks' toolkits (Blinder et al. 2008); the crisis reinforced this trend. The survey results show clearly that central banks have stepped up their communication efforts (more than 80% of central bankers and academics think that communication has intensified), and there is consensus that these changes are here to stay, or will go even further.

Communication can be very effective. A well-known example is ECB President Draghi's "whatever it takes speech" in London in 2012. Prior to this speech, markets had started pricing currency convertibility risk into the government bonds of several stressed euro area countries. Draghi's unequivocal statement and the subsequent announcement of the ECB's Outright Monetary Transactions (OMT) Programme calmed markets without spending a single euro under this programme.

Forward guidance about policy rates has become a major communication device (Moessner et al. 2017), but central bankers and academics have different views on its future. Most academics would like to relate the time horizon over which the central bank foresees keeping policy rates low to incoming data, whereas central bankers prefer purely qualitative forward guidance (the horizon of which is tied neither to economic data nor to calendar dates). A better understanding of the effectiveness of different types of forward guidance is therefore warranted. Coenen et al. (2017) provide some evidence in this direction by testing how forward guidance shapes private-sector expectations, and whether these effects differ across different types of forward guidance. By looking at how government bond yields respond to macroeconomic surprises and by studying the disagreement across economic forecasters, they show that forward guidance has been more credible when tied to a distant future calendar date, or when tied to incoming data (in contrast to forward guidance that is purely qualitative or tied to a calendar date not too far in the future). Credibility of forward guidance is furthermore strengthened in the presence of an asset purchase programme, indicating that the various monetary policy tools interact and therefore should not be judged in isolation.

Central bank independence

In some countries, the central bank's crisis-fighting efforts did not go undisputed. Academics in particular perceived that their central bank has received considerable criticism (Figure 2). They are also more concerned about changes to their central bank's independence from government, with almost 40% seeing moderate or even substantial threats to independence – in contrast to more than 70% of central bankers seeing no or only little threats to independence.

Alesina and Tabellini (2008) argue that delegation of decision-making authority to non-elected bureaucrats is especially beneficial when the tasks are technical in nature and policies do not have first-order distributional effects. This sounds like monetary policy. Although conventional monetary policy transfers wealth between borrowers and lenders, it is widely believed that the primary impact of policy rate changes is on output and inflation and that its distributional effects are secondary. However, macroprudential and unconventional monetary policies may have stronger distributional consequences than conventional monetary policies.

Furthermore, financial support to ailing financial institutions and asset purchase programs imply a non-trivial chance that the central bank, and thus indirectly the country's taxpayers, will suffer a loss. For this reason, they are often called *quasi-fiscal policies*, a term that suggests that such actions constitute a kind of government spending. The survey results show that central banks which resorted to unconventional monetary policies, and in particular those that purchased assets other than government debt, were more likely to have received criticism for their actions. What is more, the likelihood that a central bank governor sees no threat to independence is considerably smaller in countries where the central bank has received a lot of criticism and in countries where there was a public discussion about the central bank's mandate (for details, see Blinder et al. 2017).

Figure 2   Assessment of the criticism central banks have received in their crisis-fighting efforts
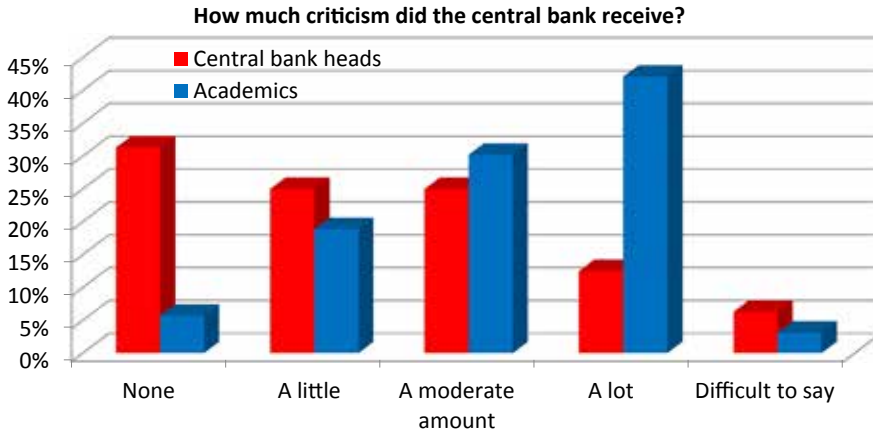
Notes: The figure reports response shares obtained from academic economists (blue bars) and from central bank heads in advanced economies (red bars). Source: Blinder et al. (2017)

Final remarks

The financial crisis has changed the way central banks conduct policy in several dimensions. Due to the severity of the crisis and the need for central banks to act quickly, there was often only little time to consider the pros and cons of the various measures. Still, the results of our surveys suggest that most of these changes will stay. We do therefore expect the central bank of the future to operate with broader mandates, to employ a wider range of tools (especially macroprudential tools) and to place even more emphasis on communication.

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11 The behaviour of the money multiplier during and after the Global Crisis: Implications for the transmission mechanism of monetary policy

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One of the basic mechanisms underlying conventional views about the transmission process of monetary policy is that, by changing the monetary base, the central bank affects the quantity of money and through it economic activity and inflation.[2] Although it has perfect control over the monetary base, the central bank does not fully control the quantity of money. How much of a given increase in the monetary base leads to an increase in the money stock depends on the willingness of banks to utilise excess reserves to extend credit and on the fraction of its money balances that the public desires to hold in the form of cash. A widely used textbook device describing the relation between the monetary base and narrow money in the economy is the M1 multiplier. This multiplier is given by

$$m = \frac{1 + c}{rr + \varepsilon + c}$$

where c is the ratio of cash held by the public to total (liquid) deposits owned by the public, rr is the required reserve ratio against such deposits, and ε is the ratio between

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1   Email: alexcuk@post.tau.ac.il. Gabi Gordon provided efficient research assistance.
2   Since changes in the central bank's policy rate have to be supported by changes in the base, this argument can also be formulated in terms of the interest rate.

excess reserves and deposits. The relationship between the monetary base, B, and narrow money is then given by

$$M1 = mB$$

Under the widely held (at least until the Global Crisis) view that this multiplier is relatively constant this formulation makes it possible to evaluate the impact of changes in the monetary base on the quantity of money. It has been taught to generations of undergraduate students over dozens of years and appears in money and banking textbooks, even after the onset of the Global Crisis. One example is the ninth global edition of Mishkin's popular money and banking text that was published several years after the start of the crisis (Mishkin 2010: 362-366).[3] In the particular case in which excess reserves are zero (or constant) a given increase in the monetary base, by inducing banks to increase loans and deposits, raises the money supply by the product of the increase in the monetary base and the money multiplier.

Figure 1 shows the behaviour of the money multiplier prior to and during the Global Crisis. The figure reveals that the assumption concerning the relative fixity of the money multiplier was not unreasonable prior to the crisis. However, with the onset of the first quantitative easing operations (QE1), the money multiplier dropped sharply to about half of its previous value and has remained in this range since then. This evidence raises two questions: First, what are the main reasons for the sharp drop in the multiplier? Second, how useful is the monetary multiplier framework for characterisation of monetary policy transmission in the aftermath of the financial crisis?

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3   See also Carlin and Soskice (2006: 270-271).

Figure 1   Behaviour of the US money multiplier, January 2001 to July 2017
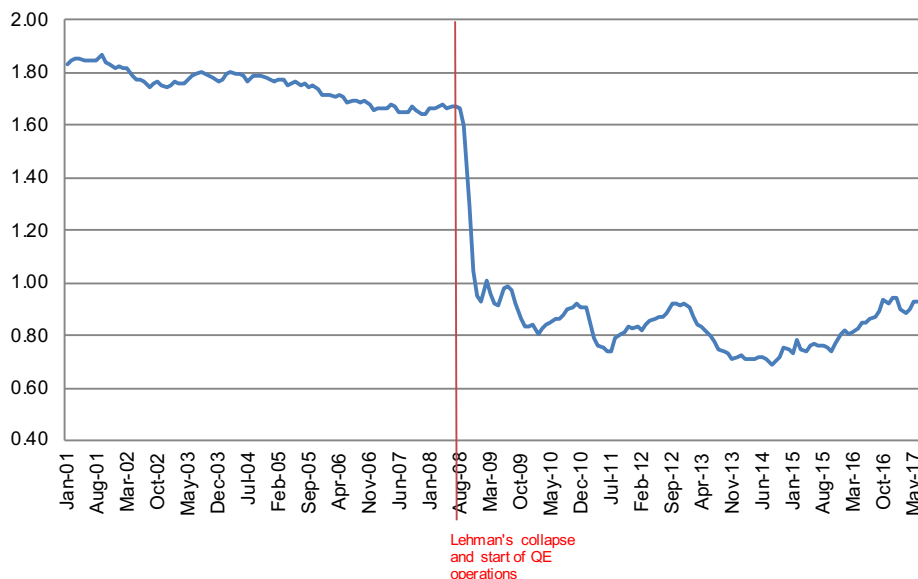
Source: Calculated from data on the monetary base and M1 from the Federal Reserve Bank of St Louis monetary data base.

What caused the drop in the money multiplier?

The main reason for the drop in the multiplier following the onset of QE1 and subsequent large-scale asset purchases is that, in spite of the expansions in the base (and therefore in the reserves of the banking system), total banking credit stagnated during the first three years following Lehman's collapse. When it resumed an upward trend during the subsequent years, the rate of growth of banking credit was anaemic and very far from the predictions of the conventional money multiplier. The impact of this behaviour on the conventional money multiplier can be illustrated by focusing on the total reserve ratio, r, defined as

$$r \equiv rr + \varepsilon$$

By definition

$$r \equiv \frac{R}{D} = \frac{R}{L}\frac{L}{D} \equiv r_l l_d$$

where R, D and L are total reserves, total liquid deposits of the public and total banking loans outstanding, respectively. r_l is the ratio between total bank reserves and total bank credit and l_d is the ratio between loans and deposits. Using the last equation, the money multiplier can be rewritten as

$$m = \frac{1 + c}{r_l l_d + c}$$

Following the collapse of Lehman Brothers in September 2008, the cash/deposits ratio, c, and the loans/deposits ratio, l_d, did not change appreciably. However, the ratio, r_l, between total banking reserves and loans increased dramatically due to the Fed's huge base expansion along with the feeble response of total banking credit. It is easy to see from the last equation above that this is the main (semi-technical) reason for the dramatic decrease in the money multiplier. Figure 2 shows the behaviour of the r_l ratio prior to and following Lehman's collapse, along with the start of QE1. It is apparent from the figure that, from that point in time on, there was a huge and persistent increase in the reserves/loans ratio that largely parallels the decrease in the money multiplier in Figure 1. Clearly, the dramatic increase in the reserves/loans ratio was due to the muted response of credit to the huge reserve expansion caused by the Fed's QE operations between September 2008 and September 2014.

Several reasons on the supply side combined to produce the muted response of banking credit. First was the need for banks to rebuild their equity capital following the crisis. This need arose initially because of losses on mortgage-backed securities (MBSs) and other securities, and subsequently due to the 2010 Dodd-Frank act that raised capital requirements particularly on systemically important financial institutions (SIFIs).[4] This was reinforced by the drying up of the repo market which seriously crippled banks' access to liquidity since the summer of 2007 (Gorton and Metrick (2012). It was further compounded during the first couple of years following the collapse of Lehman Brothers by an increase in bailout uncertainty.

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4   Although there is a tradeoff between higher capital and lending in the short and intermediate run, higher equity capital actually encourages lending and financial stability in the long run (Thakor 2014).

The decision not to bailout Lehman Brothers after numerous previous rescue operations spooked financial markets and banks by raising the level of uncertainty about the likelihood of bailouts (Cukierman and Izhakian 2015). In addition, the dramatic events that accompanied Lehman's collapse raised the aversion to this uncertainty. Being akin to a post-traumatic stress disorder, this increase in uncertainty aversion is likely to have had a more persistent effect on the arrest in banking credit than the initial increase in bailout uncertainty.[5]

Credit stagnated also because of a decrease in the demand for credit due to a fall in household consumption demand triggered by negative wealth effects in housing. Using microeconomic evidence on the impact of the fall in housing prices on household consumption and wealth at the county and zip code levels, Mian et al. (2013) find the following:

1. The elasticity of consumption with respect to housing net worth during the Global Crisis was between 0.6 and 0.8 and the average marginal propensity to consume was between 5 to 7 cents for every dollar loss in housing wealth.

2. The marginal propensity to consume was sharply higher for poorer and more leveraged households, implying that tightened credit constraints were partially responsible for the decrease in consumption. Although this evidence supports the view that demand factors also contributed to the credit slowdown, at the same time it reveals that part of this stagnation would not have materialised in the absence of credit rationing, which originates on the side of credit supply.

How useful is the money multiplier framework as a tool for characterisation of monetary policy in the aftermath of the crisis?

I turn next to the second, wider question on the usefulness of the conventional money multiplier in the aftermath of the Global Crisis. This multiplier provides a useful characterisation of the transmission of monetary policy during periods in which the

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5   An elaboration of this mechanism appears in the second half of Section 4 in Cukierman (2016).

binding constraint on banking credit is the level of banking reserves, as was occasionally the case prior to the crisis. However, as long as it is flooded with huge excess reserves, this constraint is no longer the binding constraint on credit extension, and therefore on money growth through credit growth. Instead, factors like the need to rebuild depleted equity capital, higher capital requirements and the risk/return preferences of the banking system and of potential borrowers take front seat in the determination of credit supply.

Figure 2 shows that prior to Lehman's collapse and the simultaneous start of large-scale asset purchases (more popularly known as quantitative easing) the ratio, r_l, between total banking reserves and loans was roughly a negligible one tenth of a percent. Within about a year it rose to about 10%, reaching a peak of over 25% in late 2014. As explained in the previous section, the extraordinary increase in r_l since September 2008 is a consequence of the QE operations in conjunction with the muted impact of those operations on total banking credit. This implies that the textbook money multiplier was not a useful concept for characterisation of the transmission of monetary policy through the banking system in the aftermath of the crisis.

Figure 2   The ratio between total US bank reserves and total US bank credit, January 2001 to July 2017
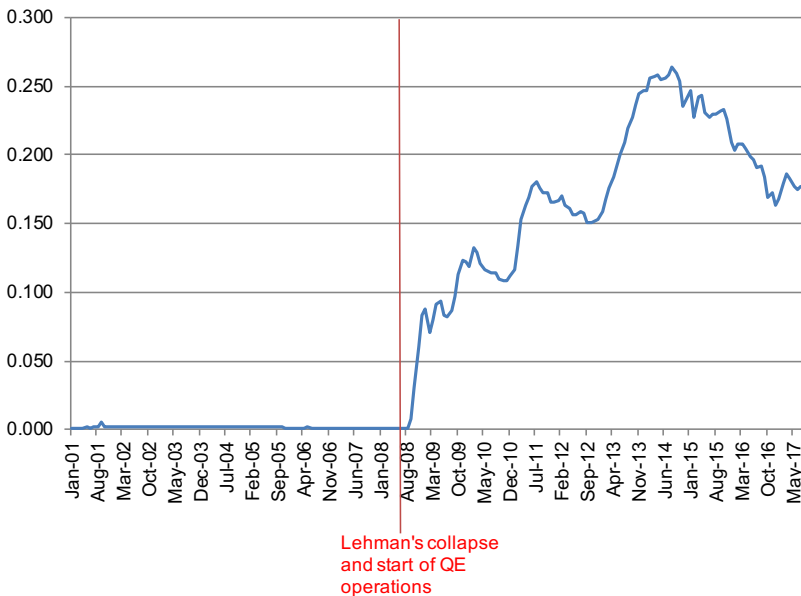
Sources: I. Total bank reserves - Fred; II. Total Bank credit - Bloomberg, index: ALCBBKCR.

An important question is whether this phenomenon will subside as the Global Crisis fades into the distant past, or whether it lasts and become a permanent feature of the transmission of monetary policy to banking credit. The answer to this question depends on whether the binding constraint on credit growth will be the scarcity of banking reserves or other factors in the future. To a large extent this in turn depends on how quickly the Fed will roll back the bloated monetary base that accumulated during the QE operations of the six years following the downfall of Lehman Brothers. As of the end of August 2017 the monetary base was a bit less than $4 trillion. About nine years earlier, just prior to Lehman's downfall, it was a bit less than $0.9 trillion. Although the base receded somewhat from its peak in the latter part of 2014, it is highly likely that the reduction in the base will stretch over many years. Since the level of excess reserves is directly related to the size of the monetary base, it is likely that the conventional money multiplier will continue to be a poor guide for the impact of monetary policy on banking credit, wider monetary aggregates and the real economy for a prolonged period of time.

Concluding remarks

This chapter documents a dramatic decrease in the US conventional money multiplier since the downfall of Lehman Brothers and attributes it to the large-scale quantitative easing operations of the Fed in conjunction with sluggish growth of banking credit. This phenomenon, now almost ten years old, suggests that shortage of reserves has not constituted a binding constraint on the expansion of banking credit since the start of the crisis.[6] An important implication of this observation is that the transmission of expansionary monetary policy through the banking credit channel has weakened considerably since the outbreak of the crisis.

Since the Fed is unlikely to quickly reduce the large balance sheet it accumulated during the crisis, the banking system will have substantial excess reserves for the foreseeable future, implying that reserves will not constitute a binding constraint on credit expansion for quite some time. As a consequence, the conventional money multiplier is likely

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6   The chapter discusses the other, relatively more important, reasons for the sluggishness in banking credit.

to be of little use as a predictor of the transmission of monetary base expansions to banking credit in the foreseeable future.

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A former president of the Israeli Economic Association, Cukierman has been a visiting professor or research scholar at Northwestern University, New York University, Carnegie Mellon University, Princeton University, the University of Chicago, Stanford University, the University of Canterbury, the University of California at Santa-Cruz, the Federal Reserve Bank of St. Louis, the World Bank, the ECB, the Universities of Bonn and Munich and the Swiss National Bank.

12 Monetary policy and fiscal discipline: How the ECB planted the seeds of the euro area crisis

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MIT Sloan School of Management

Since the beginning of the euro area crisis, euro area governments have experienced greater fiscal stress than governments of advanced economies outside the euro area with comparable or weaker fiscal fundamentals (De Grauwe 2011, Orphanides 2017b and references therein). What has been the source of this fragility? How does it relate to the role of the ECB in exerting fiscal discipline in the euro area? How can it be corrected?

The cause of the instability in euro area government bond markets can be traced to a discretionary decision taken by the ECB Governing Council *before* the crisis, in the aftermath of the failure of the Stability and Growth Pact (SGP) – the mechanism of the Maastricht framework meant to ensure fiscal discipline by euro area governments. The decision effectively delegated the determination of collateral eligibility of euro area government debt to private credit-rating agencies and subsequently led to the compromising of the safe asset status of government debt. This chapter sheds light on the circumstances of this unfortunate decision and discusses how its consequences can be ameliorated with appropriate use of the ECB's discretionary authority, in accordance with its mandate.[1]

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1   The exposition draws heavily on material that is presented in Orphanides (2017a,c).

The demise of the Stability and Growth Pact

A prerequisite for the success of the economic and monetary union is a framework that can ensure sound fiscal policies by the governments of member states. The SGP was adopted in 1997, before the introduction of the common currency, as the pillar meant to provide incentives to the member states to maintain fiscal soundness. It required governments to contain fiscal deficits to be at most 3% of GDP and to work towards keeping government debt below 60% of GDP over time. The SGP failed in 2003, when the French and German governments first violated its provisions and subsequently successfully demonstrated that they could block its enforcement, rendering it meaningless. By March 2005, the demise of the SGP was sealed when EU governments formally adopted reforms that weakened the pact (Eijffinger 2005, Buiter 2006).

Without a credible mechanism to ensure sound fiscal policies by the member states, the long-term success of the monetary union was under threat. Following the failure of the SGP, financial markets became more important as a means of discouraging member state governments from running excessive deficits. If fear of default on government debt could be cultivated in financial markets whenever governments with high debt ran excessive deficits, holders of government debt would demand an additional credit premium. Although this would unnecessarily raise the cost of debt finance for governments, it could also discourage fiscal profligacy. In this manner, market discipline could potentially replace the role of the SGP as a mechanism for securing fiscal soundness in the monetary union.

Market discipline and the ECB collateral framework

The operational framework of ECB monetary policy blunted the potential role of market discipline. Similar to the treatment of government debt issued by their governments in any other central bank, when the euro was adopted the ECB accepted the government debt of all euro area member states as eligible collateral for credit operations. Financial institutions holding the debt of any euro area government could obtain liquidity from the ECB to finance their holdings by posting the debt as collateral. This ruled out the possibility of liquidity pressures on any euro area government and, since the SGP assured long-term debt sustainability, there was virtually no market discrimination

among the government debt of euro area member states. The government debt of all euro area member states was considered a safe asset. This was appropriate also in light of the favourable treatment of government debt that had been hardcoded into the regulation of banks and pension funds.

In the context of the demise of the SGP in March 2005, the ECB faced criticism for not using the discretionary power relating to its collateral framework in a manner that would leverage market discipline. At the press conference following the 7 April 2005 meeting of the ECB Governing Council, President Trichet was asked to comment on the view that the ECB framework hindered the market instead of helping the market "reward sound public finances and punish unsound finances". In his response, Trichet reiterated that it was imperative to restore the SGP's credibility and stressed that "every institution has to be up to its responsibility, and this is truer than ever". With respect the ECB's collateral framework, he noted that: "… it is not the intention of the Governing Council of the ECB to change our framework now". (ECB 2005.) Speeches by ECB Executive Board Member Otmar Issing on 20 May 2005 and ECB Vice President Lucas Papademos on 3 June 2005 followed up on this issue. Papademos (2005) observed: "… it has been suggested that the ECB's collateral policy could encourage market reactions to fiscal policies, for example, by imposing haircuts for bonds issued by governments that fail to comply with the SGP". While acknowledging that such proposals might appear appealing, both Issing and Papademos expressed their disagreement, and Issing (2005) explicitly called these suggestions "misguided".

Using the collateral framework of the ECB as a disciplining device could be seen as being inappropriate on several grounds. As Papademos summarised: "The purpose of the ECB's collateral policy is to ensure sufficient availability of collateral to allow a smooth implementation of monetary policy and to protect the Eurosystem in its financial operations. Using the framework for alternative purposes would be contrary to the ECB's mandate."

Article 18 of the Statute governing the ECB authorises the institution to conduct credit operations "with lending being based on adequate collateral". The determination of what constitutes "adequate" collateral is left to the discretion of the ECB Governing Council. When the euro was created, the eligibility of government debt was beyond questioning; it was inconceivable that the ECB would use its discretion to declare that

the government debt of a member state was not "adequate" collateral, absent extreme circumstances that rendered that state's debt unsustainable. The ECB also decided to accept private assets as eligible collateral, provided that these assets met "high credit standards". Since the list of eligible collateral included tens of thousands of private assets, the ECB took into account available ratings by private credit-rating agencies in its assessment of these assets. By declaring some private assets, but not others, to be eligible collateral, the ECB powerfully demonstrated its discretion in determining the meaning of "adequate" collateral in its credit operations.

Credit ratings, the cliff effect, and the euro area crisis

As 2005 progressed, the consequences of weakening the SGP on fiscal finances became increasingly evident. About half the member states ran afoul of the rules. The criticism directed at the ECB for not using its collateral framework as a disciplining device continued. In early November 2005, the ECB communicated a drastic change to its collateral framework. Collateral eligibility for all assets, including government debt, would be subject to a minimum credit-rating threshold. The policy change was immediately recognised as the ECB's response to the weakening of the SGP, an attempt to cultivate market discipline by punishing governments that were perceived as more likely to follow loose fiscal policies (e.g. Atkins and Schieritz 2005, Barrett 2005, Curtin 2005). With this decision, the ECB effectively communicated that it had decided to use the discretionary authority relating to its collateral framework as a disciplining device against member states governments.

The decision to tie collateral eligibility to credit-rating thresholds created the potential for a destabilising cliff effect, thereby precipitating a crisis. During a panic, fears of downgrades and potential default would become self-fulfilling if investors projected that the ECB would refuse to accept government debt as collateral even for member states with sound fiscal fundamentals. The loss of eligibility could lead to an unnecessary credit event. In light of the potential multiplicity of expectational equilibria in sovereign markets, the credit-rating threshold would guide markets to adverse outcomes for "weaker" member states. In the monetary union, investors would scramble to replace lower-rated debt – seen as more likely to fall off the edge of the eligibility cliff – with higher-rated debt, which would remain eligible. The demand for euro-denominated

government debt would shift away from states perceived to be "weaker" to states perceived to be "stronger", inducing an indirect transfer in the form of a risk premium for "weaker" states and a safe haven subsidy for "stronger" ones. In a panic, declaring government debt as ineligible collateral merely on the basis of private credit ratings rather than on the basis of fundamentals, would virtually inevitably lead to crisis.

The force of the potential instability created by the ECB in 2005 became evident during the Global Crisis but was only fully realised following the October 2010 agreement reached in Deauville by the French and German governments. The Deauville agreement implied that if a euro area member state faced liquidity difficulties, capital losses would be forced on investors holding the debt of that state, even if the debt was sustainable. Given the ECB policy to deny collateral eligibility even for governments with sustainable fundamentals when credit-rating agencies downgraded a sovereign below the minimum threshold, the Deauville agreement successfully injected unnecessary default risk in most euro area sovereign markets, thus compromising the safe asset status of government debt. While the French and German governments later pulled back from the automatic imposition of default, the demonstration of how the ECB collateral framework could be used to precipitate default has sustained an elevated credit default risk in financial markets for "weaker" euro area member states relative to other advanced economies with similar or worse fiscal fundamentals.

Can the damage be reversed?

The ECB's decision to use its collateral framework as a disciplining device following the demise of the SGP in 2005 was unfortunate. In retrospect, the misgivings that had been expressed in May and June of 2005 by Issing and Papademos proved justified. Their analysis already suggested a fundamental legitimacy problem with the subsequent ECB actions. As Issing had pointed out: "[I]t is clear that the design of the Stability and Growth Pact and its implementation are governmental responsibilities, to be controlled by parliaments. . . . [I]t is not and cannot be the ECB's role to enforce fiscal discipline and to correct shortcomings in the implementation of the Stability and Growth Pact. Attempting to do so would politicise the ECB's operations and ultimately threaten its independence, on which the credibility and effectiveness of monetary policy crucially

rely." Using the ECB's collateral framework as a disciplining device is contrary to the ECB's mandate.

In accordance with the Treaty, enforcement ought to be left to the European Commission and the member states of the European Union and the euro area. The ECB should suspend its earlier discretionary decisions that have effectively converted its collateral framework to a disciplining device. The ECB should discontinue delegating the determination of collateral eligibility of government debt to private rating agencies. The ECB has the responsibility to independently determine whether government debt of euro area member states is "adequate" collateral on the basis of fundamentals-based debt sustainability analysis. The ECB can make a positive contribution towards stabilizing the fragility of the euro area by focusing on its mandate.

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Part Two

Monetary policy and central bank communication

13 More, and more forward-looking: Central bank communication after the crisis

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Changes in central bank communication since the global financial crisis

Central bank communication has changed markedly since the global financial crisis. While the earlier paradigm that some ambiguity in central bank communication might be useful (Goodfriend 1986, Stein 1989) had long been overcome when the crisis hit, and central banks had become substantially more transparent, this trend has strengthened considerably since. During the crisis, central banks stepped up their communication activities even more. Especially once central banks had resorted to unconventional policies, they went to great efforts to publicly define the scope and implementation of their unconventional policies, as well as to build a common understanding of their limitations and their expected effectiveness. In addition, many central banks also became more explicit in signalling the direction of their policies through various forms of forward guidance – at which point, communication reached the status of an explicit policy tool.

The rising economic uncertainty caused by the crisis and the use of new tools increased complexity for policymaking. This came along with an increasing tendency of central

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[1] The views expressed in this chapter are solely those of the authors and do not necessarily reflect the views of the ECB, the Banque de France or the Eurosystem.

bank committee members to disagree (Meade et al. 2015) and a substantial increase in the length of the minutes of central bank committee meetings (Coenen et al. 2017). The increasing complexity was also reflected in central banks' monetary policy statements. Figure 1 shows how the language employed in the Federal Open Market Committee (FOMC) statements became substantially more difficult to understand, by plotting the Flesch-Kincaid reading grade level statistic, which measures the years of formal education that are required to understand the statement. While they have become somewhat easier to understand recently, they are still considerably longer and more complex than prior to the crisis.

Figure 1 Length of FOMC monetary policy statements and difficulty of language employed
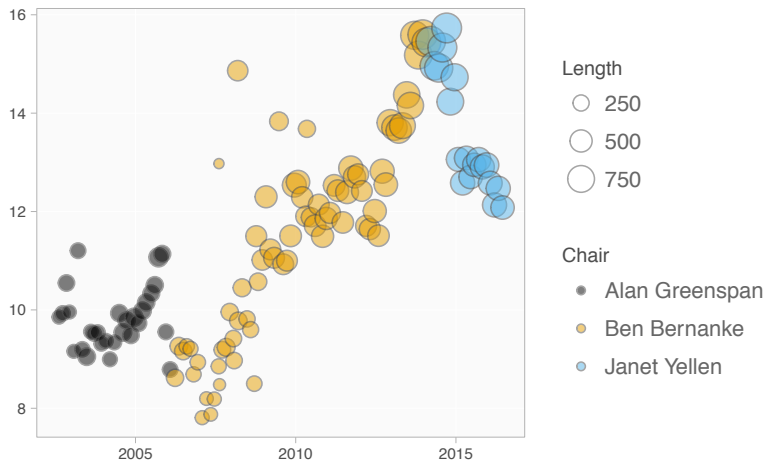
Note: The figure depicts the length of the FOMC monetary policy statements, measured by the number of words, through the size of the circles. The difficulty of the language employed is measured by the Flesch-Kincaid reading grade level statistic (which indicates how many years of formal training are required to understand the text, based on the length of its sentences and words). Last observation: March 2017.
Source: Coenen et al. (2017).

At the same time, central bank communication has also become more forward-looking. Figure 2 shows the degree of forward-lookingness of the FOMC's communications, measured following the text-analysis approach by Galardo and Guerrieri (2017). Forward-lookingness in the minutes, which are available reaching back to the late 1930s, dropped to historical lows in the 1970s during the Great Inflation, then recovered, but took another dip during the Great Moderation, to rise strongly following the global financial crisis and the Great Recession.

For FOMC statements, we need to rely on a shorter time sample, but the evolution since 1994 (when these announcements were made for the first time) very much mirrors that of the minutes, with little forward-lookingness during the Great Moderation (some statements did not contain any future tense marker), and a substantial increase since. Analogous results are obtained for the ECB in Coenen et al. (2017).

Figure 2   The use of forward-looking terms by the Federal Reserve
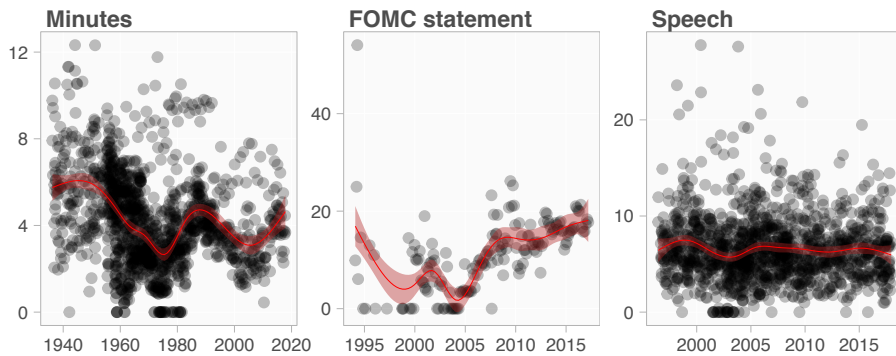
Note: This figure shows the share of forward-looking terms (expect, going to, may, might, shall, will) per 1,000 words in the Federal Reserve's minutes, policy statements and speeches by the members of the Board of Governors. The red lines denote Loess curves (which describe the deterministic part of variation in the data by fitting low-degree polynomials to localised subsets of the data, observation by observation, giving higher weights to observations near the observation concerned), the red shaded areas show the 95% confidence interval. Last observation: March 2017.

Source: Coenen et al. (2017).

The importance of central bank signals about the future

While forward guidance became a more widely used tool once policy rates reached their effective lower bound, central banks had given signals about the future course of monetary policy prior to the global financial crisis in various different ways. It is worthwhile drawing some lessons from these earlier episodes, as this helps to put the recent experience gained with forward guidance into perspective.

For instance, in 1999 the FOMC broadened its policy statements to include a forward-looking element, first in the form of an outlook for the monetary policy stance and later in the form of a balance-of-risks assessment concerning inflationary pressures and economic conditions in the 'foreseeable future'. Ehrmann and Fratzscher (2007) have shown that these statements made a difference to how markets anticipated monetary

policy decisions – they extracted information from the statements whereas before, they had reverted to other types of FOMC communication in the inter-meeting periods. This suggests that more forward-looking communication can improve transparency, by releasing relevant information at an earlier time and with clearer signals.

More generally, research has found that central bank communication about the future exerts powerful effects on financial markets. Gürkaynak et al. (2005), for instance, identify two factors that drive the response of US asset prices to monetary policy, a 'current federal funds rate target' factor and a 'future path of policy' factor. The latter is closely associated with the FOMC statements, and exerts much stronger effects in particular on longer-term treasury yields. Analogous findings have been reported for the ECB by Brand et al. (2010).

But forward-looking signals had already been an implicit part of monetary policy before explicit forward-looking communication, and could at times be inferred from current central bank actions. This is the case, for instance, for turning points (i.e. changes in the policy rate with a sign different from the sign of the previous policy change). As noted by Rudebusch (1995), monetary policy rates are usually changed gradually, so that turning points are likely to signal a number of future changes in the same direction (and are thus inherently forward-looking).

Table 1 reports the market reaction to US monetary policy surprises on regular days, and compares it to the reaction on turning points, updating earlier evidence by Demiralp and Jordà (2004). Our findings confirm that turning points are indeed associated with a stronger financial market reaction to monetary policy shocks. The effects of 'regular' monetary policy surprises are concentrated in shorter maturities up to two years. Monetary policy shocks around turning points in monetary policy have a significantly larger impact, in line with the argument that these shocks are predicting a series of future policy changes into the same direction. In particular, we observe that the relative importance of turning points, measured by the ratio $(\beta+\delta)/\beta$, is increasing in maturity. While the extra effect is around 70% for three-month bills, this increases to around 180% for five-year bonds.

Table 1   The effects of US monetary policy shocks on interest rates around turning points

	3m	6m	2y	5y	10y
β	0.400***	0.436***	0.422***	0.217**	0.076
	(0.110)	(0.116)	(0.118)	(0.108)	(0.080)
$\beta + \delta$	**0.750*****	**0.972*****	**0.894*****	**0.646*****	0.353
	(0.159)	**(0.140)**	**(0.190)**	**(0.226)**	(0.226)
N	201	201	201	201	201

Note: This table depicts the relevant coefficient (sum) estimates for $\Delta R_t^m = \alpha + \beta \Delta MP_t + \gamma TP_t + \delta \Delta MP_t \times TP_t + \varepsilon_t$, where ΔMP_t is the monetary policy surprise based on the change in Fed Funds Futures in a window of +/- 30 minutes around the relevant FOMC news release (see Gürkaynak et al. 2005 for details), and ΔR_t^m is the contemporaneous change in the treasury bill/bond yield with residual maturity m. Finally, TP_t is a dummy variable that is equal to one on days that are turning points. Robust standard errors are given in parentheses. The sample period is July 1991 – June 2015. Bold letters for $\beta + \delta$ indicate that the coefficient estimate for δ is significantly different from zero at the 10% level or better. ***/**/* denote statistical significance at the 1%/5%/10% level.

Source: Coenen et al. (2017).

Studying these earlier episodes of central bank signals about the future indicates how important such signals are for financial markets, and for the predictability and transparency of monetary policy.

State-dependent forward guidance

With policy rates reaching unprecedented low levels after the global financial crisis, several central banks adopted various forms of forward guidance about their future course of policy. At times, forward guidance was open-ended, i.e. with no explicit term for the commitment. Other central banks used a time-dependent (or 'calendar-based') variant, indicating the likely future path of the policy instrument as a function of calendar time. As an alternative to a time-dependent commitment, some central banks preferred state-dependent (or 'data-based') forward guidance, i.e. forms of commitment depending on some economic conditions to prevail.

Coenen et al. (2017) provide evidence of how such different types of forward guidance help reduce uncertainty and anchor agents' expectations, by studying their effects on the responsiveness of government bond yields to macroeconomic news and on disagreement across forecasters for a panel of advanced economies. They find that time-dependent forward guidance has been interpreted by markets as a credible commitment and has

helped align forecasters' expectations, but only when the guidance was provided over relatively long horizons. Time-dependent forward guidance with short horizons, just as open-ended forward guidance, in contrast, appears to have been rather ineffective along these dimensions, at times even leading to perverse effects. State-dependent forward guidance, in turn, seems to have 'worked' as expected. It lowered disagreement among forecasters – not only about short-term rates, but also about several other variables – and muted (but did not eliminate) the responsiveness of markets. This is consistent with the notion that central bank watchers understood the conditionality contained in the state-dependent forward guidance.

Figure 3   Effects of inflation threshold-based forward guidance
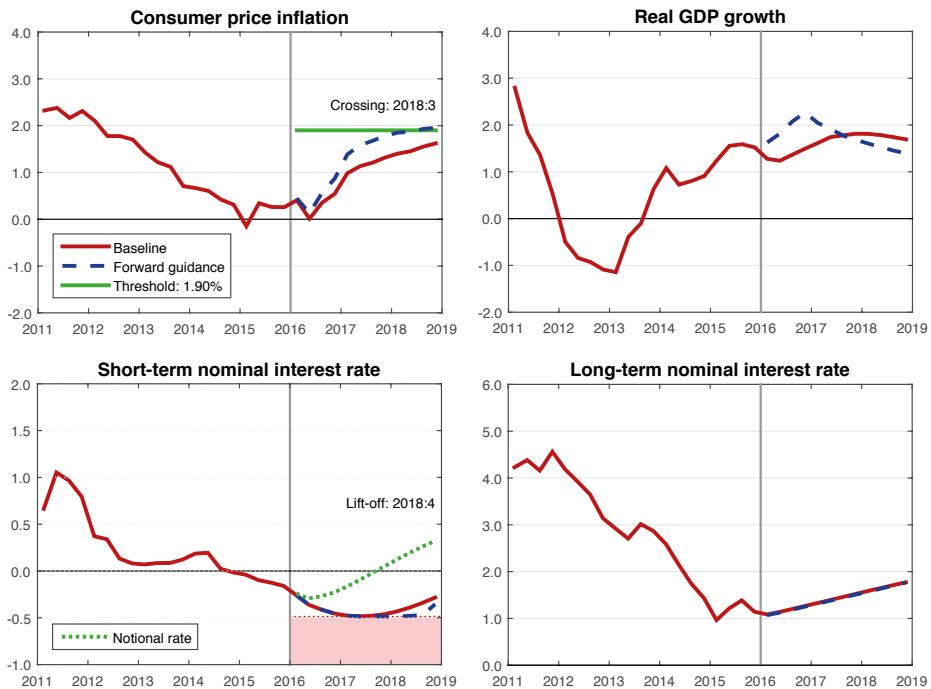
Note: Counterfactual simulation based on the NAWM. The vertical lines indicate the starting date of the March 2016 ECB staff Macroeconomic Projection Exercise, which serves as the baseline for the simulation. Consumer price inflation and real GDP growth are reported as annual rates of change, in percentages, whereas the short-term interest rate (corresponding to the three-month EONIA) and the long-term nominal interest rate (corresponding to the average euro area ten-year nominal government bond yield) are reported as annualised percentages. Once annual consumer price inflation crosses the assumed threshold level of 1.9% and the short-term nominal interest rate is lifted with a one-quarter delay, the short-term rate follows the prescriptions of a Taylor rule: $r(t) = 0.9 \, r(t-1) + 0.1 \, (1.5 \, pi(t) + 0.5 \, y(t))$, where $r(t)$ and $pi(t)$ denote percentage-point deviations of the annualised short-term interest rate and the annualised quarterly inflation rate from their respective steady-state values, and $y(t)$ represents the output gap.

Source: Coenen et al. (2017).

But how exactly does state-dependent forward guidance work? Simulations using forward guidance with inflation thresholds based on the ECB's New Area-Wide Model (NAWM) can illustrate this for the euro area context. The results are reported in Figure 3, and show that the adoption of inflation threshold-based forward guidance would shift the inflation path upwards and bring forward the adjustment of inflation towards levels close to 2%. The figure also shows the distance between the baseline interest rate path and a 'notional' interest rate path derived from a Taylor rule with inflation and output gap calculated from the counterfactual simulation – the path of the 'notional' interest rate is considerably higher than the path implied by the threshold-based forward-guidance policy, implying a sizeable effective easing of monetary policy against the more favourable ex post outcomes for inflation and the output gap.

At a more fundamental level, the stimulus of the inflation threshold-based forward guidance rests on the expectations channel of monetary policy. To the extent that the announced inflation threshold is fully credible, the central bank is able to engineer a rise in inflation expectations. As long as private-sector price- and wage-setting behaviour is at least moderately forward looking, this rise in expectations shifts the actual inflation path upwards, while the short-term interest rate remains at its effective lower bound for longer. In so doing, adopting an inflation threshold causes a marked easing of the monetary policy stance through the implied decline in ex ante real interest rates, over and above the stimulus coming from lower nominal interest rates themselves.

Conclusion

Following the global financial crisis, central banks resorted to unconventional monetary policy tools, and at the same time stepped up their communication efforts, leading to more, and more forward-looking, statements. Signals about the future have always exerted substantial effects, for instance on financial markets, and the same holds for the post-crisis forms of forward guidance.

While different types of forward guidance have been employed by central banks, we argue that central bank reaction functions relate central bank actions to the evolution of the economy, and that central bank communication about its future actions is therefore naturally state-dependent. Furthermore, state-contingent forward guidance allows economic agents to endogenously adjust their expectations in light of new economic

developments, thereby requiring fewer re-adjustments of central bank communication if these developments differ from the original expectations. In this chapter, we have shown how such state-dependent forward guidance can work, using the example of inflation thresholds for the euro area.

The ECB has resorted to forward guidance, which has evolved over time, and placed increasing emphasis on its state-contingent nature. Going forward, providing guidance about the envisaged path towards removing monetary accommodation will be a key communication task for the ECB. To some extent, this is not different from communicating any turning point in monetary policy, when the central bank shifts from an easing stance to a tightening stance. However, given the complexity of the exit process in the presence of multiple tools, it will be important to lay out the central bank's reaction function in this different environment well in advance.

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14 Central bank communication strategies: A computer-based narrative analysis of the Bank of Japan's Governor Kuroda

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Communication with financial markets – the strategy in monetary policymaking by central bankers in the advanced economies – has gained momentum.[1] Former Chairman of the US Federal Reserve, Alan Greenspan, took office after an era of "monetary mystique" (Goodfriend 1986) and pursued a communication strategy in a collegial way, as reflected by then-Vice Chairman Alan Blinder (Blinder 1998). Financial markets then responded only to the maestro's voice of authority. The one-voice approach to communications is in contrast to a highly individualistic one, according to which individual policy board members are allowed and encouraged to manifest their personal views, as is often the case in the Bank of England (Ehrmann and Fratzscher 2005). A communication strategy is now a policy instrument of contemporary central banks for controlling expectations in a way that is consistent with the actual outcomes that monetary policy would achieve.

In terms of tactics for central bankers to implement a communication strategy, there are two dimensions: channels and messages. Central banks communicate with financial markets through channels of information flows in market microstructure that embed institutional settings for policy announcements. Under whatever elaborate timing the central bankers may make their policy announcements for fear of bringing about

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unintended market impacts, however, they could represent noise among financial markets if the policy changes are expressed carelessly. Messages transmitted by central bankers and broadcast by some media are received by market participants eager to evaluate the policy in order to make profits from their investments. In particular, in the exasperating course of unconventional monetary policy by some central banks, financial investors have become cautious about catching what follows the policy messages.

Some journalists have begun to poke fun at the communication strategy of the Bank of Japan (BOJ) Governor Haruhiko Kuroda, dubbing it 'monetary shamanism'.[2] Since 2013, when former Governor Masaaki Shirakawa retired, the BOJ has adopted an inflation-targeting commitment of achieving a 2% rate in two years by doubling the amount of the monetary base. While the unconventional measures temporarily succeeded in achieving a rate above 2% from April 2014 to March 2015 (with a peak rate of 3.4% in May 2014), the core inflation rate has since fallen below 0.5%, diving again into deflation and further away from the target.

Kuroda confessed to being inspired by the story of Peter Pan, quoting: "The moment you doubt whether you can fly, you cease forever to be able to do it". To make the BOJ's commitment credible to the public, Kuroda has taken every opportunity to reinforce this commitment to future inflation, in defiance of actual deflation. The BOJ holds regular press conferences with the governor just after the end of every monetary policy committee (MPC) meeting. At these press conferences, which are broadcast online in real time, the governor makes remarks in Japanese on decision making at the MPC and questions are asked by the Japanese press. The wording used by the governor at the press conferences is then covered by news media such as Reuters.

How have the narratives issued by the 'monetary shaman' been perceived by internet viewers or news readers? In a recent paper, we explore the BOJ's communication strategy with a natural language processing method (Keida and Takeda 2017). The paper follows spirits of narrative economics (Shiller 2017) stating, "[t]he field of

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2   "Central bank chiefs need to master the art of storytelling", *Financial Times*, 23 August 2013; "Quiet critic of Kuroda's 'monetary shamanism' turns up the volume", Reuters, 21 October 2014. The former article relies on an anthropologist's analysis (Holmes 2014), citing "central bankers also try to control economic outcomes by using words, not merely to influence price and interest rate expectations but to shape the mood."

economics should be expanded to include serious quantitative study of changing popular narratives". Browsing Kuroda's statements in the regular press conferences, we analyse the communication strategy with a latent semantic analysis (LSA) in statistical natural language processing.[3] All of the BOJ documents from the regular press conferences of the governor are in Japanese, requiring specific morphological analysis before LSA application. The statements cannot be corrected verbatim, unlike the case with the *Wall Street Journal*'s US Fed Statement Tracker.[4] Our analysis is able to overcome these problems that are specific to the BOJ statements.

Our sample covers 55 BOJ regular press conferences from July 2012 to November 2016, during which time both Shirakawa and Kuroda held office. Our LSA shows values of cosine similarity between each document. Table 1 indicates cosine similarities for a sample of press conference dates. Each governor appears to use serially correlated wordings with cosine similarity higher than, say, 0.8, but the relatively lower similarities of the documents across the terms suggest that Kuroda has followed a strategy that differs from that of Shirakawa. On 4 April 2013, Kuroda introduced the quantitative qualitative easing (QQE) monetary policy, with subsequent market impacts. He also decided to further ease monetary policy on 31 October 2014 with a slight majority in the MPC voting. While these two meetings indicate peculiarity among the documents issued by Kuroda, there appears to be quite strong similarities between other statements prior to 2016.

Since 29 January 2016, when the BOJ introduced the negative interest rate policy (NIRP), Kuroda's communication strategy has changed implicitly. The cosine similarities are lower than before. The lower similarity in 2016 is comparable to that associated with the transition in governor from Shirakawa to Kuroda. In spite of the BOJ's message that the policy would not change, as Kuroda repeatedly emphasised, our results imply that the BOJ made a misjudgement in its communication strategy.

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3   Applications to the US FOMC minutes are Boukus and Rosenberg (2006) and Mazis and Tsekrekos (2015).

4   The *WSJ*'s Fed Statement Tracker says that "[t]he Federal Reserve releases a statement at the conclusion of each of its policy-setting meetings, outlining the central bank's economic outlook and the actions it plans to take. Pundits and traders parse the changes between statements closely to see how policy makers' views are evolving. Use the tool below to compare any two statements since 2007."

Table 1

Cosine similarity		14/02/13	07/03/13	04/04/13	31/10/14	21/01/15	18/02/15	29/01/16	15/03/16	28/04/16	21/09/16	01/11/16
Shirikawa	14/02/2013	1.000										
	07/03/2013	0.981	1.000									
Kuroda	04/04/2013	0.696	0.702	1.000								
	31/10/2014	0.777	0.758	0.887	1.000							
	21/01/2015	0.782	0.745	0.719	0.909	1.000						
	18/02/2015	0.842	0.798	0.738	0.905	0.960	1.000					
	29/01/2016	0.714	0.728	0.705	0.862	0.746	0.772	1.000				
	15/03/2016	0.769	0.788	0.652	0.804	0.758	0.803	0.960	1.000			
	28/04/2016	0.781	0.796	0.691	0.844	0.764	0.801	0.973	0.990	1.000		
	21/09/2016	0.623	0.601	0.708	0.734	0.667	0.685	0.753	0.709	0.726	1.000	
	01/11/2016	0.792	0.738	0.707	0.805	0.811	0.823	0.742	0.741	0.765	0.915	1.000

A possible interpretation on the implicit change in the BOJ's communication strategy is its early consciousness of 'exit' from the ongoing unconventional monetary policy. The 'stealth tapering' detected with the statistical natural language processing coincides with the fact that since September 2016, the BOJ has already been slowing the purchases of Japanese Government Bonds to around 50-60 trillion yen, relative to the target of 80 trillion yen per annum. The computer-based narrative analysis we summarised above reveals the BOJ might have followed a 'cheap talk' strategy to manipulate expectations (Stein 1989).

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15 How central bank communication generates market news

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Introduction

Central banks communicate frequently nowadays, but this is a relatively recent phenomenon. Montagu Norman, the Bank of England's Governor between 1920 and 1944, apparently had the motto "Never apologise, never explain"! As recently as January 1994, even the Federal Reserve did not immediately announce their monetary policy decisions. As monetary policy has shifted to focus on expectations management, communication became a key tool (Blinder 2008, Woodford 2001). There now exists a substantial literature that shows that central bank communication of different types has effects on market yields across different asset types and maturities.[1]

Romer and Romer (2000) emphasised that the idea that the Fed's interest rate decision transmitted "private" information – an information advantage on short-term inflation and output forecasts. Of course, it need not be truly private information. Central banks may occasionally have truly private information, but more likely it reflects central banks' greater analytical expertise. The fact that future policy will depend upon the central bank's beliefs makes their views more important than other agents' views.

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1   Some key references include Gürkaynak et al. (2005), Ehrmann and Fratzscher (2007), Boukus and Rosenberg (2006), Blinder et al. (2008), Ranaldo and Rossi (2010), Hayo and Neuenkirch (2010), Berger et al. (2011), Hayo et al. (2012), Hubert (2015), Carvalho et al. (2016), Hubert (2016), Nechio and Regan (2016), and Nechio and Wilson (2016).

Central bank communication can, broadly, be about reaction function or the state of the economy. Surprises associated with the announcement of monetary policy are shown to move both nominal and real long-maturity yields (Hanson and Stein 2015, Nakamura and Steinsson 2017, Hansen et al. 2018a). While communication about the reaction function, if credible, might be expected to move longer-maturity interest rates, it is less obvious communication about the current state of the economy should. This chapter sets out a simple framework, developed in Hansen et al. (2018b), that captures numerous reasons why even communication about the economy might have longer-lasting impacts.

Framework to think about the effects

Consider a market participant who is forming an expectation on what she thinks will be the prevailing short-term interest rate at some future time. Imagine that this investor knows that the one-month nominal policy rate ($i_{0:1,t}$) is, in a reduced form sense, approximated by:[2]

$$i_{0:1,t} = r_t^* + \pi_t^* + \phi_\pi \, \mathbb{E}_t^{CB}[\pi_{t+h} - \pi_t^* | Z_t] + \phi_y \mathbb{E}_t^{CB}[y_{t+h} | Z_t] + \varepsilon_t \tag{1}$$

where Z_t is current information. $\mathbb{E}_t^{CB}[\pi_{t+h} - \pi_t^* | Z_t]$ is the central bank's h-period ahead forecast of the inflation gap made in period t and $\mathbb{E}_t^{CB}[y_{t+h} | Z_t]$ is their analogous forecast of the output gap. The ϕ coefficients are the agents estimated coefficients that relate economic conditions to the nominal interest rate decision. The central bank's view of the equilibrium real interest rate, r_t^*, is time-varying but slow-moving (Laubach and Williams, 2003). ε_t is the unexplained component (relative to the central bank's typical reaction the economic conditions) of the policy rate; it is the shock measure of Romer and Romer (2004).

To form different future interest rate expectations, the investor simply uses equation 1 together with forecasts of (i) the central bank's future economic forecast, and (ii) the

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2   In (1), we allow the inflation target to vary and in non-inflation targeting countries it may not be known. In inflation targeting central banks this may be fixed and known.

other arguments such as the real interest rate. For example, representing the vector of economic conditions as ω, expectations of the three-year forward rate are:

$$f_{36,t} = \mathbb{E}_t[r^*_{t+36}|Z_t] + \mathbb{E}_t[\pi^*_{t+36}|Z_t] + \phi\mathbb{E}_t[\mathbb{E}^{CB}_{t+36}[\omega_{t+36+h}]|Z_t] + \mathbb{E}_t[\varepsilon_{t+36}|Z_t] + \Upsilon_{36,t} \quad (2)$$

Communication solving the identification problem

The key to understanding the potency of communication is to recognise the identification problem facing the investor. If the central bank announces the policy decision (such as to raise interest rate by 25 basis points) but doesn't provide any statement about what drove the decision, the investor knows the left-hand side of equation 1 but cannot identify which right-hand side variable changed. Without knowing the driving factors, it is hard to determine whether the policy change is expected to short lived or persistent. Moreover, uncertainty about forecast-expectations formation, including signals about uncertainty from the central bank, will appear in the term premium.

Central bank communication helps to solve this identification problem. We explore some specific examples of this for different forms of communication, and communication about different variables. As will become apparent, discussion of one topic (e.g. the economic outlook, ω_{t+h}) can reveal information useful to form views on another aspect (e.g. policy preferences, ε_t). This can explain why even communication on shorter-term topics can have implications for longer-maturity yields.

The monetary framework as low-frequency communication

Communication on the framework of the central bank, though typically low frequency, is important. For example, a central bank which follows an inflation target typically publishes information on (i) the inflation target (π^*_t), and (ii) the analytical tools used by policymakers, such as the model(s) used. This information, assuming it is clear and credible, helps the market pin down elements of the right-hand side of equation 1.

Information on the forecast

The central bank may release quantitative forecast information, such as the Bank of England's Inflation Report or ECB staff macroeconomic projections. Quantitative forecasts provide a signal to investors on ω_{t+h}. But it is important to remember that the current forecast is an input into the current policy decision; future decisions will, as made clear above, use a future forecast as the input into the decision.

Nonetheless, such quantitative signals may affect beliefs about future interest rates through two channels:

- Directly: Persistence in macro conditions means that this information helps investors update their views of future forecasts. However, macro persistence is likely to be insufficient to materially affect expectations for longer maturity assets; certainly, thinking about ten-year real rates reacting to today's economic situation seems hard to justify.

- Indirectly: As discussed above, the signal can cause revisions to the other key expectations. Perhaps it causes a revision of market beliefs about the equilibrium real interest rate (r_t^*) and/or the monetary policy preferences (ε_t). These concepts are typically much more persistent than elements of ω_t. Moreover, these variables drive both nominal and real expected interest rates.

Central banks also provide a description of the uncertainty and risks around the forecast. While the literature typically considers the main effects through expectations, information on the distribution of possible outcomes can directly affect term premiums given by $\Upsilon_{36,t}$ above. These signals could come from both narrative descriptions and also quantitative measures of forecast distributions. By affecting markets' distribution of possible future outcomes, central banks can affect longer-maturity term premiums directly. This affects longer-maturity interest rates and improves the transmission of their policy.

Wider information on the state of the economy

Central banks often also provide their reading of the current economic data drawing, potentially, on hundreds of possible series that the central bank monitors including surveys, disaggregate activity and inflation series, and so on. This information is comprised of both hard and soft indicators and can be quantitative or qualitative. An example is the ECB *Monthly Bulletin*, but such information is also regularly communicated in speeches by policymakers.

The fact that all macroeconomic variables are (potentially) endogenously related to each other means that such wider information allows the markets to refine their views of the likely evolution of the forecast. Different underlying drivers of the current outlook may have different persistence and so different effects on future forecasts. It also potentially provides information on the likely range of future outcomes that should be considered, and hence can also affect the term premium.

Direct Information on more elusive economic concepts

Central banks may also provide information about latent macroeconomic variables. This could be guidance about the level and likely evolution of the equilibrium real interest rate (r_t^*). While central banks could release a specific number for these concepts, they typically provide implicit signals through their narrative. This is because different members of the policymaking committee may have different views on these more elusive concepts, and the central bank may not wish to tie its hands by announcing specific values. Given this, the narrative is the only way to communicate these ideas.

But such narrative signals can be incredibly powerful. If markets revise their view of the central bank's beliefs about these concepts, both now and into the future, this can drive both real and nominal interest rates far across the yield curve. In particular, r_t^* is typically modelled as a highly persistent variable.

Direct Information on preferences

Central banks can also provide direct information on the preference shock term ε_t. This can be quantitative, such as implied by the most likely interest rate paths used by the Norges Bank, or narrative descriptions. An example of the latter is where a central bank makes explicit that it is choosing to look through a particular economic shock for particular reasons. These narrative shocks can be extremely important, especially around turning points. But a key point of this chapter is to highlight that even in situations where the central bank is explicitly not providing guidance on future policy, the provision of other information can help investors to better identify policy preferences.

Learning and updating

Another channel through which a central bank communication may lead to market news is learning. From the information signals released, such as discussions of forecast variables and their likely evolution over time, markets can learn and update their views about how the central bank views the interactions of variables in the economy or on how the central bank will react to these developments (updating ϕ coefficients in equation 1).

This also occurs because the ϕ terms are an aggregation of individual committee member views. This means that, for example, individual speeches by new policymakers could affect market views on the committee's overall reaction to economic news. In Hansen and McMahon (2015), we show that there are dynamics in the preferences of UK policymakers.

Also, on learning the central bank view, market participants with an alternative view of likely developments might believe that when the central bank reaches the future, they will encounter a different world and so take a different action. In this case, the market expects the policymaker to update their view in the future in a particular way.

Conclusion

While we cannot explore in full detail the implications of all possible signal types and the different effects of updating beliefs and learning, this chapter makes two important points that highlight the potency of central bank communication across different yields. First, there is an identification problem which limits the ability of market participants to form accurate assessments of future interest rates (which will nonetheless be subject to uncertainty about the economy). Second, through helping to identify drivers of current monetary policy, even shorter-term information can appear to drive longer-term yields in a way that may, at first, appear surprising.

The difficulty for markets is that central bank communication typically provides multidimensional information which makes it hard to decipher all signals clearly. The challenge for central banks is to ensure that it sends signals as clearly as possible.

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How do central bankers' deeds and words influence our economies? After the two big shocks of the Internet Revolution and the Global Crisis, we still know little about the mechanisms that govern the production and distribution of monetary policy committee decisions in the advanced economies.

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