Monetary Policy Over Fifty Years

Experiences and lessons

Edited by
The Deutsche Bundesbank

Routledge International Studies in Money and Banking

Monetary Policy Over Fifty Years

This book is based on a conference celebrating the fiftieth anniversary of the Deutsche Bundesbank. Since the 1950s, there have been fundamental changes in the monetary order and financial systems, in our understanding of the effects of monetary policy, the best goals for central banks and the appropriate institutional setting of central banks. Prominent monetary economists and central bankers give their views on the most significant developments during this period and the lessons we should draw from them.

The book contains four sections on central issues. The first part discusses the main successes and failures of monetary policy since the 1950s. The second part asks what economists have learned about monetary policy over the past 50 years. It gives an overview on experiences with various monetary strategies, focusing in particular on monetary targeting and its problems, on inflation targeting and why it was successful, and the institutional framework for monetary policy. The next section outlines the progress that monetary economists have made since the Bundesbank was founded and discusses the extent to which central banks can rely on 'scientific' principles. The final part describes the interaction between monetary policy, fiscal policy and labour markets.

The book provides a comprehensive overview of the main challenges faced by central bankers in the past, and how and to what extent monetary economics have been helpful in tackling them. It outlines our current knowledge about the effects of monetary policy and the appropriate institutional framework for central banks, and raises some open questions for the future. It will be of great interest to monetary economists, central bankers and economic historians.

The Deutsche Bundesbank is Germany's central bank. Since 1999, the Bundesbank has continued to perform important central bank functions as an integral part of the European System of Central Banks.

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Carol Boyd

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The ECB, The Pre-Euro Bundesbank and the Federal Reserve System
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John Chown

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Lessons from Europe and the Americas
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38 Monetary Policy in Central Europe
Miroslav Beblavý

39 Money and Payments in Theory and Practice
Sergio Rossi

40 Open Market Operations and Financial Markets
Edited by David G. Mayes and Jan Toporowski

41 Banking in Central and Eastern Europe 1980–2006
A comprehensive analysis of banking sector transformation in the former Soviet Union, Czechoslovakia, East Germany, Yugoslavia, Belarus, Bulgaria, Croatia, the Czech Republic, Hungary, Kazakhstan, Poland, Romania, the Russian Federation, Serbia and Montenegro, Slovakia, Ukraine and Uzbekistan
Stephan Barisitz

42 Debt, Risk and Liquidity in Futures Markets
Edited by Barry A. Goss

43 The Future of Payment Systems
Edited by Stephen Millard, Andrew G. Haldane and Victoria Saporta

44 Credit and Collateral
Vania Sena

45 Tax Systems and Tax Reforms in Latin America
Edited by Luigi Bernardi, Alberto Barreix, Anna Marenzi and Paola Profeta

46 The Dynamics of Organizational Collapse
The case of Barings Bank
Helga Drummond

47 International Financial Co-operation
Political economics of compliance with the 1988 Basel Accord
Bryce Quillin

48 Bank Performance
A theoretical and empirical framework for the analysis of profitability, competition and efficiency
Jacob Bikker and Jaap W.B. Bos

49 Monetary Growth Theory
Money, interest, prices, capital, knowledge and economic structure over time and space
Wei-Bin Zhang

50 Money, Uncertainty and Time
Giuseppe Fontana

51 Central Banking, Asset Prices and Financial Fragility
Éric Tymoigne

52 Financial Markets and the Macroeconomy
Willi Semmler, Peter Flaschel, Carl Chiarella and Reiner Franke

53 Inflation Theory in Economics
Welfare, velocity, growth and business cycles
Max Gillman

54 Monetary Policy Over Fifty Years
Experiences and lessons
Heinz Herrmann (Deutsche Bundesbank)

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Contents

Figures

Contributors

Olivier Blanchard, Massachusetts Institute of Technology

Richard H. Clarida, Columbia University

Wolfgang Franz, Centre for European Economic Research

Charles Goodhart, London School of Economics

Otmar Issing, Center for Financial Studies

Takatoshi Ito, University of Tokyo

Donald Kohn, Federal Reserve Board

David Laidler, University of Western Ontario

Bennett T. McCallum, Carnegie Mellon University

Frederic S. Mishkin, Federal Reserve Board

Manfred J. M. Neumann, Bonn University

Athanasios Orphanides, Central Bank of Cyprus

Lucas Papademos, European Central Bank

Hans-Werner Sinn, CESifo

Lars E.O. Svensson, Sveriges Riksbank

Axel A. Weber, Deutsche Bundesbank

Introduction

Axel A. Weber

In 2007 the Bundesbank celebrated the fiftieth anniversary of its founding. This conference volume brings together a collection of papers presented at the special occasion of celebrating this event on 21 September 2007.

For more than forty of those fifty years, the Bundesbank bore the primary responsibility for the stability of the D-Mark. The D-Mark now belongs to the past but the Bundesbank is still very much present – with good reason – and this is a subject to which I shall return later. I would like to start by retracing the Bank's history. However, it is not my intention to give a detailed chronological account of the Bundesbank's initial half-century. Instead, I would like to highlight five milestones that were of major importance for the central bank and the monetary history of post-war Germany and therefore for the first fifty years of the Bundesbank.

Currency reform of 1948

The starting point for this brief historical review actually pre-dates the founding of the Bundesbank. The D-Mark was introduced on 20 June 1948 as part of Germany's currency reform. In retrospect, the general public perceives this day as the start of the German economic miracle of the 1950s and early 1960s. During the first years of the D-Mark, the central banking system in Germany was still organised on a two-tiered and decentralised basis, and the Bundesbank did not yet exist. At the individual Federal State or *Land* level, the *Landeszentralbanken* (Land Central Banks), as they were called, were still independent legal entities fulfilling their role as decentralised units. The centralised authority with the right to issue banknotes and decide on monetary policy was the *Bank deutscher Länder* and its Central Bank Council. The *Bank deutscher Länder* was independent of German government bodies and institutions but remained subject to Allied instructions. A central bank system organised in this way was consistent with the desire, especially of the United States, for decentralisation and diversified management structures in post-war Germany.

Founding of the Bundesbank in 1957

The *Bank deutscher Länder* was superseded in 1957 by the Deutsche Bundesbank, which is now more than fifty years ago. With the founding of the Bundesbank, the *Landeszentralbanken* lost their status as independent legal entities and from then on had only a restricted amount of functional independence. The presidents of the *Landeszentralbanken* were members of the Bundesbank's Central Bank Council and – together with the members of the Bundesbank's Executive Board – determined the monetary policy strategy in Germany. The Bundesbank's legal mandate was to regulate the volume of cash in circulation and the supply of credit to the economy with the objective of safeguarding the currency. To achieve this objective, the Bundesbank was granted independence. It was this crucial decision that enabled the Bundesbank to fulfil its stability mandate so successfully.

End of fixed exchange rates in 1973

Of the many events in the Bundesbank's long custodianship of the D-Mark, 1973 stands out as a signal year. It was the year when the prevailing system of fixed exchange rates, known as the Bretton Woods system, ended. The D-Mark had been participating in this system since 1952, although it had initially been an internationally weak currency. This changed, however, as the German economy strengthened and the country's exports rose. Consequently, the Bundesbank was compelled ever more frequently to intervene in the foreign exchange market in order to counter appreciation pressures on the D-Mark. The Bundesbank therefore saw itself increasingly confronted by the dilemma of choosing between external exchange rate stability and internal price stability. Thus, the end of the Bretton Woods fixed exchange rate system was a decisive turning point for German monetary policy. With the disappearance of external constraints, central bankers gained considerably greater scope to pursue their primary objective of safeguarding price stability.

German monetary union and stage one of EMU in 1990

Looking back over the past two decades, I would especially like to highlight the years 1990 and 1999. From a German viewpoint, 1 July 1990 marks the date of two monetary unions. First, it was the starting date for German monetary, economic and social union – the former eastern German Democratic Republic had adopted much of the economic and legal systems of the western Federal Republic of Germany, as then defined, before acceding to it on 3 October 1990. Second, the year 1990 saw the start of the first of the planned three stages for the introduction of European monetary union. For various reasons, these two monetary unions are not directly comparable. However, intra-German monetary union had already clearly illustrated the multifaceted challenges facing monetary policy-makers when different types of economic area are merged. Today, we can still draw on the wealth of experience gained from German monetary union to help us in various areas of the Eurosystem's activity.

The start of monetary policy at the ECB Governing Council in 1999

The year 1999 ultimately stands for the start of European monetary union and therefore marks the turning point in the Bundesbank's monetary policy role: our sole responsibility for the D-Mark became a joint responsibility for the euro. Since the start of stage three of European monetary union in 1999, responsibility for the single monetary policy in the euro area has been borne by the Eurosystem; that is to say, the association consisting of the European Central Bank (ECB) and the national central banks of the euro-area countries. But the Eurosystem did not start from scratch. Gearing monetary policy to ensure that its primary aim is the safeguarding of price stability is the key legacy which the Bundesbank has passed on to the single monetary policy of the euro area. Thus, it is fair to say that the Bundesbank's guiding principle in the D-Mark era became the blueprint for the present Eurosystem. At the same time, despite a change in the bounds of our activities, it would be too simplistic to conclude that the transition to monetary union means that the Bundesbank no longer has a major role to play in the age of the euro. The national central banks in the Eurosystem team are by no means a 'relic' from pre-euro times. Rather, the national central banks are constituent parts of the monetary union's policy-making structure.

While the institutional setting in which the Bundesbank acts has doubtless changed considerably since the start of monetary union, it is not entirely different. Quite the contrary. However, our actions have been adapted to the new conditions set by monetary union. We now concentrate our resources on several core areas: monetary policy, financial stability, payment systems oversight and banking supervision. In our opinion, stability is the common denominator which informs all the key areas of our everyday activities.

The Bundesbank's commitment to stability is well known in the central banking community. After all, the Bundesbank has played a significant part in the development and dissemination of ideas such as central bank independence, the importance of a nominal anchor and the primacy of price stability within what is nowadays macroeconomic mainstream thinking in central banking circles worldwide. In the first half of the twentieth century, Germany experienced at first hand how the undermining of central bank independence can cause severe harm to the national economy. As a consequence, political and monetary decision-makers very soon recognised the benefits of a central bank's sound institutional design. From the outset, the Bundesbank was granted by law the status of being fully independent of central government and was primarily mandated to secure price stability and to pursue a clearly defined monetary policy strategy providing a nominal anchor to the general public. Not least thanks to this institutional framework, the Deutsche Bundesbank has delivered a remarkable track record of low inflation over the past fifty years. For the German people, who experienced two periods of hyperinflation in the first half of the last century, this was a crucial achievement and led to the D-Mark becoming a symbol of national identity.

What in retrospect sounds like plain sailing was actually achieved by decades of hard work spent rigorously focusing on price stability, resolutely withstanding political pressure, and successfully tackling historic challenges such as German and European monetary union. The Bundesbank could not have achieved such an impressive track record without applying state-of-the-art monetary theory to practical problems, and indeed several of the conference papers in this volume focus precisely on these issues. What have economists learned over the past fifty years? In fact, the past half-century has seen remarkable advances in monetary policy and theory, starting with the growing belief in and the subsequent demise of the Phillips Curve's trade-off, Friedman's strict monetary policy rule, essential insights into the role of commitment and expectations, and the introduction of optimising behaviour in dynamic models. In Chapter 2, Bennett McCallum reminds us how different our thinking was fifty years ago. All these different strings of monetary theory have culminated in a surprisingly widespread acceptance of best practices for central banking. Nine such principles are identified by Frederic Mishkin in Chapter 3, including, above all, Friedman's famous statement that 'inflation is always and everywhere a monetary phenomenon', the major benefits of price stability, the non-existence of a long-run trade-off between output and inflation, the crucial role of expectations and central bank independence.

Obviously, the weighting of the nine principles presented by Frederic Mishkin may differ depending on one's own particular historical experience and economic conviction. The same goes for the precise number of principles. In this regard, Lucas Papademos notes in his panel contribution that one important principle is missing from those cited by Frederic Mishkin, namely the role of money and credit in the monetary transmission mechanism and the assessment of medium to longer term risks to price stability. From the German perspective, money has indeed played a vital role in monetary policy. The Bundesbank (together with the Swiss National Bank) was the first central bank in the world to introduce monetary targeting in 1975. After the collapse of the Bretton Woods system in 1973, both central banks deemed it necessary to provide the public with a nominal anchor. The aim of monetary targeting was to steer inflation by controlling a monetary aggregate, a variable that monetary policy can impact on with much shorter and less variable time-lags than inflation itself. Over the years, this strategy was instrumental in achieving the Bundesbank's sound track record and worldwide reputation. Moreover, the fact that the Bundesbank's strategy was already proving to be relatively successful during the 1970s – a period dubbed the 'Great Inflation' – was an incentive for other central banks to follow suit.

It is its primary focus on price stability and the attention paid to money growth that led David Laidler to call the Bundesbank a good example in central banking. In Chapter 1, he argues at length that successes and failures of monetary policy in the past fifty years are closely linked to a central bank's consistent response to money growth or, conversely, the lack of it. As one example, he cites the experience of Germany and Switzerland during the 'Great Inflation', which differed from that of the USA, the UK and Canada. However, we do not have to go back so far

into the past. Even if the proliferation of financial innovations has somewhat obscured the relationship between money and inflation and if, as a consequence, pure monetary targeting has gone out of fashion at the world's leading central banks, money still remains a valuable indicator of future inflation.

Against this background, why is it that money is such a contentious issue among central bankers? In Chapter 2, Lars Svensson makes the point that, in the setup of the standard New Keynesian framework, monetary aggregates matter little, or even not at all, for monetary policy. Credit aggregates may matter, though. It is certainly true that most of the key arguments against money in the standard New Keynesian framework are valid. However, I would like to point out that the limited role of money in this setup is based on certain simplifying assumptions and that relaxing some of these may restore a more meaningful role to money. In particular, several recent studies have shown that slight modifications of the model may restore a more important role to money as a monetary policy indicator, that a reaction to monetary aggregates may offer protection against undesirable equilibria, and finally, that delegating a money growth target to the central bank can be beneficial in the presence of general model uncertainty and reduce the efficiency loss associated with discretionary policy. Hence, central banks are well advised to pay continued attention to the results of monetary analysis. Moreover, in the light of our experience of the current financial turbulence, which is ultimately rooted in deteriorating credit conditions in the US subprime mortgage market (fuelled by exceptionally low interest rates in the most important regions of the global economy for a considerable period of time after the bursting of the 'New Economy' bubble), the potential virtues of a thorough analysis of monetary and credit conditions should clearly gain importance in order to minimise macroeconomic risks that emerge at frequencies lower than is suggested by the traditional business cycle focus of monetary policy-makers. This is a lesson which was stressed by Otmar Issing and others during the conference.

Besides recapitulating monetary policy achievements of the past 50 years, the conference also looked to the future, focusing in particular on the old and yet always lively debate on whether monetary policy could ever become a 'science' or whether it will always largely remain an 'art'. Undoubtedly, monetary policy is one of the policy areas that is heavily influenced by academic study. The best proof is the large number of academics in monetary policy decision-making nowadays. In that respect, Frederic Mishkin's proposition is that monetary policy will become more of a science, but never turn into a boring scientific routine such as dentistry. Surely, the role played by 'science' will increase thanks to an increase in computing power and, hence, in mathematical approaches as well as a growing exchange among researchers and central bankers, as is reflected in the advances of theoretical and econometric models. General equilibrium models and their numerous extensions are just one example. Simultaneously, however, art – or, rather, discretionary judgement – will remain invaluable. This is due to – to name just a few obstacles to a purely scientific approach – real-time decision-making, data, model and parameter uncertainty as well as ongoing structural changes in economies and financial markets. Athanasios Orphanides presents a prime example

of this when he discusses the limitations of gauging gaps from equilibrium or natural rate concepts, such as the natural rate of output or interest.

All of these uncertainties call for monetary policy to be robust – a characteristic demanded by most speakers. Examples of robust monetary policy strategies may be found all over the globe, and range from the Bundesbank's monetary targeting to inflation targeting as it is generally practised today and the Eurosystem's two-pillar strategy. Besides being robust, the Bundesbank's monetary targeting also serves as an example of a well-defined mixture of science and art. Between 1975 and 1999, the Bundesbank did not deliberately opt for strict monetary targeting as proposed by Milton Friedman, but rather carried out a pragmatic policy of monetary targeting, the overall record of which was favourable. Especially in the face of historic challenges such as German unification, the monetary targets provided valuable orientation for monetary policy. In some years, however, target overshooting could not be avoided. This was due, not least, to the fact that, in the short run, the Bundesbank never regarded the annual targets as the sole guideline for its liquidity and interest rate policy actions, but also took into account domestic and external underlying conditions. This does not mean, however, that, by doing so, it relinquished its medium-term objectives for appropriate monetary growth.

To my mind, the balance between art and science in monetary policy is unlikely to change much (which makes my job more interesting and conferences like these still useful), but both art and science will become more sophisticated the more we know and the further the advance of globalisation and the proliferation of financial innovations proceed.

Widespread agreement on best practices of central banking obscures the fact that there are still many open issues and unsettled questions. The more we dig into a subject and the more we broaden our understanding of monetary policy, the more new questions arise. At the same time, the economic and financial environment is undergoing constant structural change. There is therefore no cause for complacency, either on the part of academic researchers or on that of central bankers. This is the background against which central banks – including the Bundesbank – are undertaking in-depth work on issues such as how to handle Knightian uncertainty and robustness and how to extend DSGE models to account for relevant financial and labour market characteristics, all sorts of rigidities, heterogeneity of agents, and learning.

What are the conditions in which central banks must operate? Scientific approaches are based on standard models which represent reality only to a limited extent. Distortions, such as real rigidities in labour and product markets and the effects of monetary policy on fiscal policy, are one big issue in this respect. Such distortions may limit or even invalidate policy advice extracted from standard models. Olivier Blanchard provides a telling example that deals with the divine coincidence, i.e. the notion that, in benchmark New Keynesian models, the central bank can achieve inflation stabilisation and output stabilisation with one and the same interest rate move. The divine coincidence breaks down, however, if distortions are added to the standard model,with the result that the central bank faces a trade-off in the aftermath of adverse supply shocks.

Olivier Blanchard's remarks on the practical applicability of the divine coincidence have, over the past few months, gained even greater relevance. At the current juncture, there is the question of whether the period of the Great Moderation of the past decades (and which resulted, in particular, from a better understanding of monetary policy) has now come to an end. In turn, there is increased uncertainty about the future outlook for the global economy. With the tailwinds of globalisation having turned into headwinds, global inflation is currently as big an issue as the ongoing financial market turmoil. Against this backdrop, central banks worldwide may now face a trade-off between inflation and output stabilisation. The Eurosystem's compass – just as that of the Bundesbank prior to 1999 – has only one needle: price stability. In the long run, price and output stabilisation will coincide, as it is commonly acknowledged that price stability is the best breeding ground for sustainable growth and employment. For those who focus on the short run, however, one must add the caveat that central banks cannot work wonders. True, confidence in what monetary policy can achieve has been boosted since the 1960s and 1970s. However, central banks cannot fine-tune the economy, neither in economic nor in financial stability terms. Athanasios Orphanides reminds us that one crucial lesson we should have learned is to respect the limits of our knowledge when designing policy. And Lars Svensson rightly points out that experience suggests that the path of wisdom is to use monetary policy explicitly to offset disturbances other than risks to price stability only when they pose a clear and present danger. Therefore, the most important action plan for central bankers is to stick to the lessons learned thanks to the advances in monetary policy and thus avoid repeating past policy mistakes, as was underscored by many speakers and discussants during the conference.

From a theoretical perspective, Olivier Blanchard raises another set of interesting questions in Chapter 4. What distortions do we encounter in the economy and what effect do they have on monetary policy? Frictions incorporated into economic models reflect the fact that monetary policy is dependent on other policy areas, especially the conditions in labour and product markets, as well as fiscal policy. In the euro area with its single monetary policy, further importance is added to these policy areas by the fact that the interest and exchange rate channels are no longer a deployment option for a country seeking to adjust to adverse country-specific shocks. Instead, flexible labour and product markets and sound public finances are now of the essence. However, weaknesses in all these areas cannot be resolved by central banks, but only by national governments. This self-evident truth is often overlooked in heated economic and political discussions when central banks all too often end up as scapegoats in the search for impediments to growth in the euro area. But as Wolfgang Franz rightly observed in the discussion, attempts to involve the Eurosystem in a more or less formal macroeconomic dialogue run the risk of damaging the independence of monetary policy. Therefore, it is reassuring to see that most European politicians have recognised that price stability and, ultimately, sustainable output growth are best maintained if the Eurosystem is to operate freely within its institutional framework.

In addition to price stability in the classical sense, the objective of financial stability has become more and more important for central banks over the past few years. This is also true of the Bundesbank. And it did not need the financial turmoil that started in the summer of 2007 to drive home the point that financial stability issues are extremely relevant to central banks, since monetary policy depends on a stable financial system if it is to succeed in maintaining price stability. Monetary policy measures, such as changing the key interest rate, do not have an immediate effect on the economy but rather an indirect effect via the banks and the financial system. Disturbances in the financial system impede this process and can jeopardise the attainment of this objective. Another aspect is that in the past two decades the national financial systems have become substantially more integrated. This means that crises in individual markets or regions can quickly spill over to other economic areas. If there were any need for further proof of this, then recent developments have furnished it. This brief outline of events clearly reveals the interdependence of monetary and financial stability. Thus, stable money is inconceivable without a stable financial system. At the same time, a stable financial system requires a stable currency. Hence, central banks have a vested interest in maintaining a stable financial system. However, as Charles Goodhart remarked, we know less about financial stability than about monetary policy. Thus, it is true that, as a central bank, we cannot guarantee financial stability in the same way that we can ensure monetary stability. The recent financial market turmoil certainly underscored the need to improve our understanding of financial issues. There is, for instance, the well-known question of whether and how central banks should respond to asset price bubbles. Donald Kohn answered this question with arguments that have become popular as the Fed's approach to asset price bubbles. I would go a long way in supporting this approach. However, the ongoing experience of financial turbulence certainly demands that further consideration be given to whether problems of moral hazard, which are inherent in an asymmetric approach of mopping up the debris, should be the final word central banks have to say on these issues.

The conference held to mark the fiftieth anniversary of the Bundesbank brought together leading central bank representatives and economists. Speakers and panellists discussed a variety of topics that have been of great importance to both German and international monetary policy over the past fifty years. This collection of papers from the conference is intended to share this experience with a wider audience. Our hope is that the studies in this volume will motivate continuing research into the science and art of central banking and promote a better understanding of the many challenges central banks are facing today. Above all, I wish to thank the contributors and editors whose expertise, ideas, and efforts have brought this volume to life. The exchange of views gained from firsthand experience and the discussion of research findings between practitioners and academics has proved beneficial, and there is no doubt that organising conferences such as this one is a course that we should, and will, continue to follow in the future.

1 Successes and failures of monetary policy since the 1950s

David Laidler

Introduction

Of the forty-two countries listed in a recent *Economist* (23–29 June 2007) 'league table' of inflation rates, only two (Venezuela and Egypt) had experienced inflation in double digits over the previous year, and a further nine (Hungary, Russia, Turkey, India, Indonesia, Pakistan, Argentina, Columbia and South Africa) inflation in excess of 5 per cent. To someone who believes that the main thing to be asked of monetary policy is a modicum of price-level stability, the assigned title of this chapter presents a strong temptation to label it as an art that has at last been widely mastered, and, given that this is the Bundesbank's fiftieth birthday, to add that perhaps this is because so many central banks have recently been following the good example that this institution set for so long.

This temptation should be resisted, though, because many of the world's advanced economies have been here before, even during the past half century. With the exceptions of France as she made her transition from the Fourth Republic to the Fifth, and Japan in the 1960s, the early years of our period were a rather quiet time for inflation, quieter than the present in some places, not least Canada and Britain, where the success of inflation targeting has, until recently at least, created much local satisfaction, and in the United States too, whose economic performance for a while suggested that formal targeting might not be quite as essential as its more enthusiastic supporters tend to argue. The inflationary facts of fifty years ago, that is to say, when viewed through the prism of subsequent experience, suggest that monetary policy's apparent successes should never be taken for granted.[1] Evidently they can easily turn into failures, whose consequences are hard to undo.

If we look past statistics to the institutional, political and intellectual background, similarities between the present and fifty years ago become harder to find. Coping with monetary problems is not merely a matter of what central banks do, but of the workings of the monetary order within which they go about their business, and this order – a complicated amalgam of institutional arrangements, not to mention beliefs and policy goals – has changed beyond recognition since the 1950s.[2]

This chapter presents a necessarily selective survey of some of monetary policy's successes and failures in advanced economies over the last fifty years.[3] It argues that these have mainly arisen from coherence, or lack thereof, in that monetary order, both in its international and domestic aspects, and only incidentally from variations in the tactical skill of particular central banks. It will pay particular attention to the extent to which policy-makers' beliefs about how the monetary system works have or have not matched the facts of the case at various times, and the influence of this feature of the monetary order on their choices. Recent stability will thus be presented as the product of a monetary order very different to that in place fifty years ago and more coherent too, but not to be taken for granted, nevertheless, because some of the very faults that led to problems in earlier times are once again discernible.

The role of the monetary order

In the real world, the monetary and financial system performs the functions that textbooks assign to the 'market', and the ultimate purpose of the monetary order is to facilitate the coordination of economic activity.[4] Given this end, however, its more proximate goals can be many and various: price stability, full employment, the convertibility of currencies into one or more precious metal at a given price, exchange rate stability, stability of the financial system, not to mention the generation of revenue for governments. Sometimes these goals are pursued single-mindedly, and sometimes in various combinations with one another. As to the institutional arrangements and mechanisms through which these goals are chosen and pursued, the day-to-day conduct of monetary policy is nowadays invariably the responsibility of a central bank, but there is no single model for its interaction with other political and financial institutions. In the important matter of setting and pursuing policy goals, and ensuring the accountability of those who do so, the extensive literature dealing with central bank independence (of which Fischer (1994) remains a definitive survey) is testimony to the diversity of possible arrangements, and there is also good deal of variety, that need not concern us here, in the day-by-day implementation of policy.[5]

Beliefs about how the economy functions are, as Heymann and Leijonhufvud (1994) have emphasized, central to the workings of the monetary order. This is because the postulate of purposeful maximizing behaviour implies that agents' actions depend upon their expectations about how the economy is likely to evolve in response both to stimuli that are independent of those actions – the typical case for members of the public at large – and to those imparted by them – a possibility more commonly faced by the policy maker. In either case, however, rational behaviour in a monetary economy must be grounded in beliefs about how it works, whether these derive from crude rules of thumb at one extreme or from formal economic models at the other; and when those beliefs prove to be false, the economy is likely to malfunction, undermining those beliefs in the process. Since, moreover, the monetary order's other defining characteristics – goals, institutional design – are themselves subject to choices made by policy-makers, and by the

public at large acting mainly through political processes, changes in economic beliefs are likely to lead to their revision too, whose consequences for the economy's future behaviour will in turn influence beliefs again, in a potentially ongoing recursive process, that may or may not be benign.[6]

The Bretton Woods system and its breakdown

The post-Second World War revival of monetary policy and the re-emergence of central banks as distinct agencies charged with its implementation occurred against the background of an international monetary order, the Bretton Woods system, whose architects' overriding priority was to avoid a repetition of the economic chaos that had followed the First World War and done so much to precipitate the Second. They sought a stable international monetary environment within which national governments would nevertheless have adequate scope to make high employment the prime goal of domestic macroeconomic policy, and a central feature of that environment was a system of fixed exchange rates among national currencies that were nevertheless adjustable should their maintenance threaten employment – though not unilaterally, so as to rule out beggar-thy-neighbour manipulation.[7]

The Bretton Woods system did not entirely neglect the price level and its stability, since it was supposedly based on the convertibility of the US dollar into gold at a fixed price, while its central institution, the International Monetary Fund, was just that, a fund and not the international central bank with power to create reserve money that Keynes had initially proposed. Nevertheless, for any individual country's local monetary order, membership of this system implied that stability of the exchange rate rather than of prices was the key goal, though its pursuit could be subordinated to other domestic ends, particularly the maintenance of full employment, as and when local conditions demanded and (in principle at least) other members' governments permitted. If domestic price stability goals were not quite absent from the typical domestic monetary order under Bretton Woods, they in no sense had pride of place.

Variety within the system

In all this, the Bretton Woods system reflected certain beliefs about how market economies work that had emerged from the inter-war experience. First, they were regarded as unlikely to deliver stable and high levels of employment without essentially continuous policy intervention, which was why the system left room for the pursuit of such goals by national governments. Second, exchange rates were thought to be prone to excessive fluctuations if market determined, and open to abuse if their control was left to the discretion of individual countries, which was why the system was based on pegged rates. Third, the influence of monetary policy on domestic economic variables, the price level included, was believed to be limited relative to that of fiscal policy. Since the latter involved taxation and government expenditure, quintessentially matters for close legislative control,

there was also a presumption that monetary policy should be subordinated to the will of elected politicians.[8]

As post-war economies moved back towards greater reliance on market mechanisms in the 1950s, the place of the central bank within the monetary order would nevertheless generate controversy. For example, in the United States, the 1951 Accord between the Treasury and the Federal Reserve System (henceforth the Fed) re-established the latter's authority over interest rate decisions, making it, perhaps for the first time in its history, an agency independent, if not *of*, then at least *within* government, as the saying goes (Meltzer 2003, ch. 8); and subsequent uncertainty about how that independence might best be used in due course provoked the creation of the privately funded Commission on Money and Credit. In the UK, a sharp local debate about monetary policy within Harold Macmillan's first Cabinet led to the creation of the Radcliffe Committee, whose *Report* (Committee on the Workings of the Monetary System, 1959) acquiesced in keeping the recently nationalized Bank of England firmly under political control to ensure that its powers over interest rates and the state of 'liquidity' would be used in support of a more broadly based and generally interventionist policy apparatus. With the coming to office of the Kennedy Administration in 1961, closely related doctrines, albeit in less extreme versions, began to dominate US policy as well.

Nor was debate confined to the USA and Britain. Canada and the Federal Republic of Germany, for example, also saw lively disagreements about the central bank's powers at this time. Canada's unilateral adoption of a floating exchange rate in 1951 in the face of the Korean War commodity boom – a radical step for one of the original signatories to the Bretton Woods agreement to take after so short an interval – inevitably shifted the emphasis of monetary policy towards domestic variables, and in due course a bitter and extremely public conflict broke out between politicians and the Bank of Canada, one of whose consequences was a clarification and strengthening of the Bank's position within Canada's monetary order, though the extent of this was initially masked by the return to a pegged exchange rate in 1961.[9]

The newly created Bundesbank also entered the 1960s with a useful degree of independence, though hardly enough to render it unchallengeable.[10] The central bank law already in place in West Germany prior to the Bundesbank's formal creation had sought to establish this, but Chancellor Adenauer and his allies nevertheless tried to bring monetary measures into a politically controlled and activist policy armory during the mid-1950s. A constituency among other politicians – the name of Ludwig Erhardt should be explicitly mentioned here – and among the general public too, that explicitly recognized a link between central bank independence and the stability of the currency and welcomed both, successfully opposed such a development, however. This success was perhaps not surprising in a country that had endured devastating inflations after two world wars, but it nevertheless put the Bundesbank in a distinctive position for that time, though not a unique one, for the Swiss National Bank also enjoyed considerable independence and was equally committed to a sound currency. In 1961,

furthermore, the increasing importance that Germany would come to attach to domestic monetary stability was heralded by that year's small revaluation of the D-mark in the face of inflationary pressures emanating from abroad, although this measure was actually opposed by the Bundesbank itself, which at the time was inclined to give priority to external stability.

In short, a rather wide range of national monetary orders coexisted within the Bretton Woods system from its earliest days of full operation (which is usually thought of as beginning with the December 1958 establishment of the dollar convertibility of its members' currencies for current account transactions). At one extreme, some central banks – for example, the Bank of England – explicitly occupied a subordinate position within an activist policy apparatus that was firmly under political control, and price stability was simply one among several goals that this apparatus was expected to deliver. At the other, the Bundesbank had claimed a significant degree of independence from day-to-day politics, and was already taking seriously its special responsibility for the soundness of Germany's currency, even though it had not yet fully faced up to the conflicts that might arise between its external and internal elements.

Cost-push theories of inflation and their policy influence

Fifty years ago, Milton Friedman's doctrine that 'inflation is always and everywhere a monetary phenomenon' had few adherents. This was the heyday of academic debates about 'demand-pull' versus 'cost-push' explanations of inflation, as survey papers by Bronfenbrenner and Holzman (1963) and Laidler and Parkin (1975) clearly show, and monetary policy figured in these at most as one possible factor among many that might work on the demand-pull side of things. In some versions of 'cost-push', where inflationary forces were said to emanate from competition over income shares that was itself the consequence of profound social tensions, demand-led economic growth, driven by fiscal policy and accommodated by *expansionary* monetary policy, appeared as a *cure* for inflation.

As Nelson (2004) has stressed, this latter doctrine influenced policy-makers in some countries.[11] In Britain, for example, it provided the rationale for the government spending-led 'dash for growth' of 1963 to 1964, whose effects foundered on balance of payments problems that eventually culminated in the 1967 devaluation of sterling, and for the later 1972 'go for growth' budget as well, of which more below. But the USA was much more important than the UK for the evolution of the international monetary order, and, as De Long (1997), Mayer (1999) and Nelson (2004, 2007) have documented, these cost-push ideas also gained influence there in the early 1970s, both within the Fed under Arthur Burns, and more generally within the Nixon Administration, and prompted policies that interacted destructively with the consequences of prior institutional developments within the Bretton Woods system.[12]

Crucially among the latter, though that system had tried to provide for the maintenance of price stability through the convertibility of the US dollar into gold, the post-war recovery of the international economy had created a growing demand

for liquidity that was met by a US balance of payments deficit; and this, in turn, had generated a chronic tendency for the ratio of US gold reserves to its international indebtedness to fall. In due course, therefore, the long-run reliability of dollar–gold convertibility had come into question. These tendencies were already evident in 1961 when the Kennedy Administration took office, but it was unthinkable for the USA to react to them with domestic monetary restraint. This would have created deflationary pressure at home and abroad and interfered with further liberalization of the international economy whose growth – given the exigencies of the Cold War, a matter of overwhelming strategic importance – was driving the international demand for liquidity in the first place. In any event, in the early 1960s, inflation was still low everywhere that mattered (except Japan, where it ran above 5 per cent in 1961 to 1963), not least in the USA itself, where unemployment was judged to be uncomfortably high and domestic politics was asking for less, not more, monetary restraint.[13] The upshot was a series of ineffective ad hoc measures aimed at the US balance of payments – e.g. an interest equalization tax, 'operation twist' on the term structure of interest rates, a more systematic programme of domestic expansion – e.g. wide-ranging tax cuts, and a distinct easing of monetary policy, accompanied by various direct measures intended to hold inflation in check – and a continued outflow of US dollars as the international monetary system slowly shifted to a fiat dollar standard in which gold would play no significant role.[14]

This shift, benign at first, had profound effects as the 1960s progressed, since it ensured that discretionary US monetary policy, and not any automatic mechanism based on gold convertibility, would come to provide the *international* monetary order's price level anchor, while leaving that policy's executant, the Fed, answerable to purely *domestic* political constituencies for the way in which it pursued purely *domestic* goals. So long as US monetary policy remained restrained, pegged exchange rates would force restraint on other countries, and their domestic monetary orders would continue to function. There was, however, no similar restraint on US policy. This fundamental asymmetry was firmly established by the early 1970s – the very time at which the idea of cost-push inflation began, as Nelson (2004) shows, to make it hard for the Fed, now in effect the international central bank that had *not* been created at Bretton Woods, to recognize that its activities could have any overriding significance for the behaviour of prices even within the USA, let alone elsewhere in the world – and it ensured that there was no mechanism within the international monetary order to correct the consequences of this faulty economic understanding once the Fed began to act upon it.[15]

The onset of inflation

In the second half of the 1960s the 'perversion of fixed parities from an instrument of discipline on deficit countries to one forcing monetary debauchery on surplus countries' noted by Emminger in his 1973 *Per Jacobson Lecture* (p. 40) was thus already well advanced, and the international monetary order was awaiting a US policy accident, which duly happened. Perhaps monetary stability could have

survived John F. Kennedy's tax cuts and his experiments with wage-price guidelines, and even Lyndon Johnson's declaration of war on poverty, but the war in Vietnam was one war too many. Domestic US politics required that its costs had to be hidden from the electorate, fiscal deficits spilled over into the US balance of payments, and a worldwide inflation was set in motion.

The early history of that inflation, even in a single country, let alone across the whole Bretton Woods world, is far too complex to be recounted here, but certain of its salient features should be noted. First, though inflation did not reach truly alarming rates anywhere until the early 1970s, it clearly began to rise in the second half of the 1960s, too early to have been caused by oil price increases, or any of the other commodity market shocks to which fashionable opinion later tended to attribute it. Second, though inflation was a system-wide phenomenon, peaking everywhere in the mid-1970s, it did so at very different rates. For example, in 1974 to 1975, the German CPI rose by 7 per cent, its greatest annual increase in the entire period under study, but the equivalent UK index rose by more than 25 per cent. Finally, though its roots surely lay in US fiscal excesses and their monetary accommodation, the worldwide inflation's dissemination was not solely or even mainly through a simple channel whereby domestic US fiscal expansion fed domestic money growth which first affected prices in the USA, and then, through the trade balance, prices in other countries. There was some of that to be sure, but much of the US fiscal deficit spilled directly into the balance of payments to be monetized elsewhere in the world economy.

The Smithsonian agreement of 1971 was essentially an attempt to re-stabilize an already tottering international monetary order on the basis of a *de facto* depreciated dollar; and it might just have succeeded for a while too, had it been accompanied by a reversal of the domestic US policies that were simultaneously undermining the system. But it was not: the agreement did nothing to address the fundamental asymmetry of a system that permitted them to continue, and rising world commodity prices, themselves an international consequence of US policy, were all too easily misinterpreted as exogenous 'imported' factors amplifying other, domestic, 'cost-push' forces. In late 1971, the Nixon Administration introduced wage and price controls to offset these alleged causes of inflation, but expansionary fiscal and, with the support of the Fed (cf. Mayer 1999, pp. 86 *et seq*.), monetary policies remained in place. The collapse of the Smithsonian agreement under the pressure of these contradictory policies, the abandonment of the gold convertibility of the dollar, and the adoption by the USA of a flexible exchange rate in 1973 as inflation there approached double digits, all followed in due course, marking the final demise of an international monetary order that had been increasingly dysfunctional for several years.[16]

The extent to which other economies suffered domestic inflation at this time depended upon local reactions to the US balance of payments deficit, and underlying these reactions, upon the nature of local economic understanding. Once again contrasts among Germany, the UK and Canada are instructive. The D-mark had been revalued in 1969, with the explicit aim of staving off imported inflationary pressures – an event that in hindsight perhaps marked the beginning

of the end for the Bretton Woods system – and when the Bundesbank's control of domestic monetary conditions, and hence prices as well – as it correctly saw it, for cost-push ideas never gained much purchase in Germany – continued to be threatened, the D-mark was finally floated in 1973. Initially this was done in cooperation with other members of the fragile and ineffective 'snake in the tunnel' programme for stabilizing exchange rates within Europe, but the Bundesbank then adopted money growth targets in 1974 (as did the Swiss National Bank), thus ensuring that the behaviour of domestic prices would have pride of place among its policy goals.[17]

In the UK, on the other hand, the authorities seem to have read the first easing of balance of payments pressures in the late 1960s as a sign that the 1967 devaluation of sterling was bearing fruit, while simultaneously interpreting domestic inflationary pressures, especially in the labour market, as symptoms of cost-push. In due course, a 'dash for growth' was begun in 1972, buttressed by wage and price controls that consciously followed the US model. Like the D-mark, Sterling was floated too, not to stave off imported inflation, however, but to ensure that the monetary accommodation of these policies would be free of any external financial constraint – which is perhaps why Britain remained in the 'snake' for only a brief period. As to Canada's reaction, this occupied an unfortunate half-way house between Germany and the UK: after successfully floating the Canadian Dollar in 1970 to stave off imported inflation, policy-makers were then lulled into a false sense of security by its – inevitably temporary – strength against its US counterpart, and presided over a domestic boom of their own making that took inflation well into double digits by 1975.

It is often remarked that the collapse of the Smithsonian agreement and its aftermath marked the completion of the long transition from commodity to fiat money that had begun with the suspension of the gold standard in 1914. It is less often noticed that the replacement of this commodity standard by one based on fixed parities against a fiat US Dollar that had seemed to be possible in the 1960s was also aborted in the early 1970s, with the immediate effect of demoting the exchange rate within national monetary orders. Its value ceased to be the main anchor of domestic monetary policy, and a variety of other goals, about which there was no international consensus, took its place. Thus, whereas the member economies of the Bretton Woods system had belonged to a single, albeit flawed, international monetary order, the flexible exchange rate economies of the 1970s constituted no such coherent grouping.

Searching for a new monetary order

Between the early 1970s and the early 1990s, the efforts of national monetary orders that had lost their common international anchor to find a substitute were dominated by sometimes differing local goals and beliefs. To this extent the period has much in common with the inter-war years, but this comparison should not be pushed too far. In particular, where so-called 'Keynesian' economics did not really come on to the scene until the very end of the period, it seemed to explain and

provide remedies for, 'Monetarism' was already complete as an academic doctrine even before Bretton Woods collapsed and the economic ideas underpinning that system were discredited.[18] In the early 1970s, therefore, monetarists, having largely won a twenty-year-long academic debate, had the dubious privilege of being invited to provide policy advice of their own in a number of countries.

Monetarism and money growth targeting

Monetarism's basic tenets flatly contradicted the ideas upon which the post-war monetary order had been based. It denied the inherent instability of the market economy, interpreting the inter-war experience as the result of flawed policies; it argued that a regime of flexible exchange rates could be relied on to operate smoothly, attributing their inter-war behaviour to policy instability; and on the domestic front it argued for the primacy of monetary over fiscal policy, and of price level over real income and employment goals. Much of this remains conventional wisdom even today, despite the fact that money growth targeting, the specific monetarist remedy for the economic ills that had developed by the 1970s, did not turn out well.

Money growth targeting was based on two propositions. The first was simply a revival of an old orthodoxy that had been pushed into temporary obscurity in the post-war period.[19] This had it that inflation, being a falling value of money, was explicable as the result of its supply expanding faster than demand. The second monetarist proposition was new, however: namely that the demand in question was a stable function of a few arguments. Taken together, these implied that, provided some real income (or wealth) measure, and one or more representative nominal interest rates, were not fluctuating excessively, the inflation rate, and perhaps the real economy too, could be kept stable by having the money supply grow at a constant rate. Such a policy had first been recommended by Friedman (1960) as a means of *maintaining* stability in an already well-behaved macroeconomic environment. To the extent that *restoring* stability was understood not to be quite the same problem, and that the money growth slowdown needed to reduce inflation would imply a transitional, but not necessarily trivial, slowdown in income and employment too, the monetarist recommendation was to proceed gradually towards the desired long-run target.[20]

Money growth targets were not quite the universal failure that they are sometimes said to have been. They lasted in Switzerland until 1999, and, much transformed from their origins, still inform the 'second pillar' of the policy framework that the European Central Bank (henceforth ECB) inherited from the Bundesbank, and it is surely not entirely coincidental that Germany and Switzerland's inflationary records in the 1970s and 1980s were much better than those of other advanced countries. But such targeting certainly turned out to be a great deal more complicated than expected, even in these cases, and in many others it was in due course judged to be unworkable. A basic problem everywhere was a significant degree of dissonance between the ideas underlying the new policy and the actual workings of the economy. Demand for money functions, whether

the aggregate chosen for targeting was narrow (e.g. in Canada) or broad (e.g. in the UK), were found in practice to lack sufficient stability to support it.

These problems ought not to have been surprising, but they were.[21] To begin with, the stability that Friedman (1959) had claimed for the demand for money was for a function fitted to *cycle average* data, and whose principal argument was *permanent* income. Policy, on the other hand, required stability on a quarter-to-quarter or even a month-to-month basis, and perhaps some reliable way of assessing the influence of current higher frequency fluctuations in income on its underlying permanent component as well. Furthermore, much hindsight about the effects of *past* institutional change had gone into creating the data on monetary aggregates to which stable demand for money functions had been fitted in the 1950s and 1960s, but that was no help when an essential, but initially under-appreciated, policy problem was how to allow for the effects of *future* institutional change on the stability of the relationships that were supposed to guide policy.

Even where money growth targeting was introduced early by rather independent central banks, and more as a means of staving off inflation than of bringing it under control, and where regulatory constraints on the ability of financial institutions to be innovative in the types of deposits and services they offered their customers inhibited institutional change – Germany and Switzerland fit these criteria – it quickly became a matter of creative and ongoing trial and error on the part of pragmatic policy makers, rather than of strict adherence to a pre-set rule. In these cases, nevertheless, the double-digit inflation that became so prevalent elsewhere was avoided, and the policy makers who persevered with money growth targets earned a degree of credibility among the public at large for their capacity to manage inflation. New and coherent local monetary orders, loosely based on monetarist ideas implemented by relatively independent central banks, did become established for a while in Germany and Switzerland. In addition, as Iwata (2006) has reminded us, such an order was also informally established in Japan at the end of the 1970s, this despite the fact that the Bank of Japan at that time had only limited independence.

In other places however, where, like Japan, double-digit inflation had taken hold before money growth targets were introduced, and perhaps crucially where the regulatory framework was already configured to permit and even encourage innovation within the financial system – Canada and the UK fit these criteria – matters were much more problematic.[22] In these cases, institutional responses to the tightening of policy itself, and their concomitant effects on the meaning of the monetary aggregates, were dramatic enough to cause policy-makers to lose confidence in the whole enterprise. The 1982 comment of Governor Bouey of the Bank of Canada – 'we did not abandon the monetary aggregates – they abandoned us' – found resonance far beyond the Canadian border, and has become a much-quoted epitaph on the whole episode as it worked out in such countries.

The *de facto* abandonment of money growth targeting in Canada, where its 1975 adoption had represented an early example of the central bank exercising the increased autonomy it had obtained a decade earlier, had in fact begun well before 1982, but it was still formally in place when Canada was side-swiped by

the US disinflation engineered by a Fed which, under Paul Volker, seems to have very quickly lost patience with a gradualist approach to reducing inflation, if indeed it had ever really had any.[23] The Bank of Canada resisted the massive downward pressure imposed on the exchange rate by US policy, pushing short-term interest rates to the vicinity of 20 per cent, and permitting an actual *contraction* of the narrow money supply that it was still formally committed to targeting. Canada, like the USA, duly went into recession – the deepest since the 1930s – and, again as in the USA, inflation quickly fell. For the balance of the decade Canadian inflation continued to run in the 4 to 5 per cent range – a little higher than in the USA, that is to say – but monetary policy remained unanchored and improvised.

The persistence of exchange rate goals

The Bank of Canada's decision to defend the exchange rate in 1981 was but one instance of a worldwide tendency for monetary policy-makers to cling to exchange rate goals long after the demise of the Bretton Woods system, and they had some reasons for doing so, because during the 1970s and into the 1980s flexible exchange rates were orders of magnitude more volatile than their monetarist advocates had predicted before the event. And though, contrary to the expectations of some, trade continued to grow despite exchange rate fluctuations, not all of the policy problems they created were merely symbolic.[24]

Nowhere was this truer than within Europe. It was not just that exchange rate stability was thought to be important for the development of private sector trade within the EEC, but also that it was required to ensure the continued feasibility of the Common Agricultural Policy (CAP), which in the 1970s accounted for around 90 per cent of the budget, and also – far more important – underpinned the Franco–German political bargain that lay at the very foundation of the European project. The ineffective 'snake in the tunnel' arrangement of 1973 was the first of a series of arrangements and plans, culminating in the creation of the Euro, meant to address these issues. It was succeeded by the European Monetary System, based on a new unit of account, the European Currency Unit (ECU) – a weighted basket of member currencies – and an exchange rate mechanism (ERM) within which each of those same members would then peg their exchange rates against the ECU, thus implying a grid of bilateral exchange rates as well that were then to be maintained within a plus or minus 2.25 per cent band (6 per cent for the Italian Lira).

The by then highly credible D-mark had a weight of just under one-third in the ECU basket, and hence was close to being the key currency of the system, with other currencies being forced to adjust along with it when its external exchange rate, notably against the US Dollar, moved. The UK, though a member of the EEC, stayed outside of the system initially, preferring to anchor its policy to money growth targets, but these were slowly abandoned in the first half of the 1980s, and a policy of shadowing the D-mark was adopted in 1987 as a prelude to full EMS membership in 1990. Sweden and Finland, on the other hand, though not EEC members, were informally part of the EMS from the outset to the extent

that they maintained pegged exchange rates against the D-mark, though they did not take on the intervention responsibilities associated with full membership.

It was not only within Europe that exchange rates issues loomed large in the 1980s. Although the Bretton Woods system was gone, the US Dollar was still the international economy's principal currency, and large swings in its exchange rate against other important currencies, particularly the Yen and D-mark, were bound to call into play policy instincts left over from earlier pegged exchange rate days. So, while Europe was trying to develop its internal monetary system, while Japan continued to enjoy the low inflation that the Bank of Japan's adoption of informal money growth targeting had helped to bring it, and while the USA adapted to the uneasy domestic monetary stability that followed the recession of the early 1980s, their authorities simultaneously made efforts to influence exchange rates among their currencies, first by organizing a devaluation of the US Dollar with the Plaza Agreement of 1985, and then by reaching an accord on the stabilization of parities at the Louvre in 1987.

The crises of the early 1990s and afterwards

The difficulty, both within Europe and worldwide, was that the international obligations that key players had undertaken on joining various exchange rate arrangements were either incompatible with domestic goals – the prime example of this being the expansionary consequences for Japanese domestic monetary policy of that country's Louvre commitment to support the Dollar/Yen exchange rate – or were likely to prove extremely hard to stick to in the face of any destabilizing shocks – the prime example here being the vulnerability of EMS exchange rates to any shock that might affect monetary conditions within Germany. These problems were made all the more acute by the rapid development of international capital mobility that the 1970s and 1980s had seen. The international monetary order of the late 1980s was, that is to say, incoherent in some respects and fragile in others, as would soon become apparent. As at the end of the 1960s, so once again accidents began to happen. Two were of particular importance: the development and collapse of the Japanese 'bubble economy', and the 1992 crisis within the EMS.[25]

The Japanese bubble

The Louvre accord of 1987 committed its participants to support the US Dollar, and for Japan this entailed a relaxation of monetary policy. Had this relaxation quickly resulted in a disturbing step-up in domestic price inflation, perhaps it would have been equally quickly reversed, but instead there developed a boom in domestic asset markets, with year-on-year consumer price inflation increasing only modestly, albeit steadily, from 0.1 per cent in 1987 to 2.3 per cent in 1990 when the collapse of the stock market signalled the end of the asset market boom, and finally peaking at 3.3 per cent in 1992. For Japanese policy-makers used to treating

the inflation rate as the all-important domestic indicator of success or failure, their new exchange rate obligations must have seemed more or less consistent with their domestic goals in the late 1980s, and though they must have been puzzled by the behaviour of asset prices, it was, as always, difficult to judge *ex ante* the extent to which changing 'market fundamentals' unrelated to monetary policy could, in any event, justify them.

Asset market booms are usually accompanied by a generalized and significant step-up in the inflation rate, and a policy that successfully stabilizes the latter reduces the risk of their getting out of hand, but asset market booms unaccompanied by a notable rise in inflation do sometimes happen and are not well understood even today.[26] Nevertheless, the phenomenon was not unprecedented in the Japan of the late 1980s: a mixture of easy money, low inflation and booming asset markets had also characterized the USA in the late 1920s (as it would again in the late 1990s), and some would argue that the Bank of Japan should have pre-empted the 'bubble economy' rather than let it run its course. The trouble with this argument is that, by the time it was reasonably clear that there was indeed a bubble to be dealt with, it was much too late for so blunt an instrument as monetary policy to cope with it smoothly: after all, the mid-1929 down-turn that ushered in the Great Depression in the US is plausibly attributed to a tightening of monetary policy aimed at cooling off the stock market, a goal that was certainly accomplished, though to what further purpose is not clear. Thus, though Japan can perhaps be faulted for undertaking international obligations at the Louvre that were potentially inconsistent with its domestic goals, it is much harder to blame its central bank for failing before the event to recognize and react to subsequent asset market developments that only in hindsight may be seen to have been significantly problematic.

If the body of economic knowledge available as a foundation for any monetary order failed in 1990 (as it still does) to provide a completely reliable guide about how to recognize and deal with a potentially damaging asset market bubble as it develops, however, 'it does not follow' as Kohn (2006, p. 5) has recently noted, 'that conventional monetary policy cannot adequately deal with the threat of deflation by expeditiously mopping up after the bubble collapses'. It is an idea almost as old as the institution itself that the central bank is the lender of last resort, and that, in times of the crisis, it should inject liquidity into the financial system in whatever amounts are needed, first to keep it functioning and then to support its recovery. For close to a decade after the Japanese bubble economy collapsed, the Bank of Japan did not do this, having concluded that once it had reduced short-term interest rates essentially to zero, it had exhausted the powers of monetary policy. It was supported in this belief, moreover, by a number of economists who proclaimed (and still do) the return of the *liquidity trap*.[27]

This diagnosis was based on what Orphanides (2004) suggests were faulty readings of empirical evidence that were very similar to some of the errors made by the Fed in the 1930s. Business and banking confidence in Japan was deeply depressed throughout the 1990s, and this surely created (among other consequences) a low elasticity of demand for *credit* with respect to the *short* interest

rate, but the liquidity trap is a state of affairs characterized by a (close to) infinite elasticity of the demand for *money* with respect to the *long* interest rate. The former state of affairs used to be called a *credit deadlock* (the term is Hawtrey's, e.g. 1932) for which the recommended remedy was, and remains, open market operations on whatever scale was necessary to induce a revival of private sector spending, a policy, as Orphanides points out, also recommended by Keynes (1930).[28] In the absence of such measures in Japan during the 1990s, no evidence could be generated about whether or not there existed a liquidity trap to prevent them from working. *Quantitative easing* was finally instituted in 2001, with reserves and the narrow (though not the broad) money supply increasing significantly, and Japan's economic recovery began, albeit haltingly, about a year later. Perhaps this is a case of *post hoc ergo proper hoc*, but the timing is surely intriguing, as it so often has been when the behaviour of money, output and prices has been subjected to empirical scrutiny.

There is not space here to argue the case in detail, and there is surely room for disagreement about Japanese experience, but let me here express my agreement with Orphanides (2004) that there never was a liquidity trap in Japan in the 1990s, and suggest that the credit deadlock that undoubtedly developed there would have been much easier to break had vigorous open market operations been instituted early in the decade. If this is correct, then Japan's lost decade was the product of a monetary order based on too narrow a view of monetary policy's powers in general, and of its transmission mechanism in particular.[29] It is notable that the Fed's reaction to the Long Term Capital Management Crisis of 1998 bears a remarkable resemblance to the Bank of England's lender of last resort operations in the wake of the Baring crisis of 1890, and that its subsequent prompt response to the collapse of the dot-com bubble was also firmly in the classical central banking tradition of supporting the financial system in time of potential trouble with as much liquidity as it seemed to demand; though, with the benefit of hindsight, the response in this case was perhaps too vigorous and prolonged, helping to push the inflation rate to well over 4 per cent by 2006, and contributing to a housing market bubble whose eventual collapse precipitated a financial crisis in the late summer of 2007 that continues to have serious international repercussions.

The ERM crisis and the emergence of the Euro

Japan's problems in the 1990s began with an event that was endogenous to her monetary order, albeit one difficult to understand given the state of economic knowledge. Europe's monetary problems at this time, on the other hand, had a political origin, and though they posed difficult political choices, their economics was quite straightforward. The reunification of Germany in 1990 was as unexpected as it was sudden, and the subsequent merging of the East German Mark with the D-mark at par (for most purposes) was more a matter of political symbolism, and of labour market and social policy, than of monetary policy. There was, therefore, nothing inappropriate about this decision being taken by politicians,

even though they do appear to have ignored warnings from the Bundesbank about its economic wisdom.

The new European political environment required wide-ranging choices to be made about the future of the local monetary order, and, though the 1992 Maastricht Treaty was part of a process that had begun long before 1990, one aim of its commitment to full European Monetary Union was nevertheless to bind a now enlarged Germany into the European project far more securely than its earlier commitment to the CAP and other programmes could ever have done. But German reunification and the decision not to finance it out of current taxation – again appropriately one for politicians, whether wise or not – also had immediate monetary consequences. The Bundesbank's key choice was between accommodating fiscal policy, and letting deficits feed money creation, or sticking to its mandate to maintain the D-mark's soundness. Its selection of the latter option was hardly surprising in the light of earlier history, but it presented problems for monetary authorities elsewhere in the EMS, not least because it meant that the Bundesbank would no longer meet the obligations to unlimited intervention in favour of weaker currencies at going parities that Germany's political commitment to the ERM had imposed upon it. Germany's real exchange rate had to appreciate to maintain equilibrium within the system, and with a rise in domestic prices ruled out, this implied either a major realignment of ERM parities, involving devaluations against the D-mark, or deflation (or at least disinflation relative to Germany) everywhere else – unless, of course, political pressure could be exerted on the Bundesbank to reconsider its own inflationary option. The scene was thus set for the EMS crisis of the autumn of 1992.

A blow-by-blow account of this crisis is not needed here.[30] Suffice it to say that the Bundesbank proved unreceptive to political pressure to inflate, that in due course Sweden followed the lead of Finland in abandoning its pegged exchange rate in early September 1992, and that, with their currencies under heavy speculative attack, Italy and the UK left the system later in the same month, the latter, as it turned out, never to rejoin it. These developments in themselves raised Germany's real exchange rate and hence weakened pressure on exchange rates that had survived the immediate crisis, but uncertainty about the ERM's future was only finally relieved later in 1993 by widening the bands within which the exchange rates of its remaining members were to be pegged, from 2.5 to 15 per cent. With the remaining one-way bets that the workings of the ERM offered to speculators thus essentially eliminated, exchange rates thereafter settled down close to their central parities.

Crucially, the Franc remained within the system, though not without considerable bilateral support from the Bundesbank. It is plausible that the exchange rate's level weighed on French economic activity even after the crisis had long passed, but it would surely be wrong to categorize its maintenance as a policy mistake. Whatever the economic costs of a strong Franc, the preservation of the EMS in some significant form was a necessary condition for moving forward with the Maastricht agenda for monetary union, and this agenda had, as noted above, only a little to do with economic issues. In due course, the European Monetary

Institute began its work in 1994, the European Central Bank (ECB) replaced it in 1999 and the Euro was introduced, first as a virtual currency in 1999, and then as a fully fledged one in January 2002. A new monetary order was thus installed in Europe based on a fiat currency managed by the central banking system of a still incomplete multinational political entity, rather than of an individual nation state. And as a corollary, the D-mark, perhaps the most successful currency of the post-war era, was eliminated in what, at first sight, resembles the kind of currency reform that usually follows monetary failure; but the resemblance here is far from complete, since in this currency reform the new monetary order mimicked, and indeed tried to improve upon, many features of the old, in a self-conscious attempt to borrow credibility from it.

In particular, where the Bundesbank's mandate and autonomy had rested on an act of the legislature, and were continuously under a degree of political pressure, those of the ECB were guaranteed by an international treaty which sought to insulate it entirely from national political processes. Thus, though the ECB's political legitimacy, and that of its price stability mandate in particular, were (and are) beyond question (as Otmar Issing has often stressed – see e.g. 2004) its ongoing accountability for the ways in which it defines and pursues that mandate is less obviously well established. The European Council's scope for intervention in monetary decisions appears to be limited to the international sphere, and the ECB otherwise reports on its activities only to the European Parliament, a body whose limited powers surely contribute to the lack of interest in its activities displayed by most of its constituents. National governments, however, remain responsible for fiscal policy, but they have been relieved by these arrangements of any obligation to consider the monetary consequences of their decisions, and, given the weakness of the Growth and Stability Pact that was supposed to constrain them, it is not clear how the politics of this all-important interface will be managed if and when it comes under stress. The possibility that a central bank can have too much legal independence for its own good when it comes to setting policy goals can never quite be discounted, and Charles Goodhart's (2006) observation that 'It is one of the misfortunes of the ECB that it did not allow the political authorities . . . to help determine the precise choice of inflation target' may just turn out to have been prescient.

Inflation targeting

The European monetary order over which the ECB currently presides is nevertheless the most carefully designed such entity since the Bretton Woods system, and the launch of the Euro was a technical triumph which surprised many sceptics who had doubted the power of a change in legal restrictions to amend so drastically a set of social institutions as pervasive as a monetary system.[31] In stark contrast, the other major monetary innovation of the 1990s, the setting of specific quantitative goals for the inflation rate (either by the central bank, or the elected government, or by agreement between them) and their systematic pursuit (usually by the central bank exercising operational independence), which, according to

Rose (2006) is now in place in no fewer than twenty-four countries, was largely the outcome of uncoordinated improvisation on the part of national policy-makers. Nevertheless, the success of such formal inflation targeting until recently has been remarkable. As Rose (2006) points out, the only countries which have given it up, namely Finland and Spain, did so as part of a prior plan to adopt the Euro. Unlike money growth targeting, it has nowhere been abandoned as unworkable.

Inflation targeting began in New Zealand as part of a more general programme designed to restore the health of an economy crippled by pervasive *dirigisme*. A systematic effort was made to identify the purposes of public sector agencies and programmes, and, where these could be found, to bind those in charge to pursue them with appropriately designed contracts. The origins of the Reserve Bank of New Zealand's celebrated contract with the government thus lay, as Redell (1999) has argued, at least as much in principle–agent theory as in the theory of money. The fact that the Bank's contract was stated in terms of inflation outcomes, moreover, rather than, say, money growth, was a direct consequence of another feature of the local landscape, namely that wholesale deregulation of the financial sector had rendered the behaviour of any money or credit aggregate totally uninformative. But to state a quantitative goal for monetary policy in terms of the inflation rate was nevertheless a leap in the dark. After all, it was conventional wisdom that a long and variable lag between the implementation of monetary policy and its effects on inflation made aiming it directly at such a distant goal a risky business. But for New Zealand there seemed to be no alternative but to try.

Canada came next. At the end of the 1980s inflation there began to drift upwards, and the Bank of Canada's governor responded by announcing that policy would pursue a rather unspecific 'price stability' goal. In early 1990 this policy encountered serious credibility problems in foreign exchange markets that were met by significant monetary tightening – as in 1980, narrow money actually contracted – and the onset of a recession almost as serious as that of a decade earlier began later in that year. At this very time, however, Canadian politicians had to become concerned about the credibility of monetary policy because a value-added tax that would give a significant boost to the Consumer Price Index was about to be implemented, and trade unions were preparing to seek compensating money-wage increases, thus threatening to turn a one-time price-level increase into ongoing inflation. Out of this situation, in February 1991 there emerged an agreement between the Minister of Finance and the Bank of Canada on 'inflation reduction targets' that specified a time path for consumer price inflation that would take it down to 2 per cent by 1995, and promised 'further progress to price stability' (left undefined pending further study, however, beyond entailing an inflation rate of clearly less than 2 per cent) thereafter. Two and a half years later, a change of government (and of central bank governor) was marked by what has turned out to be the indefinite postponement of the latter promise, and 2 per cent inflation (plus or minus 1 percentage point) has become an essentially permanent policy goal.[32]

Similar stories of improvisation driven by local necessity mark the subsequent adoption of inflation targets elsewhere. In the UK they were seized upon as a

new anchor for monetary policy in the wake of Sterling's exit from the ERM, and they were also adopted in Finland and Sweden as means of stabilizing their domestic monetary systems in the wake of the EMS crisis, and then kept in place in preparation for the adoption of the Euro. It was only later second thoughts on the part the Swedish electorate that changed them there from a temporary to a seemingly permanent feature of the local monetary order. Australia is generally reckoned to be a targeter too, but ambiguously enough there seems to be some doubt about the date of the regime's adoption. The spread of inflation targeting among emerging economies should also be noted here, though the details of this process are beyond the scope of this chapter. Among advanced economies, setting aside the ECB, which, having given quantitative content to its price stability mandate by making an inflation rate below but close to 2 per cent its policy goal, looks like a targeter to many observers, the most conspicuous absentees from the roster of formal inflation targeters are now Japan, still awaiting the secure return of its inflation rate to positive territory as its slow recovery from the 1990s continues, and the USA, where the adjective *formal* is of some significance, since the Fed is well known to have a 'comfort zone' for inflation, which may play a larger role in the rhetoric of monetary policy were it not for the so-called 'dual mandate' specified in its governing legislation.

The intriguing question about inflation targeting is why it has worked so well, particularly when its success seems to fly in the face of earlier conventional wisdom about the feasibility of stabilizing a variable which monetary policy affects with long and variable lag, and when there seems to be no evidence that the introduction of such a programme anywhere had a direct effect on expectations. Inflation-targeting central banks have earned their credibility over time by bringing inflation down and keeping it there, as indeed has the Fed without the support of a formally announced programme. Nor does it seem plausible to attribute success to the alleged benign influence of globalization on the strength of inflationary pressures in the world economy in the 1990s. Increased trade with low-wage countries should lower the *relative prices* of labour-intensive goods, not the *rate of change of the nominal prices* of everything, and arguments to the contrary bear too much resemblance for comfort to old stories about cost-push inflation with the appropriate signs reversed.[33] And, given political upheavals, wars, terrorist attacks, a string of international financial crises, not to mention huge swings in commodity prices, it is far from clear that the last fifteen years or so really have been any more devoid of potentially destabilizing shocks than were the 1970s and 1980s. Let me nevertheless suggest the following explanation of inflation targeting's apparent success where it has been adopted.

To begin with, obvious but still worth explicitly stating, inflation is, after all, a consequence of monetary policy, and this particular piece of economic understanding, so painfully regained in the two preceding decades, formed the very foundation for inflation targeting. At this most basic level, therefore, such a programme provides a sound basis for a new monetary order in a way that, for example, direct intervention in labour and goods markets with wage and price guidelines or controls never could. Inflation targeting was, moreover, introduced

almost everywhere in circumstances that required inflation to be stabilized and usually to be reduced as well, and, in stark contrast to money growth targeting, this fact worked in its favour. It is technically easy to stabilize inflation, particularly when it must also be reduced: a sufficiently sustained tightening of monetary policy (whether measured by a reduction in money growth or an increase in short-term nominal interest rates is barely relevant) will do the trick. Furthermore, and crucially, the well-established non-linearity of the short-run Phillips curve helps ensure that initial policy errors will have their most obvious consequences in an earlier than forecast arrival at whatever goal has been set (where inflation needs reducing), followed by a relatively 'small' target undershoot, and in a tendency for any residual instability to be more visible in output than in inflation. When the first task of inflation targeting is to stabilize and/or reduce inflation, that is to say, it is output and employment that take the strain of policy miscalculations, but so long as such effects prove politically supportable, policy can err systematically on the tight side for long enough for even the most mechanically formulated inflation expectations to adjust to experience and begin to generate credibility for the regime.[34]

Such credibility, once established, is then self-reinforcing in a number of ways. First, it promotes continuing clarity in monetary policy by keeping discussions among those in charge of it focused on an agreed goal. Second, to the extent that the costs of servicing public debt can create monetary stress, credible low inflation helps keep nominal interest rates down, and hence reduces those costs. Even more important, that same credibility helps to prevent the short-run consequences of exogenous shocks, and even of monetary policy miscalculations, from feeding through to subsequent price- and wage-setting decisions.[35] Successful inflation targeting, in short, contributes to a policy climate and a state of economic understanding that supports its own continued operation, as much among those for whom this understanding is merely a matter of rules of thumb that seem to work, as among those who resort to formal economic models to inform their decision making.[36] Finally, as the Bundesbank knew even in the 1950s, there is political constituency for low and stable inflation. Ordinary voters understand what inflation is, and most of them dislike it, so policy explicitly targeted at it can command political support of a kind that money growth targets, so remote from everyday experience, could never hope to attract. Perhaps the greatest strength of formal inflation targets is thus that they help to shield the central bank from the day-to-day pressures of politics. A minister of finance who might consider ordering a money growth targeting central bank, or one without any clearly defined goal, to ease its policy in the interests of pursuing some other end, would have to think hard about explicitly and publicly ordering it to increase inflation, however worthy that other end may be.

Looking back and looking forward

It is arguable that the first monetary policy success of the post-Second World War years was the survival of the Bretton Woods system for almost a quarter

of a century. The international gold standard certainly lasted longer – about thirty-five years, from around 1880 until 1914 – and worked more smoothly too, but a fairer standard of comparison is surely the twenty years after the First World War, when successive failures to re-establish any kind of functioning international monetary order made their own significant contribution to the outbreak of the second. Even so, it must be added that the Bretton Woods system's eventual collapse was also the first major failure of the period, while the eventual and (almost) worldwide restoration of a reasonable degree of monetary stability since the early 1990s, the second major success since the Second World War, has been the outcome of a series of piecemeal local policy initiatives, many of them associated with inflation targeting, rather than a distinctively international event; and this current stability might just be fragile.

Some lessons from the past fifty years

The Bretton Woods system was self-consciously designed as an international monetary order suitable for its times, and it worked for a while because its policy concerns were clearly defined, and its institutions configured so that these concerns could be addressed. The system, however, was intended to contribute to the post-war evolution of a wider international economic order that would, with the passage of time, come to rely increasingly on market forces, and we have seen that as these came to play a greater role in economic life, the misunderstandings about how they worked, based on faulty diagnoses of inter-war experience that had informed the system's design inevitably began to take their toll on its performance. In particular, the architects of the Bretton Woods system underestimated the extent to which the control of inflation would become the world's primary monetary policy issue, and in their concern with other goals, paid insufficient attention to insulating their system against it.

The onset of inflation destroyed that system, but that very experience in due course re-established widespread understanding of the monetary nature of the phenomenon, the capacity of fiscal policy to undermine monetary stability, and of pegged exchange rates to transmit these effects internationally. In addition, the experience of such countries as Germany and Switzerland provided early confirmation that the more single-mindedly domestic authorities concentrate on maintaining their currency's internal value when the anchor for its external value begins to drag, the greater their success is likely to be. These lessons are, of course, platitudes, but even after the experience of the 1970s should have confirmed their obviousness to policy-makers everywhere, the Louvre accord had adverse monetary consequences for Japan because they were ignored; while even today there are still countries anchoring their currencies to the US Dollar during a new period of serious fiscal imbalance there, and risking excessive domestic monetary expansion as a result. Perhaps, therefore, these platitudes still bear repeating.

Money growth targeting from the mid-1970s onward yielded salutary lessons about the dangers of over-confidence when academic ideas are transferred to the policy arena. Institutional change within monetary systems did not begin in the

mid-1970s; it was bound to matter for the way such policies would work, and yet it was largely ignored in their design, and the difficulties they encountered therefore came as a much bigger surprise than they should have done. Perhaps that is why they produced an intellectual over-reaction whose influence continues to be all too widespread for comfort in much of the academic monetary economics that is now influencing day-to-day policy. Specifically, the fact that demand for money functions proved insufficiently stable over monthly or even quarterly intervals to provide a basis for regular monetary policy decisions does not imply that the only variables of any significance for monetary policy under any circumstances are the short interest rates that central banks use as their instruments, but it seems to be widely believed nowadays that this is the case. The above-mentioned lessons about the dangers of applying academic ideas to policy without due caution, that is to say, have not yet quite sunk in.

Over-exclusive emphasis on the role of interest rates in monetary policy has already done damage, having, in the 1990s, led the Bank of Japan into thinking that, once short interest rates reach zero, it had exhausted its options, and hence into not tackling promptly and vigorously the credit deadlock which followed the collapse of the 'bubble economy'. This erroneous view of the limits of monetary policy is but one implication of what has now evolved into a standard model of the implementation of monetary policy through an interest rate instrument, which, though its day-to-day usefulness is not in question, is inconsistent with the empirical evidence generated by the monetary history discussed earlier in this chapter. To put matters simply, this model has the quantity of money responding passively to variations in the arguments of its demand function and to that function's error term, and hence implies that fluctuations in the quantity of money should *lag behind* those in interest rates, real income and prices, and not feed back into the system in any important way. But over the past fifty years, whenever such fluctuations have been significant, money has *systematically led* output, which in turn has *led* inflation. From the late 1960s onward, the onset of inflation everywhere was preceded by increases in money growth, while the sometimes severe recessions that accompanied efforts to control it were preceded by the collapse of money growth.[37] It was the very pervasiveness of such evidence that undermined the intellectual consensus in favour of the cost-push ideas that had permitted the great inflation to get under way in the first place, and the view that the quantity of money is irrelevant for monetary policy is a curious legacy indeed to have been left by an inflation that was so clearly created by this variable's misbehaviour.

Useful or not then, as has been argued at greater length in Laidler (2002), there is something important missing from today's standard monetary policy model, and it is a disturbing feature of many inflation targeting regimes that, as Freedman (2006) has documented, they seem to be becoming more and more heavily dependent on it as time passes.[38] There is still much to be said for deploying a reference value for money growth as a formal backstop within these regimes, or at least for according this variable a prominent informal role among the data that are routinely consulted as policy is made and monitored.

Prospects for a new monetary order

Rose (2006) has recently suggested that the spread of inflation targeting heralds the development of a new international monetary order that stands Bretton Woods on its head by giving pride of place to domestic policy goals in the countries that make it up, while leaving it to foreign exchange markets to deal with domestic policy's consequences for the international monetary system. This way of looking at things is intriguing, and inflation targeting supported by market-determined exchange rates certainly eliminates the problems that have arisen so often in the past fifty years when monetary policy has tried to pursue domestic goals while simultaneously setting exchange rate targets. But it is worth recalling that another pervasive feature of the experience surveyed in this chapter has been the destructive power of divergences between beliefs about how monetary mechanisms work and the facts, and simply to devote monetary policy to domestic ends does nothing to eliminate such divergences. They remain dangerous, therefore, particularly should the embryonic monetary order envisaged by Rose come under stress, and there is considerable potential for such stress to arise nowadays.

First, though the Fed usually seems to conduct its day-to-day policies 'as if' it were an inflation targeter, it lacks the extra degree of protection against political pressures to relax its policies in times of fiscal difficulty that formal targeting would give it. This is surely becoming just such a time. Second, though the ECB does recognize a policy role for monetary aggregates, and does pursue a quantitative inflation goal as well, this goal is of its own choosing, and elected governments are not implicated in it, beyond their ongoing commitment to the Maastricht Treaty, a fact which, it has already been suggested, may imply that the ECB is too well insulated from day-to-day political pressures for its own long-term good. The Growth and Stability Pact notwithstanding, it is simply not clear whether the institutional structure through which the tensions among central bankers and elected politicians that growing divergences among national fiscal policies with the Euro zone threaten to create is up to the job, and a monetary order that cannot cope with such pressures may prove brittle.

So the future stability of neither of the world's two main internationally used currencies is quite secure at present, while Japan, the source of a third, is likely to find the public debt levels inherited from the 1990s hard to cope with as it emerges from deflation. Meanwhile, fear of the floating exchange rates that are so necessary for inflation targeting's adoption still seems to be widespread elsewhere in the world – China in particular comes to mind here as a place where policy makers might do well to study the lessons yielded by Japanese experience of the late 1980s about the dangers of pursuing incompatible exchange rate and inflation goals in circumstances where asset markets can get out of hand.

If, then, Rose's attractive vision of inflation targeting's future role as the basis of a new international monetary order is to come to fruition, that regime needs to spread more widely than it has as yet. And if it is to be robust in the face of the shocks that might hit the international monetary system in the meanwhile, it would do well to avoid becoming too reliant on a model of monetary policy that cannot

explain the salient facts about money growth's temporal relationship to inflation rates that the world's monetary systems generated the last time they went out of control. In short, though inflation in the world economy has recently been lower and more stable than anyone would have predicted even as recently as the beginning of the 1990s, and though we may be closer to a coherent international monetary order now than at any time since the late 1960s, the way forward is not yet risk-free.

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Notes

1 Specific data on inflation rates given from time to time below are for year-on-year changes in consumer prices taken from various annual issues of *IFS*.
2 I first discussed this concept in Laidler (1993). I am aware of having borrowed it from Brunner (1984) but, as George Tavlas has pointed out to me, it was extensively discussed earlier by Mundell (1972) in an article to which Cesarano (2006a) has recently given attention.
3 Thus, the discussion that follows does not deal with the often fascinating and instructive monetary experiences of emerging economies in Asia, Africa, Latin America and Eastern Europe. There is simply insufficient space in a single chapter to deal adequately with this material.
4 To stretch Adam Smith's metaphor a little, the invisible hand has monetary and financial fingers, and their deftness is a necessary condition for the successful coordination of the myriad decisions and activities upon which our society's economic well-being depends. Although this is not the place to debate the matter, it should be acknowledged that this does indeed mean that the 'Classical Dichotomy' between the economics of choice and markets on one hand, and of money on the other, on which so much modern economics is based, is located in the wrong place.
5 Woodford (2003, Part 1) presents an excellent discussion of current practices, and an assessment too of their relative merits. His preferred scheme involves the central bank setting a 'corridor' for overnight interest rates, and does not include the use of reserve requirements. This is essentially the one currently in place in Canada.
6 This is why the subject's own history is an integral part of economics, and should be taught as such, a matter which I have argued at greater length in Laidler (2004a, ch. 19).
7 Cesarano (2006a) presents a recent and comprehensive discussion of the Bretton Woods system considered as an international monetary order and of the pitfalls inherent in its failure to set unambiguous priorities for the goals of domestic monetary policy of its members. This work also contains an extensive bibliography of earlier literature dealing with these topics.
8 The first of these beliefs stemmed directly from the revolution in economic thought that found its focus in Keynes (1936) and the second received powerful support from Nurkse's (1944) League of Nations study. Evidence for the pervasiveness of the third

belief may be found in the *Reports* of both the Radcliffe Committee in the UK (1959) and the Commission on Money and Credit in the US (1961), while the fourth received a powerful statement in Gordon (1961).

9 The 'Coyne affair', as it is usually known, has been described in detail by Powell (2007). It reached its climax in 1961 with the forced resignation of Bank of Canada Governor James Coyne, and led to a significant clarification of the relationship between the bank and elected politicians. Under the so-called *dual responsibility doctrine* the Bank conducts policy, but in the event of a disagreement the Minister of Finance may issue a directive that the Bank must obey. However, this must be specific, written, and promptly published. Crucially (though not legally required), its issue will lead to the Governor's resignation. The overall effect of these measures is mutually assured destruction should things ever come to such a pass, and they therefore create an overwhelming incentive for minister and governor to resolve any differences privately.

10 The work of Berger has proved an extremely helpful guide to these matters. See, for example, Berger and de Hahn (1999), where references to other papers by Berger may also be found. My discussion here has also benefited from the comments of Hans Tietmeyer.

11 It was sometimes hard to distinguish between the influence of elected politicians and that of appointed policy-makers. The dominance of the former over the conduct of monetary policy in the UK at this time was taken for granted, but even in the USA, as Mayer (1999) makes particularly clear, the Fed was anything but a free agent in designing monetary policy at the beginning of the 1970s. This does not mean, however, that central bankers were unwilling accomplices in the policies they implemented in either jurisdiction.

12 Orphanides (e.g. 2002) has shown that estimates of the 'output gap' and 'natural unemployment rate' available to policy makers in the 1970s systematically and significantly understated the extent of demand pressures on the economy. Though it is possible *ex post* to interpret the period's monetary policy as the consequence of applying an appropriate Taylor-style rule to faulty data, an alternative interpretation of the contemporary policy significance of these measurement errors is, as Nelson (2004) has suggested, that they gave a great deal of credibility to claims that inflation could not plausibly be attributed to monetary policy, but had to be explained as the consequence of cost-push factors. In addition, as Tim Congdon has pointed out to me, there was some confusion at this time about just what concept of the output gap was relevant for policy. Some already focused on deviation of output from a 'natural' level, while others were more focused on the deviation – almost invariably a shortfall – of output from some higher Keynesian 'full employment' level.

13 It is sometimes argued that the Kennedy Administration's policies involved a deliberate attempt to exploit a stable inflation–unemployment trade-off. Although it is certainly true that the Phillips Curve idea was being extensively discussed among academics at this time (e.g. Phillips (1958) and Samuelson and Solow (1960)) and its policy relevance explored, a careful reading of the contemporary evidence suggests that the policy trade-off idea was not fully developed until a little later, and probably did not begin to influence policy much before the beginning of the 1970s, when, even adapted to incorporate the role of inflation expectations, its main message was to strengthen the case against deploying monetary measures to bring inflation under control (see Laidler (2004a, ch. 16).

14 Crucial evidence of this shift is that the behaviour of gold reserves in general, and the declining ratio of those reserves to the international liabilities of the USA in particular, had no discernible influence on the conduct of US monetary policy. See the thorough empirical study of these and related matters by Darby and Lothian (1983).

15 In contrast, in the nineteenth century, the potentially inflationary consequences of central banks being guided by the real-bills doctrine were kept in check by their

convertibility obligations. It is no accident that the great German hyperinflation that began under the Imperial regime and came to full fruition under the Weimar Republic got under way only when the convertibility obligations of a central bank that had long been guided by this doctrine were suspended.

16 As Leeson (2003) has shown, however, the adoption of a flexible exchange rate by the USA in 1973 was due to much more than the force of immediate circumstances. It also marked the culmination of the policy influence of one aspect of the monetarist critique of post-war macroeconomic orthodoxy, originating in Friedman's (1953) essay on 'The case for flexible exchange rates', that had been slowly but steadily making converts for many years.

17 This episode is described in detail by von Hagen (1998). Given the clarity displayed by Emminger (1973) about the nature of processes then at work in the international monetary system, what is surprising in retrospect is not that the Bundesbank acted relatively early, but that it took as long as it did to do so.

18 There is no better evidence to support this claim than that, apart from its neglect of open economy issues, Mayer's (1975) survey of monetarism is comprehensive and remains definitive even today. It is a defensible claim that the final major academic contribution to the doctrine's structure was Friedman's (1968), where the concepts of the natural unemployment rate and accelerationism were developed. Note that some will find this judgement controversial, since it implies another, namely that Tobin (1981) was in error when he gave New Classical Economics the label 'Monetarism Mark II'.

19 Though evidently not in the Federal Republic of Germany, for the early development of the Bundesbank's views and position described above occurred too early to have been the product of post-war monetarism, Friedman's assignment as an adviser there in the late 1940s notwithstanding. Presumably, traditional monetary policy ideas that were already well developed by the early 1930s in a rich German literature – see Ellis (1934) – had survived there among liberal economists, whereas they had been largely eclipsed elsewhere by the so-called Keynesian Revolution.

20 The formal analysis of the transitional costs of reducing inflation came in the late 1960s. Although Friedman (1968) developed its monetarist version, it was Edmund Phelps (1967) who went more deeply into the dynamics of the inflation–unemployment trade-offs that were implicit in what came to be called the 'expectations-augmented Phillips curve'. Note, however, that this trade-off was habitually discussed in terms of Okun gaps (lost output) and Harberger triangles (better known as 'shoe-leather' costs of inflation) (see Tobin 1977) and that, because the latter seemed to be trivial, the relevant literature yielded little support for serious efforts to eliminate inflation. It is hard to realize now that the capacity of inflation fundamentally to disrupt the market economy's coordination mechanisms does not seem to have figured prominently in the academic discussion before the appearance of Leijonhufvud's (1977) study on this topic.

21 The change in the subtitle of this author's *Demand for Money*, from *Theories and Evidence* to *Theories, Evidence and Problems* between its second (1977) and third (1985) editions reflects the influence of accumulating evidence on his own confidence in the extent of our understanding of this relationship. Bordo and Jonung (1987) remains an important study of the influence of institutional change on the secular behaviour of velocity.

22 Canada had significantly deregulated its financial system in response to the *Report* of the Porter Commission (Royal Commission on Banking and Finance, 1964) set up in the wake of the Coyne affair, as Freedman explains in his (1983) discussion of the breakdown of money growth targets in Canada. Congdon (2005, ch. 3) explains the role of the so-called 'Competition and Credit Control' reforms of 1972 in preparing the ground for subsequent developments in the UK financial system.

23 As Bordo *et al*. (2007) have shown, the likely effectiveness of gradualist

disinflationary policies hinges critically upon the credibility of the central bank implementing them, and since this was very much in question in the early 1980s, a more vigorous contraction probably had a better chance of signalling that the stance of policy had changed and of reducing inflation. For an early, albeit brief, statement of this insight made in the context of Canada's gradualist experiment, see Wirick (1981).

24 There seems to be no consensus about why exchange rates moved so much in the 1970s and 1980s. My own favourite conjecture is that being asset prices, these variables are affected today by any news which arrives about what might occur at any time in the future. In a world where domestic monetary policies were without clear goals, there was huge scope for opinions to change often and sometimes significantly about what the future held in store in different countries. A corollary of this conjecture would be that the widespread adoption of inflation targets would tend to anchor expectations in foreign exchange markets, and hence help stabilize them.

25 This list is far from complete. For example, there were banking crises in the Nordic countries in the early 1990s, and later the so-called 'tequila crisis' of 1994 to 1995, as well as crises that affected the pegged exchange rate economies of Asia in 1997 to 1998. Space does not permit discussion of these episodes here.

26 We have learned much about financial instability, thanks largely to the persistence of researchers at the BIS (for example, Borio and Lowe 2002) and more recently at the ECB as well (for example, Adalid and Detken 2007), but not to the point at which there can be much certainty about how to deal with it. Perhaps it requires the attention of financial market regulators rather than central banks (or, where central banks are also regulators, of their regulatory rather than their monetary policy divisions), or perhaps it is a phenomenon which signals that market economies are, after all, not quite as inherently stable as we nowadays think, or at least hope. This last was certainly the predominant view in the inter-war years – See Laidler 2002.

27 See, for example, Krugman (1998, 2007) and Svensson (2003), and see Laidler (2004b) for a discussion of the confusion between the credit deadlock and the liquidity trap in the context of the Japanese experience. The fact that I concentrate here on monetary policy measures alone, and do not discuss, for example, the deep structural problems within the banking sector that the collapse of the Japanese bubble revealed and which surely required policy attention, does not mean that I regard these latter problems as unimportant.

28 Two further similarities between Japan in the 1990s and the USA during the Great Depression should be mentioned: namely that between claims made in both cases about the limited powers of central banks once short interest rates have been moved close to zero, and that between the abovementioned counter-arguments, and those first advanced about the USA by such commentators as Hawtrey (1932), Currie (1934), and later by Friedman and Schwartz (1963) as part of their successful monetarist attack on the conventional economic wisdom upon which the post-Second World War monetary order had been built.

29 Ugai (2007) surveys studies of quantitative easing and finds its effects to have been extremely modest. Precisely: the increase in the base and narrow money that it engendered was huge, though that in broad money was extremely modest, and Japan's subsequent recovery was, as already remarked, halting, but it did occur.

30 Such an account, accompanied by much penetrating analysis of the mechanics of the ERM, and of financial crises more generally, is to be found in Buiter *et al*. (1998).

31 That order can also claim deep roots in a well-established academic literature on the economics of common currencies, to which Mundell's (1981) contribution is the best known, though, as Cesarano (2006b) has shown, it has earlier origins than this.

32 However, this episode differed from the Coyne affair inasmuch as, rather than being forced into resignation, Governor John Crow decided not to seek reappointment at the normal end of his term, apparently because he could not reach agreement with the new

government about the retention of a long-run price stability goal. Crow himself (2002) discusses this episode. For an overview of the evolution of inflation targeting in Canada, see Laidler and Robson (2004).

33 Nor am I yet convinced that national inflationary processes have changed by the fact that there seems to be an important place for world output gap measures in domestic Phillips curves (see e.g. Borio and Filardo 2007). In the 1970s we already knew that there was an important place for world inflation measures in such relationships, and indeed that it was possible to estimate them using 'world' aggregate data (see e.g. a number of the essays included in Parkin and Zis 1976). Given the inevitably strong degrees of correlation among the relevant variables, we need some work to show that new work is not just rediscovering old results that still hold. Of particular interest here is the role of exchange rate regimes in helping to generate such results. Although formal pegging is much less common than it was, 'fear of floating' could still help to produce cross-country correlations in output and inflation fluctuations.

34 Note that the foregoing discussion deals with what any inflation targeter has to achieve when the regime is introduced, and not with any special extra tasks imposed by a period of targeted disinflation at the outset. I am grateful to Charles Freedman for drawing my attention to this distinction. Of the fifteen countries pursuing stable inflation targets studied by Roger and Stone (2005), seven had adopted such stable targets from the outset and eight had begun with formal disinflation targets, as had a further five countries included in their study that were still in a disinflation phase at the time of its completion.

35 Indeed, once established, the credibility of low inflation even reduces the risks of 'probing' the economy's capacity to absorb expansionary impulses. Awkwardly for those who stress the importance of the formal inflation target itself for the regime's success, the best example of this effect is surely the Fed's success in the 1990s, though recent experience there, where CPI inflation has run above 4 per cent. suggests that there are limits here.

36 This is in contrast to exchange rate pegging, for example, whose vulnerability to balance of payments shocks does not seem to diminish with the passage of time.

37 Even so, the proposition that significant rises in inflation are always preceded by increases in money growth should not be reversed. The early 1980s saw bursts of money growth in a number of economies as increases in the demand for money caused by falls in the opportunity cost of holding it were accommodated. Friedman's (1984) all too well-known prediction of an imminent inflationary threat in the USA thus did not follow from his own monetary theory, and he should not have made it. It was, as he noted in a 2006 private communication to this author, 'a major blooper'. Nelson (2007) discusses this episode in some detail, and places it in the broader context of Friedman's role in US monetary policy debates.

38 This model relies exclusively on a direct effect of the interest rate set by the monetary authorities on aggregate demand. Although such an effect surely exists, agents typically do not interact with the banking system simply to vary their holdings of cash balances, but to change their levels of indebtedness, and, when the interest rate is varied, this interaction has consequences for the behaviour of the money supply whose subsequent interaction with the demand for money is also an important component of monetary policy's transmission mechanism. See Laidler (1999) for a discussion of the contrast between the 'passive' and this 'active' view of money's role, and for references to the literature dealing with these ideas. Woodford's (2006) recent demonstration of the irrelevance of money to the conduct of monetary policy is contingent upon a passive money model, and hence does not counter the arguments advanced here, and Goodhart's (2007) caution about his results is well taken.

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Discussion

Charles Goodhart

David Laidler's papers are always a pleasure to read; wise, balanced and persuasive. And this is no exception. I was particularly struck by his opening warning that 'the inflationary facts of fifty years ago [when it was just about as commonly low as today] . . . suggest that monetary policy's apparent successes should never be taken for granted. Evidently, they can easily turn into failures.'

I want to develop this theme, and suggest two reasons for particular care and caution about the apparent current successes of monetary policy, here and elsewhere; why it just might all end in tears. First, there is a very natural tendency for more monetarist-leaning economists to attribute most, or all, of the improved outcomes to better understanding of the transmission mechanisms; no more truck with silly ideas like cost-push, and incomes and prices policies. And I would agree that our analysis has improved *somewhat*, though remembering that this has been a year in which questions have been raised about whether it makes sense for central banks to pay *any* attention to the growth rates of the monetary aggregates in assessing future inflation prospects, I do not even feel too confident on that score.

What I want to remind you is that mechanisms to maintain price stability, whether the gold standard, Bretton Woods or inflation targets, are constraints, and meant to be so. A frequent simile is 'an anchor'. Being held back by an anchor is upsetting if you mean to go with the flow. We are so used to believing that the only two variables that should enter a policy-maker's objective function are the output gap and inflation that we forget that there is a third, to wit growth.

One reason why the Bretton Woods regime became unpopular in the 1960s, especially in the UK, was that the resulting balance of payments problems in deficit countries appeared to act as a constraint on their growth. I would contend that one reason why the new monetary order of inflation targetry has been so successful is that it has coexisted with a period in which world growth, with the partial exception of the euro zone, has been quite strong and robust. We have been able to have our cake and eat it.

One common response to the claim that our recent low inflation owes a lot to cheap Chinese imports is to remind the audience that this is to confuse relative prices with general inflation, a position oddly enough adopted by some who would simultaneously downgrade paying attention to the monetary aggregates! But what

if the inclusion of major Asian countries, and their labour force, should also have raised productive potential in the rest of the world, thereby allowing faster growth to coincide with price stability? Will this stability necessarily continue?

The driving force towards stagflation could be stagnation in output putting greater political pressure on the constraining anchor. The pressure on the anchor comes when it appears to be restraining the achievement of other desirable economic outcomes. For the time being that has not yet happened in most inflation-targeting countries, so no wonder that policy has seemed to be so successful. You, in the euro zone, are a partial exception owing to a currently relatively slow growth rate, at least as conventionally measured. Even despite the constitutional fortifications that protect your operational independence and price stability mandate, I cannot help wondering what might happen when push comes to shove, say should the euro/exchange rate rise towards $1.50 to €1.

Nevertheless we should appreciate that, in macroeconomic terms, we are living in a golden age. While we, as central bankers and economists, have every reason to enjoy this, being partially responsible for achieving it, we should also recall that the last two similar golden ages were to be found in the USA in the 1920s and in Japan in the 1980s. One hardly needs reminding that both came to an end with an asset price boom/bust, not an inflationary blow-up. Laidler's title is 'Successes and failures of monetary policy since the 1950s', but he treats monetary policy as largely synonymous with the use of instruments, either interest rates or monetary targets, to achieve price stability. How about financial stability; is this not a crucial component of monetary policy? Financial instability ended the prior golden ages; might it terminate our own as well?

Here we know less; and as Laidler states, 'asset market booms unaccompanied by inflation do sometimes happen'. Only sometimes? Given the tech bubble and housing markets around the world, I would regard 'sometimes' as an understatement. He goes on to state that such asset bubbles and busts are not well understood. Is not this a somewhat damning criticism of monetary and financial economics? Moreover, just at a time when the macro-policy role of a central bank has become much better defined, its financial stability role has become equivalently more uncertain. What exactly are the remaining financial stability functions of a central bank when supervision has been hived off to a specialist universal financial services authority? Within the euro zone there is the added complexity of the relative responsibilities of federal and national bodies. Furthermore, there is no source of funding to enable any federal handling of cross-border crises, so we have the curious conjuncture of policy measures to encourage pan-European banking institutions to develop without having a proper mechanism in place for resolving pan-European banking failures.

Moreover, with interest rates being predicated to the achievement of price stability, and rightly so given that it is a central bank's top priority, do we have another instrument for achieving financial stability? Laidler (footnote 26) rather lamely advocates passing the buck on this to financial market regulators. But such bodies are liable to become focused on consumer protection issues, and to be dominated by lawyers and accountants, rather than by economists.

Whether or not this has been an influence, the recent trends in banking regulation, combining Basel II with mark to market accounting, strike me as having a potentially malign effect on *systemic* stability by enhancing procyclicality. Note, for example, the attempt to prevent the various CDOs from subprime mortgages from being put on the market at all, for fear of what the resulting asset price reduction would have on balance sheets and assessed capital adequacy around the world. Closer to home here, I tend to connect German economists and central bankers with an emphasis on the 'moral hazard' doctrine. How does the rescue of IKB square with that? Although I appreciate that this was orchestrated by the government, not yourselves.

Be that as it may, I am concerned that we are all quite muddled and confused about who should do what in the systemic stability arena. Whereas much of recent monetary policy has been increasingly well managed and successful, largely under the guidance of the Bundesbank and its dedicated officials, I cannot say the same about systemic stability issues. Let us hope that it is not the Achilles heel of monetary policy more broadly.

Discussion

Otmar Issing

David Laidler has presented a brilliant survey. In identifying successes and failures of monetary policy over the past fifty years he has referred to the concept of 'monetary order'. This conceptual approach looks very 'German' – but this is not the only reason why I like his paper.

Let me first explain where I do not agree with my old friend David. He is concerned that the ECB may be too independent in the sense that it is 'too well insulated from day-to-day political pressures for its own long-term good' . . . 'and a monetary order that cannot cope with such pressures may prove brittle' (p. 30). Considering not only my own experience, but also more general arguments, I arrive at the opposite conclusion. First, the European Monetary Union represents a very complex institutional arrangement which is unique in history: One central bank, the ECB and – for the time being – thirteen governments. Second, the euro area is (still) not an optimal currency area. Markets, especially labour markets, are far from being flexible enough and the single market, especially for services, is anything but complete. Under these conditions the single monetary policy of the ECB cannot fully unfold its beneficial effects. The combination of these factors turns the ECB into a welcome target for continuous attacks by politicians and a perfect scapegoat for disappointing macroeconomic results. In such an environment the ECB must steer a clear course of maintaining price stability and reject any idea that it could compromise on its goal for the sake of good cooperation, coordination or whatever one might call such behaviour. Demonstrating 'flexibility' would be perceived as an invitation for politics to interfere with monetary policy and thereby undermine the credibility of the central bank. This does of course not exclude openness for mutual information and dialogue.

With its strategy the ECB has a firm fundament for monetary policy and its communication. And here comes the part of Laidler's chapter which I especially appreciate. It is his warning against neglecting 'money' in the conduct of monetary policy. I think he is absolutely right in his admonition that the notion of money being irrelevant for monetary policy has been a major source of inflation in the past. There is convincing evidence that this neglect is a main cause behind the 'Great Inflation' from 1965 to 1984 (see Meltzer, 2005). And it is anything but a surprise that the central bank which did not succumb to this failure, the Bundesbank, can refer to a much better record (Issing, 2005).

Can we really assume that the neglect of 'money' will not be a threat also for the future?

Money – and credit – has yet another dimension. Research by the BIS and the ECB has delivered evidence for their relation with asset price misalignments and global macroeconomic developments. We are still far from a concept of monetary policy which encompasses the rapid development of financial markets in a satisfactory manner. Here I will only raise some questions. Can central banks just ignore the squeeze in risk premia across different classes of assets even if abundant liquidity has been a major driver? And what about an extended period of extremely low interest rates – not least central bank interest rates – which have if not triggered but certainly contributed to the mispricing of risks, the development of new financial instruments and high debt levels for many borrowers?[1] (I have said that long before and wrote these lines before the recent turmoil in financial markets. I see no reason for skipping these remarks.) To my mind recent developments have not supported the notion that the role of central banks in this context must be limited to provide abundant liquidity once markets collapse.

Furthermore, is the common inflation forecast an encompassing, fully satisfactory fundament for monetary policy decisions? David Laidler doubts whether the present 'state-of-the-art approach' of inflation targeting is the appropriate answer and I share his concerns.

So far my analysis is on challenges respectively potential failures in the future. What about the past? At its fiftieth anniversary, is it a sacrilege to raise the question whether the Bundesbank ever made mistakes – and even to affirm it? Yet what would you call the resistance of the bank to the appreciation of the DM in 1961, its difficulty in understanding the importance of a flexible exchange rate for its monetary policy and even more its taking sides against Karl Schiller on the issue of exchange controls? However, it is only fair to say that the Bundesbank learned, fully understood the importance of the exchange rate regime for a stability-oriented monetary policy and became a strong supporter of free movement of capital.

In the past the Bundesbank also had difficulties in fully understanding the advantages of well-developed, open financial markets – although one might add that not every financial innovation has turned out to be beneficial for the economy. For a long time there were – beyond the limited money market and the market for government bonds and mortgages – hardly any relevant financial markets in Germany. The bank lending channel was the main transmission of monetary policy.

In this regime minimum reserve requirements were a dominant instrument of monetary policy. However, in maintaining high minimum reserve ratios also at a time when free movements of capital played an increasing role, the bank has contributed to, if not triggered, an external market for its currency. Over time this has not only weakened the banking industry in Germany but also negatively influenced the efficiency of the Bundesbank's monetary policy.[2] It was only in the 1990s that the Bundesbank substantially lowered the minimum reserve ratios and simplified its implementation. This came just in time to make this instrument attractive for the incoming ECB.

Yet these are relatively minor critical comments on the policy of the Bundesbank. All in all, under the headline of this panel, the history of the Bundesbank is an outstanding success. The Bundesbank can point to an overwhelming track record of preserving the value of its currency. An annual inflation rate of 2.7 per cent on average over the fifty years of the existence of the D-mark, by far the largest part under the aegis of the Bundesbank, does not sound impressive from today's perspective. However, considering that most other currencies have lost much more in value, the Bundesbank has been the best performer following the Second World War. Put the other way round: if the Bundesbank's monetary policy was not a success, what would you call the policy of most other central banks? With its track record and its statute the Bundesbank became the role model of a central bank when the decision on the statute for the future European Central Bank had to be taken.

The outstanding performance of the Bundesbank is a contribution that extends into the future. The Bundesbank enters the new decades as an important national central bank in the Eurosystem.

Notes

1 In this context see an interesting 'counterfactual exercise' for the USA by John Taylor. According to his model a higher federal funds rate path would have avoided much of the housing boom (Taylor, 2007).
2 Issing (1987).

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Discussion

Donald Kohn

I appreciate this opportunity to speak on the occasion of the Deutsche Bundesbank's fiftieth anniversary by participating in the panel on 'Success and Failure of Monetary Policy since the 1950s'. I was reassured in my acceptance of Axel Weber's invitation by David Laidler's survey paper, which found more successes than not over the past two decades.

A concise summary of this success is evident in the performance of consumer price inflation in the advanced economies. Median inflation in that group (as defined by the International Monetary Fund) has held near 2 per cent for this decade. Indeed, in the IMF's latest *World Economic Outlook*, four out of five countries in this group are expected to post inflation rates between 1 per cent and 3 per cent in 2007. That good performance has helped to anchor inflation expectations, which, in turn, generates many benefits. Anchored inflation expectations damp the pass-through of supply-related price shocks. They also permit central banks to respond more forcefully to output fluctuations. Most significantly, the improved inflation performance has come with, not at the expense of, output stability. Although a consensus has not formed on how much of the 'Great Moderation' in the growth of real output can be attributed to monetary policy, everyone agrees that at least a portion of it can.

Laidler views these macroeconomic outcomes as a triumph of monetarism, but not because the formulaic policy prescription associated with that doctrine succeeded (or, for that matter, was even tried on a sustained basis). Rather, the underlying tenets of monetarism ultimately seeped into the collective central banking unconscious and fostered better decision-making. The beliefs that he identifies are threefold: That market economies are inherently self-righting, that open economies perform best under flexible exchange rates, and that central bankers should focus on price stability as their long-term objective.

Laidler suggests that monetarism failed when its proponents got too prescriptive by advocating rigid rules for money growth. Among the lessons he takes from the failed monetarist experiment are that central banking is an applied science and that our imperfect understanding of how economies and markets function implies that a good dose of humility is required – and I agree. As evidence of that humility on my part, let me also agree with Laidler that two important questions about the conduct of monetary policy have not yet been resolved. This is unfortunate because

these two questions are both long-standing sources of debate and central to current policy concerns. First, what is the best way to pursue price stability, and, second, how should asset prices be taken into account in steering policy?

In many countries, though not my own, the answer to the first question has been that price stability should be pursued through the formal apparatus of an inflation target, which typically includes establishing an inflation goal by the government, setting metrics to evaluate central bank performance, and periodically communicating progress to the public. Although correlation does not convey causation, the spread of such regimes has coincided with sustained low global inflation. In addition, no adopter of an inflation target has subsequently abandoned it.

Before anyone jumps to the conclusion that Frankfurt is a stop on my road to Damascus, let this Saul state that for me the case remains open. Inflation has fallen worldwide, in countries without, as well as with, inflation targets. Moreover, I share Laidler's puzzlement about why an explicit inflation goal should make a substantial difference in performance given the paucity of evidence showing that choosing a target directly affects the level of the public's inflation expectations. That said, I am relatively more persuaded that inflation targeting helps reduce the variance of inflation expectations. Evidence has accumulated to suggest that stock prices, interest rates and measures of inflation expectations seem to vary less in economies in which the central bank has an explicit long-term goal for inflation.

I suspect that this better anchoring of expectations and the success of inflation targeting in many countries is attributable in part to aspects of the political economy that Laidler identified. A formal inflation target represents a national embrace of a goal, in which elected authorities recognize the primacy of price stability and publicly support – indeed, even require – the central bank's pursuit of that goal. To the extent that elected authorities channel the desires of the electorate, a central bank directed to adopt an inflation target is being given a strong signal as to the goal's importance to the public at large. This affirmation has often been reinforced by the granting of operational independence to the central bank to achieve that goal most effectively. An important effect of such public acceptance of price stability is that it erodes the standing of those who would direct central bank action towards other ends. In such an environment, workers, businesspeople and investors can make plans with the expectation that nominal magnitudes will be predictable and so devote their attention to more productive matters.

For the European Central Bank, this framework was established by treaty. In most other instances, the adoption of an inflation target involved laws and mutual understandings, not constitutional changes. The early adopters of inflation targets were parliamentary democracies, which is not too surprising given that in such a system a single branch of government can enact laws and put them into effect. With regard to an inflation goal, Parliament can erect the formal apparatus and the finance minister can serve as the government's point of contact with the central bank.

The system in the United States is different in that two independent branches of government are responsible for economic policy-making, making agreement on a single goal problematic. Moreover, those two branches have already spoken as

to the appropriate aim of the nation's central bank: Congress, in a law signed by President, has given the Federal Reserve a dual mandate that directs us to foster maximum employment and stable prices over time. This instruction is not an accident of history, in that, in the past, Congress has shown no appetite to amend its legislation. Nor is this instruction unreasonable, in that the dual mandate has come to be interpreted as assigning to us the responsibility for attaining price stability in the long run, which will bring with it maximum employment, and of being mindful of resource utilization in the succession of short runs that make up the long run. The dual mandate seems proper and fitting, given that economic costs are incurred both by having inflation stray from its long-term goal and by having output deviate from the economy's potential to produce; and it seems to produce results that are not too different in practice from those associated with central banks that are flexible inflation targeters.

As I said earlier, anchoring expectations has value, in that it makes planning easier, reduces resources spent on predicting and protecting against unexpected variations in nominal magnitudes, and grants a central bank greater scope to lean against fluctuations in output while keeping inflation contained. The latter is particularly attractive given our dual mandate, in that better-anchored inflation expectations could produce the win-win outcome of improving the attainment of both goals. For that reason, in its consideration of its communications strategies, the Federal Open Market Committee has been discussing whether mechanisms could be put in place that could better anchor inflation expectations in a manner consistent with the institutional framework of our dual mandate.

The second of Laidler's open issues – whether central banks should lean against possible asset price bubbles – was the key topic in my discussion here eighteen months ago, at Otmar's festschrift. My answer then is my answer now. A central bank should focus on the outlook for the macroeconomy and generally relegate asset prices to the subordinate role of inputs to the forecast process. I view this as the simple application of humility that Laidler and I find so admirable. Although economic theory provides no settled answers to any topic, its predictions are especially imprecise with regard to asset pricing, which has two implications for central bankers. First, little confidence can be attached to the determination that an asset bubble exists except in the most extreme of circumstances. Second, even less confidence can be attached to predictions of the effects of policy on asset prices, and in particular on any speculative element in those prices. Moreover, monetary policy actions addressed at a perceived bubble in one sector may have undesirable effects for other asset prices and the economy more generally.

As a result, my preferred policy framework remains three-pronged. First, assign the single instrument of monetary policy to its macroeconomic objective; second, rely on regulation to erect a resilient financial structure; and, third, in the event that market judgements prove to be wrong and financial prices adjust sharply, apply the tool of monetary policy to the macroeconomic task at hand. That task is not always easily captured by simple statistical regularities. Relationships between financial markets and economic results are complex and nonlinear, especially when markets are not behaving normally. When investors are ebullient,

their expectations of outsized capital gains can feed on themselves and back on the economy. On the way down, investors' loss of confidence, a reduction in credit availability, and a tightening of terms and conditions for credit have the potential to have pronounced effects on activity and inflation.

The world is, no doubt, different from when we gathered here eighteen months ago. However, it is far too soon to pass judgement on what went wrong in the US housing market and why. I suspect that, when studies are conducted with cooler reflection, the causes of the swing in house prices will be seen as less a consequence of monetary policy and more a result of the emotions of excessive optimism followed by fear experienced every so often in the marketplace through the ages. To some extent, too, the amplitude of the housing cycle was heightened by the newness of the subprime market, the fragmentation of regulatory oversight responsibility for that market, and the complexity and opacity of the newer instruments for transforming and distributing risk. Low policy interest rates early in this decade helped feed the initial rise in house prices. However, the worst excesses in the market probably occurred when short-term rates were already well on their way to more normal levels, but longer term rates were held down by a variety of forces. And similar, sometimes even sharper, trajectories in house prices have been witnessed in some economies in which the central banks said they were paying more attention to asset prices.

The action the Federal Open Market Committee took on 18 September 2007 may be interpreted as the application of the third leg of my preferred policy triad, in that it was taken 'to forestall some of the adverse effects on the broader economy that might otherwise arise from the disruptions in financial markets and promote moderate growth over time'. In the past, such efforts to cushion the restraint induced by declines in asset prices have fuelled the assertion that Federal Reserve policy is asymmetrical in its response to booms and busts in asset prices. Such an asymmetry is said to have the potential to feed 'moral hazard' in that investors would spend less effort assessing underlying values as they were lulled by the protection they expected to be provided by monetary policy action.

In point of fact, Federal Reserve policy-makers have not been asymmetrical in intent or in actions, in that we have always focused sharply on the macroeconomy. Asset prices have mattered in the determination of policy because they have mattered for our outlook. I am confident that the federal funds rate would not have been as high in 2000 if it had not been for the level of equity prices that year, nor would the federal funds rate have been as elevated in 2006 in the absence of the tight credit spreads, low term premiums and the impetus from housing wealth. In addition, I doubt that policy would have been eased this week if housing prices had continued their upward march. In each instance, however, policy was motivated not by the desire to achieve any particular level of asset prices, but rather by the Federal Reserve's assessment of how changes in asset prices were affecting the forecast of growth and inflation.

I would also caution that a symmetrical response to the macroeconomic outlook will need to reflect the inherent asymmetries in business cycles. In the typical boom–bust cycle, asset prices tend to rise relatively gradually over a protracted

period but fall sharply in a shorter stretch of time, which financial economists refer to as 'rising by the escalator and falling by the elevator'. Perhaps because those asset prices are important to spending, key macroeconomic indicators, such as the unemployment rate, exhibit a similar pattern. It is not surprising then that a macro-focused monetary policy will leave an asymmetric footprint in the data.

In the end, my humble advice is to evaluate policy-makers relative to the tasks the law has given them. In my judgement, the record over the past twenty-five years of steady growth with two mild recessions and gradually declining inflation to a reasonably low level does not betray an asymmetry in our policy responses in the metric that counts – macroeconomic performance.

Acknowledgement

Vincent Reinhart, of the Board's staff, contributed to the preparation of these remarks. The views expressed are my own and not necessarily shared by my colleagues on the Board or the Federal Open Market Committee.

2 What have economists learned about monetary policy over the past fifty years?

Lars E. O. Svensson

What have economists learned about monetary policy over the past fifty years? In economic research, fifty years is a long time. I will actually start in 1967, with Milton Friedman's presidential address at the meeting of the American Economic Association, so I will cover only about forty years. I will give a very personal view of what economists have learned since Friedman's address that is most relevant for practical monetary policy. In order to be brief, I will have to leave out many important research contributions. I will hence be very selective, eclectic, and possibly controversial.[1]

Friedman's 'The role of monetary policy' – a classic

The title of Friedman's presidential address was 'The role of monetary policy'. It was presented on 29 December 1967, and published in the *American Economic Review* in 1968 (Friedman 1968). It remains a classic and a milestone in the development of a modern monetary policy framework.

Friedman discussed what monetary policy cannot do, what it can do, and how monetary policy should be conducted. Regarding what monetary policy *cannot* do, he noted that it cannot in the long run control real variables such as unemployment and GDP; in the long run it can only control nominal variables, such as the exchange rates, the price level, or monetary aggregates. These insights were not obvious at the time, but they are now part of the conventional wisdom.

Regarding what monetary policy *can* do, Friedman emphasized three things. First, monetary policy can avoid being a major source of disturbance. It can avoid major mistakes. Second, monetary policy can provide a stable background for the economy, preferably by achieving price stability. Finally, monetary policy can contribute to offsetting major disturbances in the economy that arise from other sources than monetary policy itself. On this last point, Friedman emphasized the danger of being too ambitious:

> [T]he potentiality of monetary policy in offsetting other forces making for instability is far more limited than is commonly believed. We simply do not know enough to be able to recognize minor disturbances when they occur or to be able to predict either what their effects will be with any precision or what

> monetary policy is required to offset their effects. . . . In this area particularly the best is likely to be the enemy of the good. Experience suggests that the path of wisdom is to use monetary policy explicitly to offset other disturbances only when they offer a 'clear and present danger.'
>
> (Friedman 1968, p. 14)

Regarding how monetary policy *should* be conducted, Friedman stated two requirements. The *first* requirement is that central banks should only target variables they can control, such as the exchange rate, the price level, or a monetary aggregate. Friedman considered an exchange rate target unsuitable for the USA, since it implies adapting to the average of whatever policies monetary authorities in the rest of the world adopt. He stated that targeting the price level would in principle be best, but emphasized that control of the price level was too imperfect, with policy actions having uncertain effects on the price level with long and variable lags. Therefore, he recommended targeting a monetary aggregate, since central banks have better control over money and the lags are shorter:

> [W]e cannot predict at all accurately just what effect a particular monetary action will have on the price level and, equally important, just when it will have that effect. Attempting to control directly the price level is therefore likely to make monetary policy itself a source of economic disturbances because of false stops and starts. *Perhaps, as our understanding of monetary phenomena advances, the situation will change*. But *at the present stage of our understanding*, the long way around seems the surer way to our objective. Accordingly, I believe that a monetary total [aggregate] is the best currently available immediate guide or criterion [target] for monetary policy.
>
> (Friedman 1968, p. 15, emphasis and clarification within square brackets added)

Here I have emphasized Friedman's qualification that the situation may change 'as the understanding of monetary phenomena advances', something to which I will return. The *second* requirement is that central banks should avoid sharp swings in policy. Therefore Friedman recommended that central banks should achieve a steady but moderate rate of growth of a specified monetary aggregate – which rate of growth and particular aggregate is not so important as long as they are explicitly stated and adopted. 'That is the most that we can ask from monetary policy *at our present state of knowledge*' Friedman concluded (1968, p. 17, emphasis added).

Monetary targeting failed, but inflation targeting has worked well

Monetary targeting was tried in several countries during the 1970s and 1980s. It constantly failed and was therefore abandoned. In contrast, when inflation targeting, the current best practice in monetary policy, was introduced in the 1990s in New Zealand, Canada, the UK, Sweden, Finland, Australia, and later in many other countries, including emerging market countries, it worked well.

The main exception to the failure of monetary targeting appears to be the great performance in Germany by the Bundesbank, which kept inflation low and stable when it was high and variable in other countries. However, closer scrutiny and many studies of the Bundesbank's monetary policy have revealed that the Bundesbank was actually an inflation targeter in disguise. Whenever there was a conflict between achieving the money growth target and the inflation target (which was called 'unavoidable inflation', 'price norm' or 'medium-term price assumption'), the Bundesbank consistently gave priority to the inflation target and willingly missed its money growth target (see Svensson (1999) for further discussion and references to some relevant studies). Thus, the Bundesbank's great and admirable performance actually demonstrates the success of inflation targeting, not of monetary targeting – although the success of a rather non-transparent inflation targeting.

Given the evidence, Friedman later actually changed his view about monetary targeting. Some years ago I had the opportunity to ask him personally at a conference at the San Francisco Fed whether the success of inflation targeting would make him revise his previous recommendation to target money instead of targeting inflation and the price level directly. He answered that he had indeed revised his recommendation. In an interview with the *Financial Times* in June 2003, Friedman also conceded that targeting money had not been a success (London 2003). In a more recent interview with the *American Prospect* in December 2005, Friedman noted that targeting the price level is easier than he previously thought, and that central banks all over the world had succeeded in achieving price stability without his money growth rule or other rules (Kuttner 2005).

Inflation targeting is in practice always *flexible* inflation targeting. That is, it aims to stabilize not only inflation around an inflation target but also the real economy. Furthermore, because inflation and resource utilization respond with considerable lags to monetary policy actions, it is necessary to rely on forecasts. Flexible inflation targeting then boils down to what I have called 'forecast targeting'. That is, it consists of choosing and implementing an interest rate path such that the resulting forecasts of inflation and measures of resource utilization 'look good'. 'Looking good' then means that inflation approaches the inflation target and resource utilization approaches a normal level at a suitable pace.

Better knowledge of the transmission mechanism

Why has inflation targeting worked so well? I believe the reason is that central banks now have a better knowledge of the transmission mechanism of monetary policy than when Friedman gave his presidential address forty years ago. This allows them to produce usable forecasts of inflation and resource utilization conditional on alternative interest rate paths or interest rate assumptions, the kinds of forecasts that are a necessary requirement for forecast targeting.

The conventional wisdom about the transmission mechanism with aggregate demand and aggregate supply/Phillips curves is still relevant, but it has been much

refined with better microfoundations and more transmission channels and, in particular, a much better understanding of the role of expectations. It is now generally acknowledged that monetary policy works mainly through the private sector expectations of future interest rates and future inflation to which central bank actions and statements give rise. Those expectations matter much more than the current interest rate. That is, monetary policy is 'the management of expectations' as Michael Woodford (2005) has expressed it. A few central banks, namely the Reserve Bank of New Zealand, Norges Bank, the Sveriges Riksbank and Sedlabanki Islands (the central bank of Iceland), now first choose and then publish what may be interpreted as an optimal interest rate path or plan, as a more effective and transparent implementation of policy. This practice will gradually become the norm, I believe. For instance, the Czech National Bank has announced that it will start doing this from 2008 (Czech National Bank 2007).

Theoretical research on the transmission mechanism has been paralleled by better empirical methods, including Kalman filtering, vector auto regression and Bayesian estimation methods. The current research frontier of monetary policy seems to be the development at several central banks of empirical Bayesian dynamic stochastic general equilibrium (DSGE) models for policy analysis, forecasting and simulation. The Sveriges Riksbank already has such a full-blown model, Ramses, in operational use (Adolfson *et al*. 2007). We are now in the process of developing Ramses to construct optimal policy projections; that is, to construct projections of inflation, output gaps and the instrument rate that minimize an intertemporal loss function that represents flexible inflation targeting (Adolfson *et al*. 2008).

Monetary aggregates matter little for monetary policy

We have also learned, I believe, that monetary aggregates matter little, or even not at all, for monetary policy. Credit aggregates may matter, though, through their impact on spending and as indicators of financial vulnerability. Certainly the financial unrest in the USA and Europe in the past few months has alerted us to the role of financial factors, credit, and risk premia in the transmission mechanism. But economic theory has not found any separate transmission channel from traditional monetary aggregates to prices. Empirically, a large amount of research has confirmed that there is little or no information in money about future inflation beyond other explanatory variables, both for high- and low-frequency fluctuations. Recent evidence on these matters was presented at the fourth ECB Central Banking Conference in November 2006; see in particular the papers by Woodford (2007a, 2007b), and Fischer *et al*. (2006). The former papers show that there is no compelling reason to assign a prominent role to monetary aggregates in the conduct of monetary policy. The latter paper does not find any evidence that the ECB's monetary pillar has had any noticeable impact on the ECB's interest rate decisions.

Furthermore, I believe that Friedman's statement that 'inflation is always and everywhere a monetary phenomenon' is often misunderstood (Svensson (2003a) provides further discussion). It refers to a long-run *correlation* between

endogenous variables, inflation and money growth, but it says nothing about *causality*; that is, which variable determines the other. The direction of causality is instead determined by the monetary policy regime. More precisely, in general equilibrium, endogenous variables are determined by exogenous variables. Which variables are exogenous and endogenous is to some extent determined by the monetary policy regime. Successful strict monetary targeting would make money growth effectively exogenous. Then inflation remains endogenous and long-run inflation will be determined by the exogenous money growth. Successful strict inflation targeting would make inflation effectively exogenous. Then long-run money growth remains endogenous and will be determined by exogenous inflation. A fixed exchange rate makes both inflation and money growth endogenous variables. Then both variables are determined by other, exogenous domestic and foreign variables, including foreign monetary policy.

The importance of the institutional framework

We have also learned the importance of the institutional framework for a stable and successful monetary policy. The Bundesbank has been a starting point and inspiration for later institutional developments in a number of countries, including the euro area. Good and stable monetary policy is now seen as resting on three pillars: (1) a mandate, with priority to price stability but also with some weight on real stabilization, (2) independence, to avoid short-term political interference and to give the central bank the possibility of achieving its mandate, and (3) accountability, which improves with transparency, creates incentives for the central bank to achieve its mandate, and provides democratic control of a powerful institution. The importance of credibility and transparency for the efficient implementation and transmission of monetary policy is also much better understood these days, and a good institutional framework contributes to the credibility of the monetary policy regime.

Inflation bias and time consistency problems

Whereas inflation was high in many countries during the 1970s and 1980s, we have seen much lower inflation in many countries from the 1990s. It seems as though the problem of so-called inflation bias, when inflation on average becomes higher than the inflation target, has been solved. Why is this? In the classic analysis by Kydland and Prescott (1977) and by Barro and Gordon (1983), an inflation bias appears when central banks have a standard quadratic loss function (the sum of squared deviations of inflation from an inflation target and a positive weight times the squared deviations of output from an output target), act to minimize this loss function under discretion, and have an overly ambitious and unrealistic output target that exceeds the natural (or potential) output level. According to the same analysis, the inflation bias disappears if the central banks commit to an appropriate simple policy rule. Does the disappearance of the inflation bias indicate that central banks have committed themselves to a simple policy rule?

As does Alan Blinder (1998), I think there is a simpler explanation for the vanishing inflation bias.[2] I believe the main explanation is that many central banks have accepted that the long-run Phillips curve is vertical and have adjusted their output target down to the natural/potential level. Central bank independence has allowed them to do this and resist political pressure from governments and parliaments. Thus, the central bank commitment is rather to a particular realistic output objective, not to a particular simple policy rule. In other words, there is a commitment to a particular policy objective, not to a particular simple rule for the setting of the policy instrument. This does not exclude that more transparency in monetary policy and the requirement of good motivations for policy choices may also work as a desirable commitment mechanism for policy.

Taylor rules are robust but often overemphasized and misunderstood

Taylor rules, where the interest rate is set mechanically as a simple linear function of current inflation and output, are frequently referred to in current monetary policy analysis. I believe that they are often overemphasized and misunderstood (Svensson (2003b) provides further discussion). In many research papers, monetary policy is modelled as if the central bank were committed to follow a Taylor rule. Taylor rules are often treated as a structural equation. But no central bank has made such a commitment, and inflation-targeting central banks respond to much more information than current inflation and output. The empirical fit of Taylor rules is actually modest: I am not aware of any estimation that has a higher R-square for interest rate changes than about two-thirds, meaning that one-third of the variance of interest rate changes is explained by things other than the Taylor rule. Taylor rules are actually empirical and simplified reduced forms, not structural equations. They are not optimal, and they lack microfoundations.

But Taylor rules are quite robust, in the sense that a Taylor rule almost never works very badly in reasonable models. Why is that? I believe the reason is that an optimal instrument rule responds to *all* the determinants of the forecasts of the target variables (inflation and resource utilization). Current inflation and output are important determinants of future inflation and output. Therefore, responding *only* to current inflation and output is not that bad and is actually quite a robust policy. If the central bank knows little about the economy and the transmission mechanism but can at least observe current inflation and output, it can do much worse than follow a Taylor rule. But today's inflation-targeting central banks have much more information, know more about the transmission mechanism, and therefore can do better than the Taylor rule. Consequently they respond to more information and deviate quite considerably from the Taylor rule.

What do we not know?

What do we not know, and where should we try to make progress in future research? I believe that it is desirable to conduct flexible inflation targeting more

explicitly. This requires more work on measures of resource stabilization and potential output, and raises difficult but important conceptual and empirical issues. I also believe that flexible inflation targeting would benefit from more use of explicit loss functions to evaluate alternative policy options and determine the optimal one. Norges Bank seems to be ahead of other central banks in this regard (Bergo 2007).

As every maker of monetary policy knows, the uncertainty about the transmission mechanism in the form of model uncertainty is always present and sometimes very substantial. We could certainly benefit from better techniques to incorporate model uncertainty in forecasts. It would also be desirable to better incorporate recent work on the modelling of financial markets and the determination of yield curves and exchange rates, the credit channel, and labour markets in the existing empirical DSGE models of the transmission mechanism for policy analysis.

Regarding the ongoing discussion about the role of asset prices in monetary policy, I believe we know enough to state that asset prices should not be targets of monetary policy. As long as their development is not a threat to financial stability and the payment system, they are relevant for monetary policy only as indicator variables; that is, only to the extent that they contain some information about the future target variables (inflation and resource utilization). However, if credit or asset price developments indicate threats to financial stability or the payment system, this may impose restrictions on the normal conduct of monetary policy and also require special action.

Conclusion

Friedman's presidential address forty years ago was full of insights that are highly relevant today. He clarified what monetary policy cannot do, what it can do and how it should be conducted. He also thought that targeting the price level directly would in principle be the best policy, but, based on the state of knowledge of the transmission mission and central banking of his time, he thought that such a policy would be too risky. Instead he recommended targeting money growth as an indirect and safer way to achieve price stability. He was careful to qualify his recommendation and leave the possibility open that 'perhaps, as our understanding of monetary phenomena advances, the situation will change'. I believe that our understanding of monetary phenomena has advanced considerably in the past forty years, that the situation has indeed changed, and that better understanding of the transmission mechanism and other macro and monetary phenomena is behind the great success of targeting inflation directly; that is, inflation targeting.

Friedman's legacy should not be identified with monetary targeting narrowly interpreted. Instead, as emphasized by Woodford (2007b), the major and lasting insights of Friedman and other monetarists are rather that (1) central banks can control inflation and therefore they can reasonably be *held accountable* for controlling inflation, and (2) a *verifiable commitment* by the central bank to price stability is important. These insights were considered unorthodox and radical forty years ago. Now they belong to the conventional wisdom. However, the insights

do not require any reference to monetary aggregates. Today's inflation-targeting central banks are indeed held accountable for controlling inflation, and the announced numerical inflation target provides the verifiable commitment, without any reference to monetary aggregates.

Furthermore, the Bundesbank's legacy should not be identified with monetary targeting. Instead, the Bundesbank is better described as an early (although disguised and non-transparent) inflation targeter. With its firm commitment to price stability, its defence of its independence, and its pragmatic and competent policy-making, the Bundesbank conducted German monetary policy steadily and calmly through difficult times when other central banks failed. For this, it deserves our deep appreciation and admiration.

Acknowledgement

All remaining errors are my own. The views, analysis and conclusions in this chapter are solely the responsibility of the author and do not necessarily agree with those of other members of the Riksbank's staff or Executive Board.

Notes

1 Clarida *et al*. (1999), Walsh (2003), and Woodford (2003) provide more complete coverage of recent advances in the theory of monetary policy.
2 Blinder had made this point already in his Marshall Lectures at Cambridge University in 1995, which morphed into his Robbins Lectures at the LSE in 1996, but they were not published until his 1998 book (Blinder 1998). A similar point was later made in Svensson (1997).

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Discussion

Takatoshi Ito

Overview

Lars Svensson gave an overview about the progress economists have made in understanding the effects of monetary policy, the role of the institutional framework and the advantages and disadvantages of different monetary policy strategies. I shall present some experiences from Japan. Monetary policy in Japan is of particular interest, as the Bank of Japan has been confronted with several very serious challenges, in particular an asset price bubble in the 1980s and a long-lasting problem of deflation in the 1990s. I shall also highlight the relevance of some institutional factors which played an important role for the monetary policy in Japan.

In the past fifty years, many central banks have evolved in their legal statuses, legal mandates, operational procedures and disclosure practices. They mostly share the common traits but with a few idiosyncratic differences. I will also comment on the common trend in central banking with some emphasis on the Japanese experiences.

Legal independence has been enhanced in many central banks, including the Bank of England and the Bank of Japan in the 1990s. When the European Central Bank (ECB) was created, its legal independence was set as strong (or even stronger) as the most legally independent central bank among its predecessor banks, namely the German Bundesbank. The Federal Reserves System in the United States has also been considered to be legally independent. For example, Governors of the Federal Reserve Board are appointed for fourteen years and the Chairman of the Federal Open Market Committee has been appointed for four years. Many other central banks in advanced and emerging market economies also went through changes to enhance their legal independence. The Bank of England was given independence in 1997. The new Bank of Japan law enhancing the Bank's independence was enacted in 1998.

In many cases laws and practices governing a central bank list objectives of the central bank that have not been limited for price stability alone. For example, the full employment is mentioned, as in the United States, and maximizing the economic power was mentioned in the old Bank of Japan law. However, the trend is to limit the objective to price stability, the single mandate. The strongest case

was the Bundesbank that had the public consensus towards price stability, and practised policy towards that goal. The Bundesbank record of achieving a low inflation rate was excellent, throughout the Bretton Woods era and beyond.

Independence has to come with transparency and accountability on the part of the central bank. Increasingly, the central banks are disclosing minutes and transcripts of monetary policy committee meetings. Voting records in those central banks with minute disclosure have also been disclosed so that each member of the committee has to show and take responsibilities for their judgements. To be accountable, the central bank needs to clarify what price stability means. The clearest way of setting up performance measures is to announce numerically the target of monetary policy. Many central banks have adopted the inflation-targeting framework following the Reserve Bank of New Zealand of 1990.

In addition to inflation targeting, which became widespread among others, the Reserve Bank of New Zealand is unique in having monetary policy decisions being made by the Governor alone. He is solely responsible and accountable. The institution is set up so that if the inflation-targeting range is missed, the Governor has to submit an explanation, with a review by the governing committee (without a say in monetary policy decisions), to the Treasury. In the worst case, which has never happened, the Governor could be dismissed.

The Bank of Japan, under the new law, has reorganized the monetary policy meeting structure by appointing experts on monetary policy, and has started publishing minutes and voting records, although the Bank has not adopted the inflation-targeting framework.

Benefits of independence, single mandate, transparency and accountability, often complemented by the inflation-targeting framework, are the stable low inflation rates among advanced countries and most emerging market economies in the past ten years. The science and practices of modern central banking were first shown by the German Bundesbank decades earlier.

Legal independence

Many central banks have achieved legal independence in the past quarter century. By legal independence, it is meant that the central bank can make monetary policy without legal direction of explicit or implicit pressure from the Ministry of Finance (Treasury). The guaranteed tenure of the governor for more than five years is considered to be an important benchmark for legal independence. A comprehensive method of 'scoring' legal independence was invented by Cukierman *et al*. (1993).

The major drive for legal independence and price stability as the single mandate has been a result of both theoretical and empirical research in economics. Various studies showed that more independent central banks tended to produce lower inflation rates. Theoretical advances in the topics like 'rules vs. discretion' and 'inflation bias' also convinced many academics and policy makers of the importance of central bank independence.

However, legal independence may not be necessary or sufficient for *de facto* independence. A legally independent central bank could become weak if the Governor, or the decision-making body, is weak and incompetent. Strong pressure from the government and public opinion could force the resignation of a governor. Even the Chairman of the Federal Reserve, who is regarded as very independent, could be forced out, such as in the case of out-of-control inflation in the second half of 1979, resulting in the change of the Chairman in 1979. The Bank of Japan, prior to 1998, was very weak in legal status, but had *de facto* independence after 1975, according to Cargill *et al*. (1997). Indeed, the Bank of Japan was an 'outlier' in the regression of the inflation rate on the independence score, *à la* Cukierman *et al*. (1993). The inflation rate using the data between 1975 and 1998, when the current law was enacted, was much lower than other OECD countries (and all other countries) considering its low score of legal independence.

Cargill *et al*. (1997) presented a hypothesis to solve the puzzle of why the Bank of Japan was such an outlier. They argued that the Bank of Japan had achieved *de facto* independence by 1975 owing to the experience of the very high inflation episode of 1973 to 1974. The Bank of Japan was under heavy pressure in 1972 to 1973 both to ease the yen appreciation pressure following the collapse of the Bretton Woods system in August 1971 and to help finance the national infrastructure projects, under the banner of 'Reconstructing the Japanese Archipelago' of Prime Minister Tanaka. The Governor sought to increase the interest rate in 1972 but was unsuccessful. In the case of Japan, the Bank of Japan law prior to 1998 endowed a strong power to the Ministry of Finance and the Governor could not and did not fight back. The inflation rate was already above 10 per cent by the summer of 1973. In October 1973, the (first) oil crisis erupted with an embargo of oil from Arab states and a sharp increase in oil prices. As Japan was highly dependent on oil imports and the ratio of oil imports to total imports was as high as one-third, the impact of the oil crisis on Japanese inflation and output was devastating: the inflation rate rose by almost 30 per cent and the output growth declined to negative territory in 1974 – a severe case of stagflation (see Cargill *et al*.(1997, Ch. 3)).

The Bank of Japan used the episode to their advantage after the inflation rate was brought back to a single digit in 1975 to 1976 at the cost of the worst recession since the 1950s. The Bank floated the idea of targeting monetary growth (M2) in order to achieve price stability in the medium term. The Bank also started to argue that the Bank's decision about monetary policy should not be influenced by the government, or face a possible flare-up of inflation as in 1972 to 1973. From 1978, the Bank started to announce the 'forecast' of monetary growth – which was taken by many as a target, although the Bank denied that it was a target. Cargill *et al*. (1997) argued that the actual policy of the Bank of Japan was more flexible than the monetarist rule, according to which the monetary base should grow at a constate rate (k% rule), accommodating any shocks to the monetary aggregate rather than offsetting the shock in the following periods (e.g. restraint after positive shock) . The main benefit of emphasizing monetary aggregate was to focus on medium-term stability of prices rather than fine-tuning, which may result in a time inconsistency problem.

From 1975 to 1985, the inflation rate in Japan had gradually declined without having an adverse effect on the output growth. The gradual disinflation during this period is credited to the skilful management of monetary policy. In particular, the quick response to the second oil crisis in 1979, by raising the interest rate to prevent inflation, was hailed as a success. Using the inflation rate as a criterion, the response of the Bank of Japan to the first oil crisis was the worst, while the response to the second oil crisis was the best among the G7 countries.

From 1981 to 1984, the dollar was strengthening steadily, due partly to the high interest rate in the United States. The current account deficits in the United States had become larger during the same period. Large current account deficits in the United States, reaching the 3.5 per cent of GDP, became an international concern and prompted a concerted action of the Plaza Agreement in September 1985. The concerted interventions by the Group of Five countries complemented by subsequent monetary policy actions produced a large and sustained dollar depreciation *vis-à-vis* the other G5 currencies.

In the second half of the 1980s, the inflation rate was maintained to be very low, but the asset and land prices rose sharply. The value of typical commercial property tripled between 1985 and 1990. The stock prices also rose sharply during the same period. Although it was not clear whether the price increases were due to changes in macro fundamentals or a speculative bubble, this was a bubble in retrospect (see Ito and Iwaisako 1996; Cargill *et al*. 1997, chs 3 and 5).

The monetary aggregates that had been closely watched by the Bank of Japan since the mid-1970s started to increase sharply in around 1987. However, the increase in monetary aggregates was thought to be mainly a result of financial liberalization that took place at that time.

The episode of the low interest rate from February 1987 to May 1989 is often looked back upon with regret by some Bank of Japan economists who think that assigning monetary policy to prevent a bubble is a good idea from the financial stability point of view (see Cargill *et al*. 1997, chs 3 and 5).

A bubble would eventually burst, and the bursting bubble creates a non-performing loans problem. Moreover, some Bank economists argue that the interest rate was forced down due to 'international cooperation'. This is regarded as another episode of the non-independent Bank making a mistake due to pressure from the government.

However, opposing views are also possible. First, it would be very difficult to raise the interest rate for containing asset prices while the CPI inflation is less than 2 per cent. The required interest rate hike to stop an asset price bubble would have been large, while it might have caused output collapse and deflation.

The stock prices started to decline in 1990, and the land price in 1991. Those prices continued to decline until 2003. The average stock and land prices became about a quarter of the peak values. The burst bubble caused tremendous stress for the Japanese economy. The so-called lost decade was related to the bursting bubble and losses of asset values that hit corporations and banks. Borrowers became non-performing and major banks had to take capital injections. The Ministry of Finance, the principal bank supervisor, could not take tough actions but allowed

forbearance. This was a mistake, as the non-performing loans problem became much larger. In the meantime, certain scandals in the Ministry of Finance were revealed. This prompted two changes. First, bank supervision was separated from the Ministry of Finance. The Financial Supervision Agency (later the Financial Services Agency) was created. Second, the Bank of Japan was given independence from the Ministry of Finance by enacting a new Bank of Japan law.

Under the new Bank of Japan law, a governor and two deputy governors are appointed for the term of five years and firing any of them by the government during their term is impossible. In addition, six members are appointed to the Monetary Policy Board, which was revamped in organization. Their status is also protected by law. Although two government representatives attend the monetary policy meetings, they cannot vote in the monetary policy decision.

Legal mandates and inflation targeting

One of the major changes in the history of central banking occurred in the 1990s when New Zealand adopted inflation targeting. The Reserve Bank of New Zealand announced the target inflation rate based on the accord with the Treasury, and guided the policy to achieve the target. If the target is missed by a wide margin (i.e. more than plus or minus 1 per cent), the Governor is held accountable. The accord made it clear that the first priority of the central bank is price stability.

The new Bank of Japan law was enacted in April 1998. In addition to independence, the Bank of Japan obtained the single mandate, price stability. The Bank of Japan on one hand rejects inflation targeting, but on the other hand started to announce inflation 'forecasts' of nine Board Members. The Bank of Japan is careful to emphasize that forecasts are not targets.[1]

Fight against deflation

The very adverse environment occurred in 1997 to 1998. Several banks failed and a severe credit crunch occurred. The growth rate in 1998 was negative, and prices started to fall. No concrete action was taken until February 1999, when the zero interest rate policy was essentially employed. The call rate was brought down to zero in the following weeks, and this was only a beginning. However, the economy became slightly better in the first half of 1999, so that the Bank of Japan raised the interest rate from zero to 0.25 per cent in August 2000. Two dissenting votes were cast in the decision to end the zero interest rate policy.

The economy worsened again towards the end of 2000. The Bank of Japan eased in March 2001, again lowering the interest rate to zero, but with an additional measure, Quantitative Easing (QE). This guaranteed to have more liquidity in the market than before. The Bank increased the purchase of long-term government bonds as a part of making sure that liquidity is provided. In March 2006, QE ended, and ZIRP reinstated. In July 2006, the first rate hike since August 2000 was implemented.

Concluding remarks

The Bank of Japan offers interesting case studies of central banking – some of them shared by other central banks and others quite unique to Japan thus far. Operation of monetary policy during the fixed exchange rate regime in 1949 to 1971 was a textbook case. Monetary policy was dedicated to keep the fixed rate by tightening the conditions when trade surpluses became larger and by relaxing them when trade surpluses produced some buffer in foreign reserves.

Japan experienced an inflation rate higher than the United States – which usually results in devaluation – but maintained the fixed exchange rate from 1949 to 1971. This is a case of the Balassa-Samuelson effect. The county with higher productivity growth (in tradable sectors in relation to non-tradable sectors) experiences real appreciation, and real appreciation may take the form of nominal appreciation of the currency or of a higher inflation rate than the country with lower productivity growth, in our case the United States.

The Bank of Japan made a mistake in its exit from the fixed exchange rate regime, and transition to managed float. To prevent yen appreciation, the Bank of Japan allowed the inflation rate to become high. The same mistake seems to be repeated in China now.

The experiences of the bubble and its burst are not unique to Japan. A bubble following financial liberalization is also common to other countries. However, the magnitude in Japan (the mid-1980s to 1990 and 1990 to 2003) was much larger than any other historical experiences after 1950. Some draw lessons that the central bank should not allow a bubble to be formed in the first place. Put differently, the Bank should have 'containing asset price inflation' as an objective separate from its primary objective of a low and stable CPI inflation rate. Others feel that the bubble-and-burst cycle cannot be prevented by monetary policy alone, and asset prices cannot be an additional objective variable. Many inflation-targeting advocates argue that asset prices are important so long as they affect future CPI inflation rates. Resilience and robustness of the banking sector to withstand shocks is important, if monetary policy is not aggressively preventing a bubble from forming.

Another question is how seriously the central bank should attempt to encourage the declines of asset prices that had increased due to a bubble. The Bank of Japan in 1990 and 1991 seemed to be putting a last nail in the coffin of a bubble. However, this was considered to be a mistake by the Federal Reserve. When the tech stock bubble collapsed in the USA in 2001, the Federal Reserve acted very quickly to lower the interest rate for soft landing.

A truly unique policy challenge that the Bank of Japan experienced was its fight against deflation with the zero interest rate (1999 to 2006). Even under the zero nominal interest rate, deflation makes the real interest rate positive. The worse deflation makes the real interest rate higher, and the 'zero bound' of the nominal interest rate means the central bank becomes impotent in its traditional weapon. A vigorous debate took place whether non-traditional policy tools should be applied when the nominal interest rate is already driven down to zero in the

deflationary environment. Several authors recommended unusual policies, such as unsterilized intervention, purchases of risky assets ranging from equity mutual funds to real estate funds (see Krugman 1998; Svensson 2001). The Bank of Japan did not adopt these radical recommendations. Instead, it committed in March 2001 to keep the zero interest rate policy until deflation was over. Later the Bank of Japan increased the monthly purchase of long-term bonds and provided liquidity so that the excess reserves at the Bank of Japan (current account of commercial banks held at the Bank of Japan) will be maintained. The outstanding amount of current accounts became a monetary instrument. This is a quite unique experience. It took almost eight years to overcome deflation.

Understanding this difficulty, the Federal Reserve drew a lesson. First, it is important not to fall into deflation; second, once deflation occurs, be prepared to take decisive action early. The aggressive decline in the interest rate in 2001 to 2002 by the FRB was attributed to the determination to avoid deflation. The experiences of the Bank of Japan influenced the thinking of other central banks.

Note

1 See Ito (2004) for why the Bank of Japan is hesitant in embracing inflation targeting.

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Discussion

Bennett T. McCallum

It is an honour and a pleasure to be here today, participating in the fiftieth anniversary programme of the Deutsche Bundesbank, a great institution. With respect to our topic, 'What have economists learned about monetary policy over the past fifty years?', there are many interesting items since a lot has happened during this span. In 1957, the Bretton Woods system was just beginning to operate; the famous *Economica* paper by A. W. Phillips (1958) had not yet been published; the Brookings and MPS econometric models had not been developed; Milton Friedman had begun his assault on Keynesian orthodoxy but 'monetarism' had not evolved; neither John Muth nor Bob Lucas had received their Ph.D. degrees; central bank governors were not regularly featured in newspaper or television reports; and no one was discussing inflation targeting, transparency, financial derivatives, or Dynamic Stochastic General Equilibrium (DSGE) models.

For the most part I will present my own response to the posed question, rather than going through comments on Lars Svensson's impressive review of developments and ongoing challenges. In a few places, however, I will refer to specific points of his.

So what, if anything, have economists learned over the past fifty years that is crucial for monetary policy? Surely it is not that an overly expansive monetary policy will result in inflation and exchange rate depreciation or that real output growth cannot be permanently increased by monetary means – although there was certainly a need at times during those 50 years to re-emphasize these ancient truths. Nor was it the recognition that an altered policy stance might have temporary effects on real variables, as David Hume had discussed in 1752. But I believe that we (i.e. monetary economists) have made substantial strides during the period, and that these have been primarily directed towards the development of dynamic analyses relevant for monetary policy. In 1957, the basic tools of dynamic modelling for policy analysis had not been created.

In this regard I believe we should not be overly critical of Phillips' (1958) suggestion that there are significant connections between inflation and the prevailing levels of real macroeconomic activity. The point is that, to conduct policy for actual economies, central bankers need to have some understanding of the relevant dynamic relationships. Modigliani (1944) and Patinkin (1956) had shown

that a monetary stimulus would expand output in a static 'short run' analysis in which the nominal wage rate is treated as fixed, suggesting that if there is some stickiness in nominal wages or prices then real effects of this type will be generated temporarily. But that is not enough of an understanding for a central bank in a democracy, in which there is a widespread desire for the bank to help avoid unemployment as well as inflation. Some notion of lags and adjustment speeds is essential in actual practice. A Phillips-curve relationship, between the (rate of) change of a nominal variable and the level of some aggregate real variable (output or employment), provides a dynamic link that connects periods analysed by the static models of Modigliani and Patinkin. Such a link is clearly essential for realistic analysis. Of course, the original Phillips relationship was formulated in a fundamentally unsatisfactory way, as Friedman (1966, 1968) and Phelps (1967) pointed out, and the necessary modification introduced expectations concerning inflation as a central ingredient. Thus the nature of the model, which was created by combining the Hicks-Modigliani-Patinkin macro model with the expectations-augmented Phillips adjustment relation, depended fundamentally on the manner in which expectations were formed.

Initially, the adaptive expectations hypothesis of Cagan (1956) and Friedman (1956) provided the specification of expectational behaviour. However, as Sargent (1971) and Lucas (1972a) demonstrated, this specification was one that permitted expectational errors to be systematic and therefore inconsistent with the economist's general approach to model building. Muth (1961) provided the method for treating expectations as being formed in an optimizing manner, consistent with the profession's treatment of decisions relating to other economic activities such as allocation of expenditures across commodities and time periods, choice of inputs and outputs in production, and so on. Then Lucas (1972b) showed how to apply Muth's rational expectations (RE) hypothesis to macro and monetary policy analysis. This step was somewhat difficult for the profession, because it necessitated concepts of equilibria that pertained to stochastic processes, rather than to prices and quantities in a given period, and it required new econometric techniques.[1] In terms of monetary policy, it became essential to think about policy as an ongoing rule of behaviour, not as an unconnected sequence of point-in-time policy actions. By now the profession has absorbed these messages and concepts fairly thoroughly, though I still occasionally hear some prominant members of the profession make statements that do not reflect the dynamic conception of policy analysis.

Of course, there are remaining issues concerning policy 'commitment' vs. 'discretion' that have not been resolved. How should analysts model the feasible alternatives? Should we conceive of central banks as optimizing with respect to conditional or unconditional expectations of future payoffs? My own view is that analyses based on conditional measure are unrealistic, beyond the reach of economists and econometricians for the foreseeable future. After any change in policy behaviour, some time will pass before market participants and policy-makers will settle into a new stochastic, dynamic equilibrium of the type that can be studied scientifically. Therefore the proper way to conduct policy analysis is to

look for policy rules that promise to deliver good performance on average over time, taking account of the great deal of uncertainty that prevails concerning the structure of the economic system. In this regard, my views differ to some extent from those of Lars Svensson, as readers of our exchange in the St Louis Fed's Review of September/October 2005 will know, but the differences concern details rather than the basic strategy.[2]

In addition to improving our understanding of the dynamic output–inflation relationship, we have also made strides in understanding the role of interest rates in monetary policy. The crucial distinction between real and nominal interest rates was not unknown in 1957 – nor in 1802[3] – but it was often ignored in both theoretical and empirical analysis prior to its emphasis by Friedman (1956) and other Chicago School economists during the 1950s and 1960s.[4] More recently, the role of interest rates as the primary instrument/indicator variable for monetary policy-making has been prominent and important, with major contributions due to Woodford (2003) and Taylor (1993), building on earlier work by Goodfriend (1991) and McCallum (1981).

It will be clear from the foregoing that I am entirely supportive of modelling that is designed to reflect optimizing behaviour in a dynamic context. Accordingly, I think that the development of DSGE models has been an important step in the improvement of monetary policy analysis. But it must be kept in mind that to have a cogent theoretical structure is just half the battle; the model must also be consistent with actual data to have a reasonable hope of being structural, and thus suitable for policy analysis, in fact as well as in the researcher's aspirations. In addition, having a cogent theoretical model requires that all lagged effects, justified by reference to 'adjustment costs', must have cost structures that are genuinely plausible.

What about the upsurge of inflation targeting? In my view this has been a predominantly positive development. The most constructive aspect of inflation targeting in practice, however, is that it has tended to shift the attention of central banks towards the goal of keeping inflation low – but not negative – and away from the other goal that in fact all central banks have (i.e., helping to smooth out cyclical movements in real aggregates including employment and output). The outstanding improvement in practice, relative to the awful decade of the 1970s, has been that central banks have taken on responsibility for inflation performance and have recognized that their primary goal should be the maintenance of inflation rates that are low enough that they can be neglected in private decision-making, as Alan Greenspan put it. There is some danger, I believe, in the more recent tendency for inflation-targeting research to depart progressively from the original idea of inflation as the sole operational objective. In addition, as an aside, I would say that the designation of an interest rate as the instrument/indicator 'operating target' of policy is not an *essential* ingredient of inflation targeting, usual modelling practice notwithstanding.

What about the emphasis on transparency and communication? Yes, I would agree that there have been major changes in this dimension, which are mostly welcome, but I also believe that the example of the Bundesbank – the most

successful central bank over the 25 years leading up to 1999 – suggests that what is truly important in this regard is not that the central bank must provide a great deal of detailed information about its models and procedures. What is important, rather, is that it conveys to the public that it will be resolute in achieving its primary objective, with that objective being control of inflation at a low rate.[5] And the best way to convince the public of that resoluteness is to be, in practice, resolute.

Finally, this discussion has – unlike the Bundesbank's thinking – neglected the international dimension of monetary policy. In that regard, the past thirty-five years have witnessed the first extended occasion in history that the world has been on a fiat (paper) money system with no metallic standard and no plan shortly to return to one. During this period it has become clear to many analysts that 'monetary policy' and 'exchange rate policy' are actually not two different policies but instead two aspects of one policy. Thus independent paths cannot sensibly be chosen for the exchange rate and the price level. This proposition is widely understood today, but there are some official arrangements that are inconsistent with it. Specifically, in several leading economies, including the United States and Japan, nominal exchange rate management is formally assigned to the fiscal authority even though the central bank is supposed to be independent and in charge of price-level behaviour. In practice this has not recently been troublesome – except arguably in Japan – but in principle such an arrangement is internally inconsistent. It is an anachronism, left over from the Bretton Woods years, that should in my opinion be corrected.

Notes

1 A notable early application was Taylor (1979).
2 See McCallum and Nelson (2005) and Svensson (2005).
3 See Thornton (1802/1978, p. 336).
4 Indeed, numerous econometric studies neglected the distinction even into the early 1970s.
5 This point of view has much in common with that of Nelson (2007), which emphasizes recognition of inflation as a 'monetary phenomenon'.

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Discussion

Athanasios Orphanides

It is an honour to participate in this celebration marking the fiftieth anniversary of the Deutche Bundesbank. So much of what we have learned about *good* monetary policy is embodied in the *actual* historical monetary policy of this great institution. As a European, and on behalf of all European citizens, I believe that we owe a debt of gratitude to the Bundesbank for providing the foundation for the policy we are now continuing with the European Central Bank for the benefit of Europe as a whole.

Our topic is what monetary economists have learned about policy in the past fifty years, but in my view we need to study not only what economists learn but also what economists may forget and perhaps rediscover over time. In my reading of history of the past fifty years, I find that we have learned some new lessons, but many of the things that appear to be new lessons are actually old lessons that have been rediscovered.

The most important lesson learned concerns the design of institutions for monetary policy. The key for institutional design has been the recognition of price stability as the primary operational objective of monetary policy, achieved by providing a legislative mandate for price stability to the central bank and by endowing the central bank with the independence necessary to pursue its primary objective. The most important lesson rediscovered – and I hope we don't keep forgetting and rediscovering it – is how essential it is to acknowledge the limits of our macroeconomic knowledge and the virtue of being modest in the objectives we set for monetary policy.

Monetary economists have been arguing about the virtues of price stability for centuries but it has only been during the past fifty years that politicians in many nations have taken the necessary steps to ensure that price stability would be the primary operational objective of monetary policy. In Europe, this has been enshrined in the Maastricht Treaty. The mandate for the European System of Central Banks states (Article 105(1)): 'The primary objective of the ESCB shall be to maintain price stability.' Full stop! It is important to keep this in mind. Of course, subject to that, the central bank should also do whatever else it can do to enhance the welfare of European citizens. This is why the Treaty continues: 'Without prejudice to the objective of price stability the ESCB shall support the general economic policies in the Community.' But the crucial element

is the recognition of the primary nature of price stability as the central bank's objective.

Not all legislative mandates around the world are similarly formulated. For example, in the United States the Federal Reserve has a so-called 'dual mandate,' listing maximum employment and growth as a goal along with price stability. However, over the past quarter of a century this mandate has been interpreted in a manner that also recognizes the primacy of price stability.[1] In my view, the success of monetary policy in the United States over the past quarter of a century can be largely attributed to this proper interpretation of how monetary policy can best contribute to economic welfare. Describing the monetary policy strategy of the Federal Reserve, for example, Alan Greenspan referred to: 'our goals of price stability and the maximum sustainable economic growth *that we associate with it*'[2], thus recognizing the primacy of price stability and its importance for achieving maximum sustainable growth.

Unless it is clearly stated, however, there is a risk that the primacy of price stability as an operational objective may at times be incorrectly interpreted. Thus, to avert the risk of misinterpretation and the ensuing policy errors, it is preferable to strive for clarity in the mandate which would ensure full political support.

The benefits of price stability are certainly far-reaching. That said, price stability should be the primary objective of monetary policy not because it is the ultimate welfare objective but because it is a necessary precondition for fostering economic prosperity. In essence, it is better to view price stability as a very convenient intermediate target – an operational objective for a central bank – a guide whose achievement is sought in order to facilitate a nation to grow and prosper over time. I make this distinction because, while I believe that we can all agree that the historical evidence supporting the importance of price stability is overwhelming, theoretical work in macroeconomics does not always lead to this conclusion without additional assumptions. And the validity of such assumptions may be hard to confirm on the basis of available evidence. For example, existing microeconomic foundations for the primacy of price stability in aggregate macroeconomic models are not thoroughly convincing. As a result, much of the literature on policy evaluation posits that price stability is one of the ultimate policy objectives to avoid implausible policy conclusions. However, the fact that we may not yet have satisfactory microfoundations for the analysis should not confuse the situation. The historical experience is too overwhelming to ignore the pitfalls of formulating policy without price stability as the dominant operational policy guide.

Perhaps the most important advantage stemming from clarity regarding the primacy of the price stability objective is that such clarity promotes credibility and facilitates the anchoring of inflation expectations. This benefit becomes crucial in the presence of adverse shocks such as supply disturbances which may result in temporary increases in inflation and shortfalls in production. Maintaining well-anchored inflation expectations provides flexibility to respond to temporary economic disturbances that might otherwise wreak havoc on the real economy, and can thus help the central bank maintain overall stability. Credibility also provides

flexibility for swift responses to financial disturbances. For example, injecting liquidity into the economy during periods of financial turmoil is an option that a credible central bank can consider without risking an adverse response in inflation expectations. That is, when the central bank's primary focus is price stability, the public may be assured that the central bank will not lose sight of its objective. As a result, expectations need not be adversely influenced by policy actions taken in response to financial disturbances that might otherwise be interpreted as potentially inflationary. Thus, policy becomes more effective overall.

Regarding operational policy design, I would argue that the most important lesson learned over the past fifty years is something that was known in the past but was forgotten – and may still be, perhaps, insufficiently appreciated by monetary theorists. This is acknowledging the limits of our knowledge and its implications, which I discuss below.

I believe that we all recognize the importance of policy guided by systematic policy rules rather than by policy-makers' discretion. But what does this mean in practice? In my view, we need a disciplined focus on simple operational policy guidelines that could be implemented in practice. These guidelines should not be mechanistic, such as simple formulas responding to recent outcomes in the economy. In light of the transmission lags in monetary policy, policy actions must be, to a large extent, pre-emptive and be formulated on the basis of forecasts. The key is the identification and evaluation of the risks to price stability in the outlook. Thus, inflation forecasting is a necessary component of the policy process and successful simple rules ought to take into account the risks that inflation might deviate from a policy-maker's price stability objective in the short and medium term.

Still, successful policy does not require a complex policy framework and complicated model-based inference and calculus. Indeed, better outcomes are likely with simple, robust frameworks.[3] The monetary policy framework of the Deutsche Bundesbank, with its focus on guidance from monetary aggregates for assessing risks to price stability, serves as an excellent example. It succeeded in delivering price stability where many other, more complex approaches failed. The inflation targeting framework, as implemented by the Reserve Bank of New Zealand during the 1990s, serves as another example. In the case of inflation targeting, the inflation forecasts served as direct guides to policy and the policy framework could be easily described only in terms of these forecasts. Thus policy decisions to ease or tighten could be deduced by examining deviations of the inflation forecast from the central bank's target. The rule could be simply stated as adjusting monetary conditions so as to achieve gradual convergence of the forecast to the target.

But why focus on simple operational policy rules? Why not opt for more complex policies that might allow policy-makers to fine-tune the performance of the economy, as may be derived by modelling exercises and applying well-known optimization techniques such as optimal control?[4] The answer is the crucial lesson rediscovered at least twice over the past century in monetary economics – that in designing policy we ought to respect the limits of our knowledge.

The economic theorist can be easily lured by the beauty of the latest 'state-of-the-art' model of the macroeconomy. Armed with such a model, the economic theorist may succumb to the temptation to assume that this model is correctly specified, abstracting from potential errors, and proclaim that policy should be identified as the solution to a mechanical optimization problem based on the model. Such policy prescriptions, the theorist may then claim, must be superior to simple guides provided that the model is assumed to be correct. The trouble is that in the history of macroeconomics we can identify numerous 'new eras' that have come and gone when theorists proclaimed to have figured out the correct model of the economy and the implied enhanced ability of policy to do more than merely stabilize the price level. The pattern, usually, is to identify real targets for the economy that in theory are compatible with price stability and then suggest that policy should be guided by these targets, in addition to price stability.

The experience of the Federal Reserve following the 1920s and the 1960s presents useful examples of the pitfalls of failing to respect the limits of macroeconomic knowledge. These are episodes when policy was arguably influenced by theory in a rather detrimental manner. On both occasions, policy-makers were urged to improve on their strategy of focusing on achieving and maintaining price stability by attempting to fine-tune economic activity as a means of fighting and perhaps eliminating business cycles. Milton Friedman used the first of these episodes to introduce his seminal presidential address delivered in 1967. As he pointed out, the concept of fine-tuning (though not the name) was first introduced by Federal Reserve economists during the 1920s, when for the first time monetary economists thought that their knowledge of the monetary transmission mechanism was sufficient to allow them to engage in fine-tuning:

> In the first flush of enthusiasm about the newly created Federal Reserve System, many observers attributed the relative stability of the 1920s to the System's capacity for fine tuning – to apply an apt modern term. It came to be widely believed that a new era had arrived in which business cycles had been rendered obsolete in monetary technology. . . . The Great Contraction destroyed this naïve attitude.
>
> (Friedman 1968, p. 1)

Undoubtedly, Friedman talked about this first experience with 'fine-tuning' in the United States because he was concerned that the lessons had been forgotten and could detect signs that a similar mistake was about to be repeated. His concerns proved to be justified.

Following Friedman, it may be instructive to use 'apt modern terms' to describe the policy mistakes following the 1960s episode of overconfidence in proclaiming a new era when business cycles could be all but eliminated. I will look at a specific policy decision couched in terms of modern theory in order to highlight what I believe is a rather risky interpretation of how central banks should implement the so-called 'flexible inflation-targeting' framework.

To set up the historical example, I note that conventional theoretical models of the policy problem are typically formulated in terms of gaps from 'equilibrium' or 'natural rate' concepts, often denoted with stars. For example, we have:

- the natural rate of interest, r^*
- the natural rate of unemployment, u^*
- the level of potential output, q^*

A key issue is how these stars (the starred variables) should be used for policy design if they are not reliably measured. A theorist can formulate a model and say that the economy may be described as underperforming or being overheated in terms of the output gap, introducing one of the stars – potential output – or, equivalently, the related star referring to the unemployment rate. The real side of the economy may be linked to inflation by associating a positive output gap with increasing inflation and a negative gap with decreasing inflation. Thus, knowledge of a real economic activity star can lead to a gap-based policy that in theory can be quite useful in controlling inflation. Furthermore, policy may be described as accommodative or restrictive in terms of the real interest rate gap, based on the interest rate star.

By definition, in this framework knowledge of the stars can be very useful for forecasting. The real interest rate gap should help forecast the output gap and the output gap should in turn help forecast inflation. Thus, assuming sufficient knowledge, the theorist may suggest that this framework could be applied and be used for policy design. Indeed, under some assumptions we can design situations where the mechanical optimization solution corresponds to optimal control answers arising out of this. An example is to choose the policy rate (and its path over time) so that the projected path of the real interest rate gap ($r_t - r^*$) is such that forecasts of the inflation gap ($\pi - \pi^*$) are roughly proportional to forecasts of the output gap ($q - q^*$). This may be proclaimed to be good policy advice.

A significant problem, however, is that if the stars and their evolution over time are unknown, policy advice from this framework can be very problematic. Indeed, this was emphasized by Milton Friedman in his presidential address:

> One problem is that [the policy-maker] cannot know what the 'natural' rate is. Unfortunately, we have as yet devised no method to estimate accurately and readily the natural rate of either interest or unemployment. And the 'natural' rate will itself change from time to time.
>
> (Friedman 1968, p. 10)

Needless to say, and as anyone who has delved into empirical exercises attempting to measure the stars can attest, we have made no discernible progress since Friedman's presidential address in measuring the stars with greater accuracy in real time.

To return to the historical example, I wish to explore how the beginning of the fine-tuning mistake committed by the Federal Reserve at the turn of the 1970s could be described in terms of the interpretation of 'flexible inflation targeting'

I noted earlier. I focus on the policy decision at the August 1970 FOMC meeting and consider what policy decision Federal Reserve policy-makers should have arrived at if they had attempted to follow modern calls for setting policy on the basis of forecasts of the output gap and inflation gap, gradually closing both as generally implied by the optimal control exercises that form the basis for the interpetation of 'flexible inflation targeting' that I consider risky. Would such procedures have resulted in good economic outcomes?

Figure 2.1 presents the data and forecasts regarding inflation and the output gap as available to the FOMC at the time of the August 1970 meeting. For visual convenience, the figure aligns the path of inflation (and its deviation from an assumed 2 per cent inflation target) and the path of the output gap. Note that with actual and projected inflation remaining above the assumed target, a policy-maker following the simple guide of an inflation targeter would have tightened policy so as to bring inflation back towards target. Needless to say, had this simple inflation-targeting rule been followed consistently during that time, we would not have experienced the Great Inflation of the 1970s in the United States. But flexible inflation targeting, with sufficient flexibility to be guided by the forecast of the output gap, would have suggested a very different answer. The flexible inflation-targeting policy-maker would have noticed that the output gap was extremely negative and not projected to improve in the forecast horizon. Thus, in order to maintain the appropriate degree of proportionality and close both the inflation and output gaps together, policy would have to be eased. Judging from the output gap forecast, there was a lot of room for easing policy. Indeed, that should have been the optimal policy in such a framework.

Interestingly, the analysis of the Federal Reserve staff, as quoted in the FOMC Committee Memorandum of Discussion, was in line with this interpretation of 'flexible inflation targeting'.

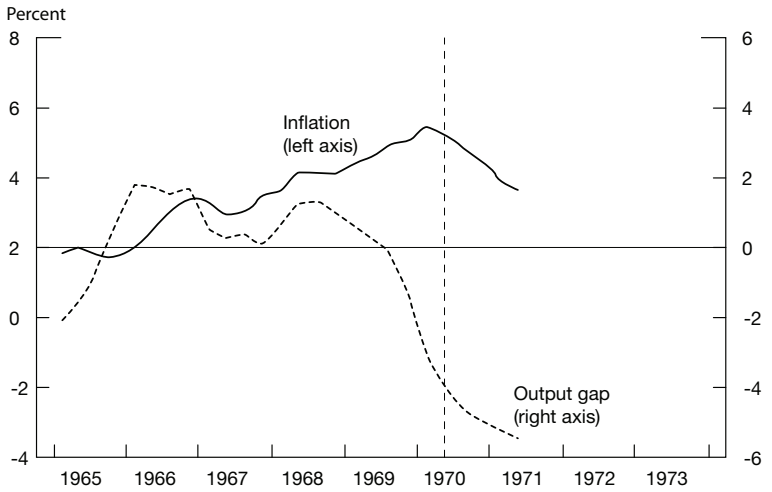

Figure 2.1 Inflation and output gap forecasts for the US economy as seen in August 1970

> Moreover, the upturn would be starting from a point where there is substantial underutilization of resources, as evidenced by a 5 per cent unemployment rate and an operating rate in manufacturing at well under 80 per cent of capacity. In these circumstances, there is virtually no risk that economic recovery over the year ahead would add to the inflationary problem through the stimulation of excess – or even robust – demand in product or labor markets.
>
> (Federal Reserve Board 1970, FOMC, p. 19)

Looking at the output gap, and in line with the flexible inflation targeting framework, the decision was obvious. Policy was eased and, in theory, this should have resulted in a gradual reduction in inflation, as reflected in the forecast, and gradual diminution of the inflationary problem. Unfortunately, history did not confirm this scenario. Instead of the anticipated gradual return to price stability, the 1970s turned into the Great Inflation.

The reason for the mistake may be deduced from Figure 2.2. The assumed confidence about knowledge of the stars was misplaced. The stars were not known then, indeed they can never be known with much confidence, and thus should not be heavily relied upon for policy guidance. Superimposing a recent estimate of the output gap (from the Congressional Budget Office) on the earlier figure shows the extent of the mismeasurement. If this additional information could have been known, it is clear that even the flexible inflation-targeting policy-maker would have followed the policy of the inflation targeter and would have tightened policy in that episode. In short, while the simple inflation-targeting framework would have avoided the error, a flexible inflation-targeting framework would not.

The mistake in the historical example highlighted in Figures 2.1 and 2.2 was not isolated. Unfortunately, the quest for pursuing what in theory seemed 'optimal'

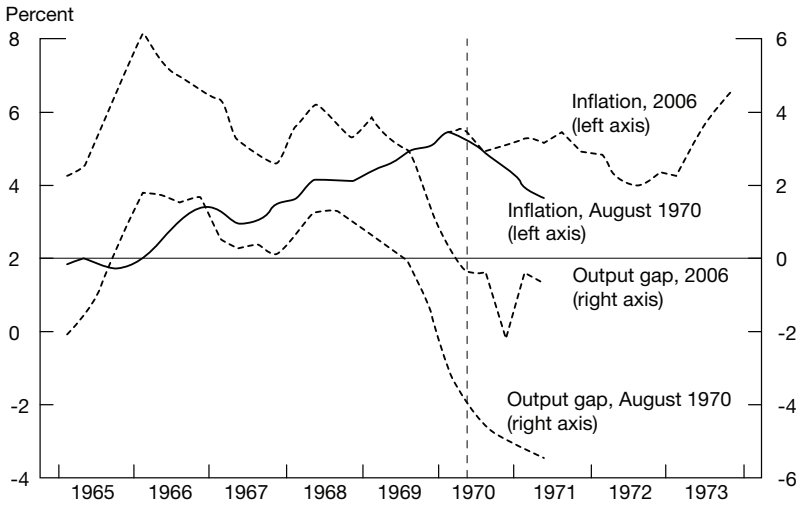

Figure 2.2 Inflation and output gap forecasts and retrospective outcomes

infected policy decisions for quite some time during the early 1970s at the Federal Reserve. As Herbert Stein, then a member of the Council of Economic Advisers in the United States, later described:

> It would be the goal of monetary policy to keep the economy on the OFP [optimum feasible path], and while that goal would not be contstantly achieved, the OFP would be the most probable path of the economy because monetary policy would be seeking to achieve it.
>
> (Stein 1988, p. 171)

Which brings me to the most recognizable and important lesson for practical policy design, as identified decades ago by Milton Friedman in his presidential address:

> The first and most important lesson that history teaches about what monetary policy can do – and it is a lesson of the most profound importance – is that monetary policy can prevent money itself from being a major source of macroeconomic disturbance.
>
> (Friedman 1968, p. 12)

In summary, one might ask: How can this be achieved? The answer is simple and can be found by looking at the experience of the Deutche Bundesbank and the framework put in place for the ECB. One should start with the correct institutional framework, one that respects what we have learned to be important from history. The first crucial element is central bank independence. The second is the primacy of price stability. Finally, for operational purposes, the emphasis should be on keeping inflation expectations well anchored and a medium-term orientation with the focus on policy robustness, as opposed to fine-tuning alternatives.

Notes

1 Orphanides (2006).
2 Greenspan (2004); emphasis added.
3 Orphanides and Williams (2007).
4 The term 'flexible inflation targeting' is also used by some authors to describe this optimal control approach to policy, in contrast to the simple 'inflation targeting' framework.

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3 Will monetary policy become more of a science?

Frederic S. Mishkin

Over the past three decades, we have seen a remarkable change in the performance of monetary policy. By the end of the 1970s, inflation had risen to very high levels, with many countries in the Organisation for Economic Co-operation and Development (OECD) experiencing double-digit inflation rates (Figure 3.1). Most OECD countries today have inflation rates at around the 2 per cent level, which is consistent with what most economists see as price stability, and the volatility of inflation has also fallen dramatically (Figure 3.2). One concern might be that the low and stable levels of inflation might have been achieved at the expense of higher volatility in output, but that is not what has occurred. Output volatility has also declined in most OECD countries (Figure 3.3). The improved performance of monetary policy has been associated with advances in the science of monetary policy; that is, a set of principles that have been developed from rigorous theory and empirical work that have come to guide the thinking of monetary policy practitioners.

In this chapter, I will review the progress that the science of monetary policy has made over recent decades. In my view, this progress has significantly expanded the degree to which the practice of monetary policy reflects the application of a core set of 'scientific' principles. Does this progress mean that, as Keynes put it, monetary policy will become as boring as dentistry – i.e. that policy will be reduced to the routine application of core principles, similar to filling cavities?[1] I will argue that there remains, and will likely always remain, elements of art in the conduct of monetary policy; in other words, substantial judgement will always be needed to achieve desirable outcomes on both the inflation and employment fronts.

Advances in the science of monetary policy in recent decades

Over the past five decades, monetary economists have developed a set of basic scientific principles derived from theory and empirical evidence that now guide thinking at almost all central banks and explain much of the success in the conduct of monetary policy. I will outline my views on the key principles and how they were developed over the past fifty years or so. The principles are: (1) inflation is always and everywhere a monetary phenomenon; (2) price stability has important benefits; (3) there is no long-run trade-off between unemployment and inflation;

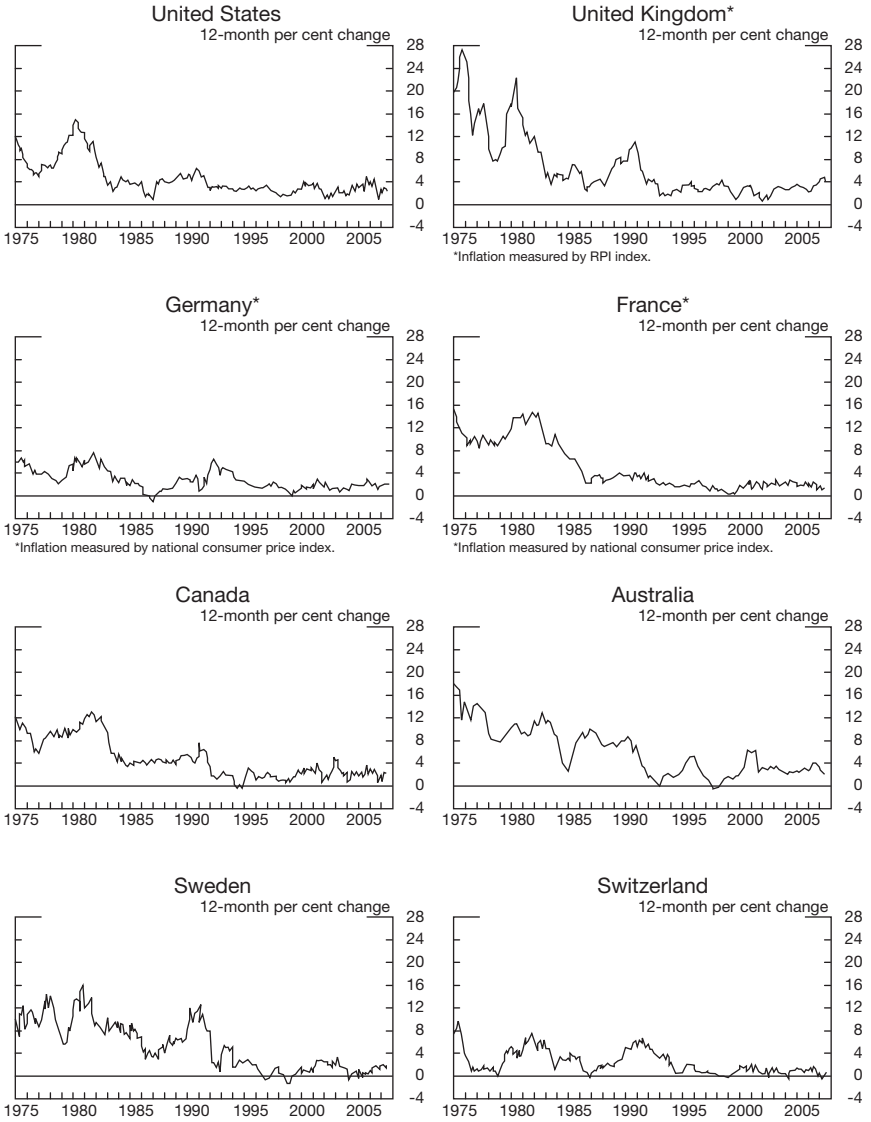


Figure 3.1 Headline inflation

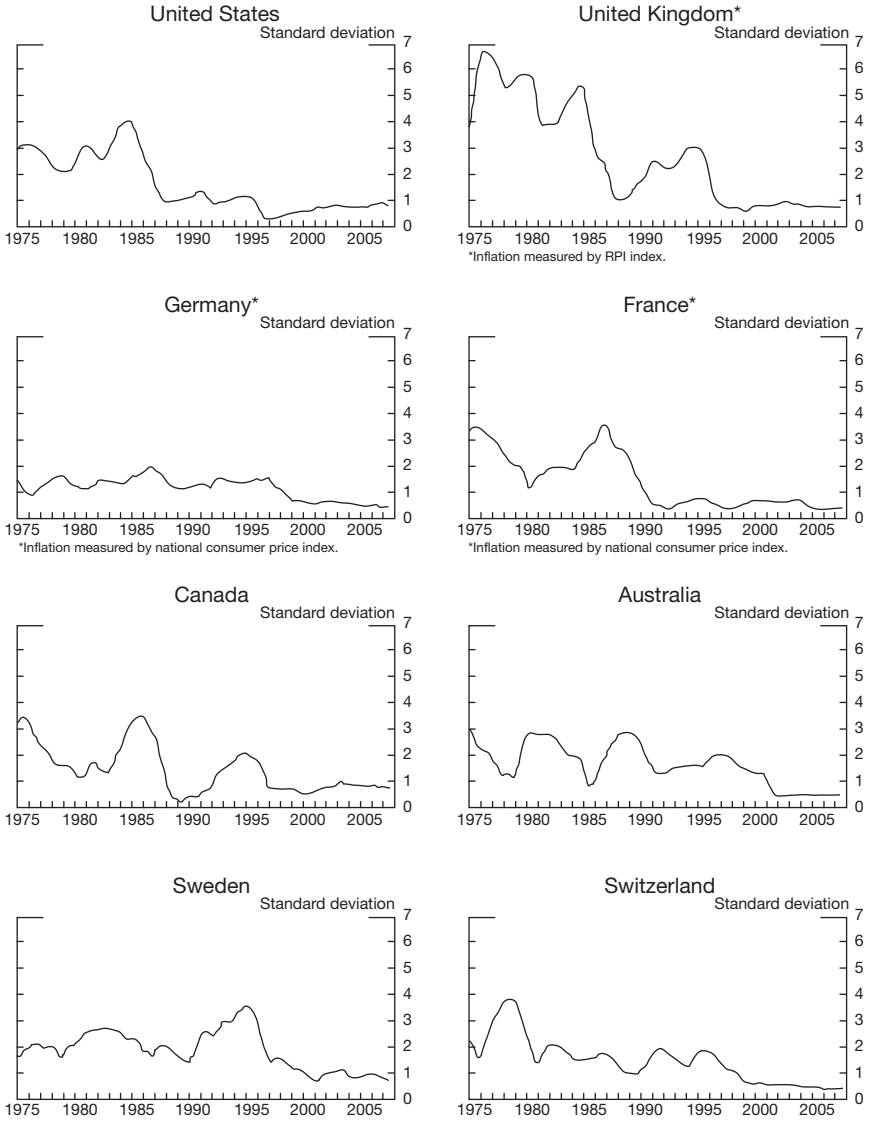


Figure 3.2 Standard deviation of headline inflation (five-year window)

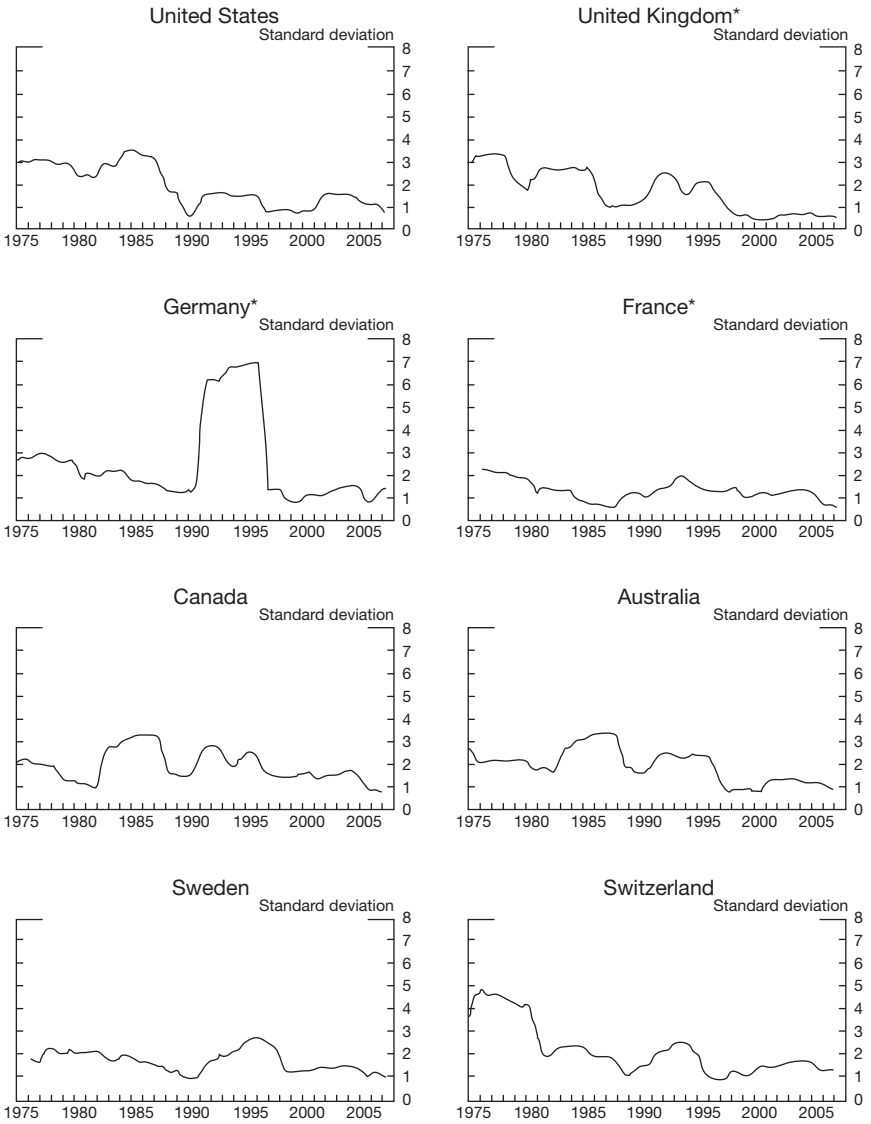


Figure 3.3 Standard deviation of output growth (five-year window)

(4) expectations play a crucial role in the determination of inflation and in the transmission of monetary policy to the macroeconomy; (5) real interest rates need to rise with higher inflation (i.e. the Taylor Principle); (6) monetary policy is subject to the time-inconsistency problem; (7) central bank independence helps improve the efficiency of monetary policy; (8) commitment to a strong nominal anchor is central to producing good monetary policy outcomes; and (9) financial frictions play an important role in business cycles. I will examine each principle in turn.

Inflation is always and everywhere a monetary phenomenon

By the 1950s and 1960s, the majority of macroeconomists had converged on a consensus view of macroeconomic fluctuations that downplayed the role of monetary factors. Much of this consensus reflected the aftermath of the Great Depression and Keynes' seminal *The General Theory of Employment, Interest, and Prices*, which emphasized shortfalls in aggregate demand as the source of the Great Depression and the role of fiscal factors as possible remedies. In contrast, research by Milton Friedman and others in what became known as the 'monetarist' tradition (Friedman and Meiselman 1963; Friedman and Schwartz 1963a, 1963b) attributed much of the economic malaise of the Great Depression to poor monetary policy decisions and more generally argued that the growth in the money supply was a key determinant of aggregate economic activity and, particularly, inflation. Over time, this research, as well as Friedman's predictions that expansionary monetary policy in the 1960s would lead to high inflation and high interest rates (Friedman 1968), had a major impact on the economics profession, with almost all economists eventually coming to agree with the Friedman's famous adage, 'Inflation is always and everywhere a monetary phenomenon' (Friedman 1963, p. 17), as long as inflation is referring to a sustained increase in the price level (e.g. Mishkin 2007a).

General agreement with Friedman's adage did not mean that all economists subscribed to the view that money growth was the most informative piece of information about inflation, but rather that the ultimate source of inflation was overly expansionary monetary policy. In particular, an important imprint of this line of thought was that central bankers came to recognize that keeping inflation under control was their responsibility.[2]

The benefits of price stability

With the rise of inflation in the 1960s and 1970s, economists, and also the public and politicians, began to discuss the high costs of inflation (see e.g. the surveys in Fischer 1993; Anderson and Gruen 1995). High inflation undermines the role of money as a medium of exchange by acting as a tax on cash holdings. On top of this, a high-inflation environment leads to overinvestment in the financial sector, which expands to help individuals and businesses escape some of the costs of inflation (English 1996). Inflation leads to uncertainty about relative prices and the

future price level, making it harder for firms and individuals to make appropriate decisions, thereby decreasing economic efficiency (Lucas 1972; Briault 1995). The interaction of the tax system and inflation also increases distortions that adversely affect economic activity (Feldstein 1997). Unanticipated inflation causes redistributions of wealth, and, to the extent that high inflation tends to be associated with volatile inflation, these distortions may boost the costs of borrowing. Finally, some households undoubtedly do not fully understand the implications of a general trend in prices – that is, they may suffer from nominal illusion – making financial planning more difficult.[3] The total effect of these distortions became more fully appreciated over the course of the 1970s, and the recognition of the high costs of inflation led to the view that low and stable inflation can increase the level of resources productively employed in the economy.[4, 5]

No long-run trade-off between unemployment and inflation

A paper published in 1960 by Samuelson and Solow argued that work by Phillips (1958), which became known as the Phillips curve, suggested that there was a long-run trade-off between unemployment and inflation and that this trade-off should be exploited. Under this view, the policy-maker would have to choose between two competing goals – inflation and unemployment – and decide how high an inflation rate he or she would be willing to accept to attain a lower unemployment rate. Indeed, Samuelson and Solow even mentioned that a non-perfectionist goal of a 3 per cent unemployment rate could be achieved at what they considered to be a not-too-high inflation rate of 4 to 5 per cent per year. This thinking was influential, and probably contributed to monetary and fiscal policy activism aimed at bringing the economy to levels of employment that, with hindsight, were not sustainable. Indeed, the economic record from the late 1960s through the 1970s was not a happy one. Inflation accelerated, with the inflation rate in the United States and other industrialized countries eventually climbing above 10 per cent in the 1970s, leading to what has been dubbed 'The Great Inflation'.

The trade-off suggested by Samuelson and Solow was hotly contested by Friedman (1968) and Phelps (1968), who independently argued that there was no long-run trade-off between unemployment and the inflation rate. Rather, the economy would gravitate to some natural rate of unemployment in the long run no matter what the rate of inflation was. In other words, the long-run Phillips curve would be vertical, and attempts to lower unemployment below the natural rate would result only in higher inflation. The Friedman-Phelps natural rate hypothesis was immediately influential and fairly quickly began to be incorporated into formal econometric models.

Given the probable role that the attempt to exploit a long-run Phillips curve trade-off had in the 'Great Inflation', central bankers have been well served by adopting the natural rate, or no-long-run-trade-off, view. Of course, the earlier discussion of the benefits of price stability suggests a long-run trade-off – but not of the Phillips-curve type. Rather, low inflation likely contributes to improved efficiency and hence higher employment in the long run.

The crucial role of expectations

A key aspect of the Friedman-Phelps natural rate hypothesis was that sustained inflation may initially confuse firms and households, but in the long run sustained inflation would not boost employment because *expectations* of inflation would adjust to any sustained rate of increase in prices. Starting in the early 1970s, the rational expectations revolution, launched in a series of papers by Lucas (1972, 1973, 1976), took this reasoning a step further and demonstrated that the public and the markets' expectations of policy actions have important effects on almost every sector of the economy.[6] The theory of rational expectations emphasized that economic agents should be driven by optimizing behaviour, and therefore their expectations of future variables should be optimal forecasts (the best guess of the future) using all available information. Because the optimizing behaviour posited by rational expectations indicates that expectations should respond immediately to new information, rational expectations suggests that the long run may be quite short, so that attempting to lower unemployment below the natural rate could very quickly lead to higher inflation.

A fundamental insight of the rational expectations revolution is that expectations about future monetary policy have an important impact on the evolution of economic activity. As a result, the systematic component of policy-makers' actions (i.e. the component that can be anticipated) plays a crucial role in the conduct of monetary policy. Indeed, the management of expectations about future policy has become a central element of monetary theory, as emphasized in the recent synthesis of Woodford (2003).[7] And this insight has far-reaching implications, for example, with regard to the types of systematic behavior by policymakers that are likely to be conducive to macroeconomic stability and growth.[8]

The Taylor principle

The recognition that economic outcomes depend on expectations of monetary policy suggests that policy evaluation requires the comparison of economic performance under different monetary policy rules.[9] One type of rule that has received enormous attention in the literature is the Taylor rule (Taylor 1993a), which describes monetary policy as setting an overnight bank rate in response to the deviation of inflation from its desired level or target (the inflation gap) and the deviation of output from its natural rate level (the output gap).[10] Taylor (1993a) emphasized that a rule of this type had desirable properties and in particular would stabilize inflation only if the coefficient on the inflation gap exceeded unity. This conclusion came to be known as the 'Taylor principle' (Woodford 2001) and can be described most simply by saying that stabilizing monetary policy must raise the nominal interest rate by more than the rise in inflation. In other words, inflation will remain under control only if real interest rates rise in response to a rise in inflation. Although the Taylor principle now seems pretty obvious, estimates of Taylor rules, such as those by Clarida *et al*. (1998), indicate that during the late 1960s and 1970s many central banks, including the Federal Reserve, violated the

Taylor principle, resulting in the 'Great Inflation' that so many countries experienced during this period.[11] Indeed, as inflation rose in the United States, real interest rates fell.[12]

The time-inconsistency problem

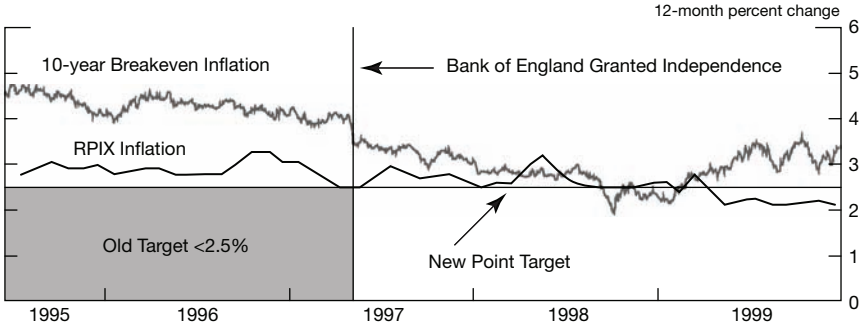
Another important development in the science of monetary policy that emanated from the rational expectations revolutions was the discovery of the importance of the time-inconsistency problem in papers by Kydland and Prescott (1977), Calvo (1978), and Barro and Gordon (1983). The time-inconsistency problem may arise if monetary policy conducted on a discretionary, day-by-day basis leads to worse long-run outcomes than could be achieved by committing to a policy rule. In particular, policy-makers may find it tempting to exploit a short-run Phillips curve trade-off between inflation and employment; but private agents, cognizant of this temptation, will adjust expectations to anticipate the expansionary policy, so that it will result only in higher inflation with no short-run increase in employment. In other words, without a commitment mechanism, monetary policy-makers may find themselves unable to *consistently* follow an optimal plan over *time*; the optimal plan can be *time inconsistent* and so will soon be abandoned. The notion of time inconsistency has led to a number of important insights regarding central bank behaviour – such as the importance of reputation (formalized in the concept of *reputational equilibria*) and institutional design.

Central bank independence

Indeed, the potential problem of time inconsistency has led to a great deal of research which examines the importance of institutional features that can give central bankers the commitment mechanisms they need to pursue low inflation. Perhaps the most significant has been research showing that central bank independence, at least along some dimensions, is likely very important in maintaining low inflation. Allowing central banks to be instrument independent (i.e. to control the setting of monetary policy instruments) can help insulate them from short-run pressures to exploit the Phillips-curve trade-off between employment and inflation and thus avoid the time-inconsistency problem.[13]

Evidence supports the conjecture that macroeconomic performance is improved when central banks are more independent. When central banks in industrialized countries are ranked from least legally independent to most legally independent, the inflation performance is found to be the best for countries with the most independent central banks (Alesina and Summers 1993; Cukierman 1993; Fischer 1994; and see the surveys in Forder (2000) and Cukierman (2006)).

A particularly interesting example occurred with the granting of instrument independence to the Bank of England in May 1997 (Mishkin and Posen 1997; Bernanke *et al*. 1999b); before that date, the Chancellor of the Exchequer set the monetary policy instrument, not the Bank of England. As Figure 3.4 illustrates,



Note: RPIX series is not seasonally adjusted; breakeven inflation uses a real bond indexed to RPI inflation.

Figure 3.4 Inflation compensation ten years ahead

during 1995 to 1996 the UK retail inflation rate (RPIX) was fairly close to 3 per cent, but the spread between nominal and indexed bond yields – referred to as ten-year break-even inflation – was substantially higher, in the range of 4 to 5 per cent, reflecting investors' inflation expectations as well as compensation for perceived inflation risk at a ten-year horizon. Notably, break-even inflation declined markedly on the day that the government announced the Bank of England's independence and has remained substantially lower ever since. This case study provides a striking example of the benefits of instrument independence.

Although there is a strong case for instrument independence, the same is not true for goal independence, the ability of the central bank to set its own goals for monetary policy.[14] In a democracy, the public exercises control over government actions, and policy-makers are accountable, which requires that the goals of monetary policy be set by the elected government. Although basic democratic principles argue for the government setting the goals of monetary policy, the question of whether it should set goals for the short or intermediate run is more controversial. For example, an arrangement in which the government set a short-run inflation or exchange rate target that was changed every month or every quarter could easily lead to a serious time-inconsistency problem in which short-run objectives would dominate. In practice, however, this problem does not appear to be severe because, for example, in many countries in which the government sets the annual inflation target, the target is rarely changed once price stability is achieved. Even though, in theory, governments could manipulate monetary policy goals to pursue short-run objectives, they usually do not do so if the goal-setting process is highly transparent.

However, the length of the lags from monetary policy to inflation is a technical issue that the central bank is well placed to determine. Thus, for example, deciding how long it should take for inflation to return to a long-run goal necessarily requires judgement and expertise regarding the nature of the inflation process and its interaction with real activity. That need for judgement and expertise argues for having the central bank set medium-term goals because the speed with which it

can achieve them depends on the lags of monetary policy. Whether the central bank or the government should set medium-term inflation targets is therefore an open question.

Commitment to a nominal anchor

The inability of monetary policy to boost employment in the long run, the importance of expectations, the benefits of price stability and the time-inconsistency problem are the reasons that commitment to a nominal anchor (i.e. stabilization of a nominal variable such as the inflation rate, the money supply, or an exchange rate) is crucial to successful monetary policy outcomes.

An institutional commitment to price stability via establishing a nominal anchor provides a counterbalance to the time-inconsistency problem because it makes it clear that the central bank must focus on the long run and thus resist the temptation to pursue short-run expansionary policies that are inconsistent with the nominal anchor. Commitment to a nominal anchor can also encourage the government to be more fiscally responsible, which also supports price stability. For example, persistent fiscal imbalances have, in the absence of a strong nominal anchor, led some governments, particularly in less developed economies, to resort to the so-called inflation tax – the printing and issuing of money to pay for goods and services that leads to more inflation and is thus inconsistent with price stability.

Commitment to a nominal anchor also leads to policy actions that promote price stability, which helps promote economic efficiency and growth. The commitment to a nominal anchor helps stabilize inflation expectations, which reduce the likelihood of 'inflation scares', in which expected inflation and interest rates shoot up (Goodfriend 1993). Inflation scares lead to bad economic outcomes because the rise in inflation expectations leads not only to higher actual inflation but also to monetary policy tightening to get inflation back under control that often results in large declines in economic activity. Commitment to a nominal anchor is therefore a crucial element in the successful management of expectations; and it is a key feature of recent theory on optimal monetary policy, referred to as the new-neoclassical (or new-Keynesian) synthesis (Goodfriend and King 1997; Clarida *et al*. 1999; Woodford 2003). A successful commitment to a nominal anchor has been found to produce not only more stable inflation but lower volatility of output fluctuations (Fatás *et al*. 2007; Mishkin and Schmidt-Hebbel 2002, 2007).

Financial frictions and the business cycle

Research that outlined how asymmetric information could impede the efficient functioning of the financial system (Akerlof 1970; Myers and Majluf 1984; Greenwald *et al*. 1984) suggests an important link between business cycle fluctuations and financial frictions. When shocks to the financial system increase information asymmetry so that financial frictions increase dramatically, financial instability results, and the financial system is no longer able to channel funds to

those with productive investment opportunities, with the result that the economy can experience a severe economic downturn (Mishkin 1997). The rediscovery of Irving Fisher's (1933) paper on the Great Depression led to the recognition that financial instability played a central role in the collapse of economic activity during that period (Mishkin 1978; Bernanke,1983; and see the survey in Calomiris (1993)), and it has spawned a large literature on the role of financial frictions in business cycle fluctuations (e.g. Kashyap and Stein 1994; Bernanke and Gertler 1999, 2001; Bernanke *et al*. 1999). Indeed, it is now well understood that the most severe business cycle downturns are always associated with financial instability, not only in advanced countries but also in emerging market countries (Mishkin 1991, 1996). Minimizing output fluctuations thus requires that monetary policy factors in the impact of financial frictions on economic activity.

Advances in the applied science of monetary policy

Scientific principles are all well and good, but they have to be applied in a practical way to produce good policies. The scientific principles from physics or biology provide important guidance for real-world projects, but it is with the applied fields of engineering and medicine that we build bridges and cure patients. Within economics, it is also important to delineate the use of scientific principles in policy-making, as this type of categorization helps us to understand where progress has been made and where further progress is most needed. I will categorize the applied science of monetary policy as those aspects that involve systematic, or algorithmic, methods such as the development of econometric models. Other, more judgemental aspects of policy-making are what I will call the 'art' of policy-making.

So, how have the basic scientific principles outlined above been used algorithmically? I focus particularly on the US examples because they are the ones I am most familiar with given my experience as an American central banker, but similar developments have occurred elsewhere.

Early Keynesian econometric models of the macroeconomy did not give monetary policy a prominent role (e.g. Tinbergen 1939; Adelman and Adelman 1959; Klein 1968). In contrast, the policy-oriented models developed in the 1960s – such as the MIT-Penn-SSRC (MPS) model, developed by Franco Modigliani and collaborators and used as the workhorse model for policy analysis at the Federal Reserve until 1996 – incorporated a very important role for monetary policy, broadly similar to the main channels of the monetary policy transmission mechanism that are embedded in the current generation of models.[15]

In this sense, the notion that inflation is a monetary phenomenon has been embedded in formal models for several decades.

Very early versions of the MPS model did display a long-run trade-off between unemployment and inflation, since the principle that there should be no long-run trade-off took some time to be accepted (e.g. Gramlich 2005). By the early 1970s, the principle of no long-run trade-off was fully ensconced in the MPS model by the adoption of an accelerationist Phillips curve (Pierce and Enzler 1974; Brayton *et al*. 1997). The recognition in their models that lower unemployment could not

be bought by accepting higher inflation was a factor driving central banks to adopt anti-inflationary policies by the 1980s.

Although accelerationist Phillips curves became standard in macroeconometric models used at central banks like the MPS model through the 1970s, expectational elements were still largely missing. The next generation of models emphasized the importance of expectations. For example, the staff at the Board of Governors of the Federal Reserve System developed their next-generation model, FRB/US (Brayton and Tinsley 1996; Reifschneider *et al*. 1997, 1999), to incorporate the importance of expectations in the determination of real activity and inflation. The FRB/US model, and similar models developed at other central banks such as the Bank of Canada's QPM model (Coletti *et al*. 1996) and the Reserve Bank of New Zealand's FPS model (Hunt *et al*. 2000) were an outgrowth of the rational expectations revolution, and they allowed expectations to be derived under many different assumptions, including rational expectations. Policy simulations to help guide monetary policy decisions, such as those that are shown to the Federal Open Market Committee (FOMC), explicitly emphasize assumptions about future expectations and how they are formed. Policy-makers have thus come to recognize that their decisions about policy involve not only the current policy setting but also how they may be thinking about future policy settings.

The focus on optimizing economic agents coming out of the rational expectations revolution has led to modelling efforts at central banks that not only make use of rational expectations but are also grounded on sounder microfoundations. Specifically, these models build on two recent literatures: real business cycle theory (e.g. Prescott 1986) and new-Keynesian theory (e.g. Mankiw and Romer 1991). In contrast to older Keynesian macro modelling, new-Keynesian theory provides microfoundations for Keynesian concepts such as nominal rigidities, the non-neutrality of money, and the inefficiency of business cycle fluctuations by deriving them from optimizing behaviour. The real business cycle approach makes use of stochastic general equilibrium growth models with representative, optimizing agents. The resulting new class of models, in which new-Keynesian features such as nominal rigidities and monopolistic competition are added to the frictionless real business models, have become known as dynamic stochastic general equilibrium (DSGE) models. Simple versions of such models have already provided a framework in which to think about key aspects of monetary policy design – insights perhaps best illustrated in the Woodford (2003) discussion of policy issues in the now-textbook, three-equation new-Keynesian model. Larger, more empirically motivated DSGE models are now in their early stages of development and are beginning to be used for policy analysis at central banks (e.g. at the European Central Bank: Smets and Wouters 2003; Coenen *et al*. 2007; and at the Federal Reserve Board: Erceg *et al*. 2006; Edge *et al*. 2007).

There are two very important implications from policy analysis with DSGE models, as emphasized by Gali and Gertler (2007). First, 'monetary transmission depends critically on private sector expectations of the future path of the central bank's policy instrument.' Second, 'the natural (flexible price equilibrium) values of both output and the real interest rate provide important reference points for

monetary policy – and may fluctuate considerably.' I can attest that both of these propositions indeed are now featured in the *Bluebook* (the staff's main document for analysing policy options for the FOMC).

The basic logic of the Taylor principle – that is, raising nominal interest rates more than one-for-one in response to an increase in inflation – was developed in conjunction with the analysis of Taylor's multi-country model and other macroeconometric models (Taylor 1993a, 1993b; Bryant *et al*. 1993). However, although the Taylor principle is a necessary condition for good monetary policy outcomes, it is not sufficient. Central bankers require knowledge about how much difference the Taylor principle makes to monetary policy outcomes. They also require an understanding of precisely how large the response of nominal interest rates should be to increases in inflation, i.e. how much greater than one. They also need to know how the policy rate should respond to other variables. Studying the performance of different rules in macroeconometric models has become a major enterprise at central banks, and the conclusion is that the Taylor principle is indeed very important. Analysis of policy rules in macroeconometric models that are not fully based on optimizing agents has been very extensive (e.g. Bryant *et al*. 1993; Levin *et al*. 1999), and we are now seeing similar analyses using DSGE models (e.g. Levin *et al*. 2005; Schmitt-Grohé and Uribe 2006).

The second principle, and the sixth through the eighth principles – which emphasize the benefits of price stability and the importance of the time-inconsistency problem, central bank independence and a commitment to a nominal anchor – have important applications to the design of monetary policy institutions.

The argument that independent central banks perform better and are better able to resist the pressures of overly expansionary monetary policy arising from the time-inconsistency problem has led to a remarkable trend towards increasing central bank independence. Before the 1990s, only a few central banks were highly independent, most notably the Bundesbank, the Swiss National Bank and, to a somewhat lesser extent, the Federal Reserve. Now almost all central banks in advanced countries and many in emerging market countries have central banks with a level of independence on par with or exceeding that of the Federal Reserve. In the 1990s, greater independence was granted to central banks in such diverse countries as Japan, New Zealand, South Korea, Sweden, the United Kingdom, and those in the euro zone.

The increasing recognition of the time-inconsistency problem and the role of a nominal anchor in producing better economic outcomes has been an important impetus behind increasing central banks' commitments to nominal anchors. One resulting dramatic development in recent years has been a new monetary policy strategy, inflation targeting – the public announcement of medium-term numerical targets for inflation with commitment and accountability to achieve this target, along with increased transparency of the monetary policy strategy through communication with the public (Bernanke and Mishkin 1997). There has been a remarkable trend towards inflation targeting, which was adopted first by New Zealand in March 1990, and has since been adopted by an additional twenty-three countries (Rose 2006). The evidence is in general quite favourable to

inflation targeting, although countries that have adopted inflation targeting have not improved their monetary policy performance beyond that of non-targeters in industrial countries that have had a successful monetary policy (e.g. Bernanke *et al*. 1999b; Mishkin and Schmidt-Hebbel 2002, 2007; Rose 2006). And, in contrast to other monetary policy regimes, no country with its own currency that has adopted inflation targeting has been forced to abandon it.[16]

The scientific principle that financial frictions matter to economic fluctuations has led to increased attention at central banks to concerns about financial stability. Many central banks now publish so-called *Financial Stability* reports, which examine vulnerabilities to the financial system that could have negative consequences for economic activity in the future. Other central banks are involved in prudential regulation and supervision of the financial system to reduce excessive risk-taking that could lead to financial instability. Central banks have also designed their lending facilities to improve their ability to function as a lender of last resort, so they can provide liquidity quickly to the financial system in case of financial disruptions.

The art of monetary policy

I have argued that there have been major advances in the science of monetary policy in recent years, both in terms of basic scientific principles and applications of these principles to the real world of monetary policy-making. Monetary policy has indeed become more of a science. There are, however, serious limitations to the science of monetary policy. Thus, as former vice-chairman of the Federal Reserve Board Alan Blinder (1998, p. 17) has emphasized, 'central banking in practice is as much art as science'. By 'art' I mean the use of judgement – judgement that is informed by economic theory and data but in a manner that is less explicitly tied to formal models or algorithms.

There are several reasons why judgement will always be an important element in the conduct of monetary policy. First, models are able to make use of only a small fraction of the potentially valuable information that tells us about the complexity of the economy. For example, there are very high frequency data – monthly, weekly and daily – that are not incorporated into macroeconometric models, which are usually estimated on quarterly data. These high-frequency data can often be very informative about the near-term dynamics of the economy and are used judgementally by central bank forecasters (e.g. Reifschneider *et al*. 1997).

Second, information that can be very useful in forecasting the economy or deciding whether a particular model makes sense is often anecdotal and is thus not easily quantifiable. The Federal Reserve makes extensive use of anecdotal information in producing its forecasts. The staff at the Board and the Federal Reserve Banks monitor a huge amount of anecdotal information, and such information is discussed extensively in the publicly released *Beige Book*, which reports information from contacts in the Federal Reserve Districts, and by the participants in FOMC meetings.

Third, although monetary policy-makers make extensive use of models in both forecasting and evaluating different policies, they are never sure that one model is the correct one. Active, and sometimes bitter, debates about which modelling approaches are the right ones are ongoing in macroeconomics, and there is often not a consensus on the best model. As a result, central banks must express some degree of humility regarding their knowledge of the structural relationships that determine activity and prices. This humility is readily apparent in the practice at central banks, which involves looking at many different models – structural, reduced form, general equilibrium and partial equilibrium – and using judgement continually to decide which models are most informative.

Fourth, the economy does not stand still but, rather, changes over time. Economic relationships are thus unlikely to remain stable, and it is not always clear how these relationships are changing.[17] Therefore, policy-makers must sometimes put less weight on econometrically estimated equations and instead make informed guesses about how the economy will evolve.

Fifth, as part of managing expectations, monetary policy-makers communicate with economic agents who are not automatons but instead process information in complex ways. Subtle changes can make a big difference in the effectiveness of communication strategies – i.e. details matter – and judgement is therefore always an important element of good communication.[18]

Although, for the reasons outlined above, judgement will always be a necessary element of monetary policy, good decisions require that judgement be disciplined – not too *ad hoc* – and be well informed by the science of monetary policy. As Blinder (1998, p. 17) has put it, 'Nonetheless, while practicing this dark art, I have always found the science quite useful.' Here I will discuss two recent episodes in the United States – the financial headwinds period in the early 1990s and the new-economy productivity burst of the late 1990s – to illustrate how judgement informed by science was able to produce good economic outcomes.

Financial headwinds in the early 1990s

The last scientific principle discussed in this chapter's first section emphasizes the link between financial frictions and the business cycle, but it is unfortunately quite hard to model the role of these frictions in a general equilibrium, macroeconometric model. The late 1980s saw a boom and then a major bust in the commercial real estate market leading to huge loan losses that caused a substantial fall in capital at depository institutions (banks). At the same time, regulators were raising bank capital requirements to ensure compliance with the regulatory framework, known as the Basel Accord. The resulting capital shortfalls meant that banks had to either raise new capital or restrict their asset growth by cutting back on lending. Because of their weak condition, banks could not raise much new capital, so they chose the latter course. The resulting slowdown in the growth of credit was unprecedented in the post-Second World War era (Reifschneider *et al*. 1997). Because banks have informational advantages in making certain loans (e.g. Mishkin 2007a), many

bank-dependent borrowers could no longer gain access to financing and thus had to cut back on their spending.

Although the large-scale macromodel then in use at the Federal Reserve Board did not explicitly have financial frictions in its equations, officials at the Federal Reserve were aware that these frictions could be very important and were concerned that they might be playing a critical role at that juncture. In part reflecting this concern, many Fed economists were actively engaged in research into the impact of bank credit on economic activity. This research, together with anecdotal reports that businesses were finding themselves credit constrained and survey information indicating that bank credit standards were being tightened, gave rise to the view among Federal Reserve policy-makers that the capital crunch at banks was noticeably constraining credit flows and hence spending by households and firms. Indeed, Federal Reserve Chairman Alan Greenspan (1992) suggested that financial conditions in the early 1990s were holding back activity like a '50-mile per hour headwind', and in that period the FOMC reduced the federal funds rate to levels well below that suggested by the Taylor rule (e.g. Rudebusch 2006). Indeed, the recovery from the 1990 to 1991 recession was very slow, and the Fed kept the federal funds rate at 3 per cent (which, with an inflation rate of around 3 per cent, implied a real rate of zero) until February 1994 – a very accommodative policy stance. The Fed's expansionary policy stance at the time has in hindsight been judged as very successful, with the economy finally recovering and inflation remaining contained.

The new-economy, productivity burst of the late 1990s

By the beginning of 1997, the unemployment rate had declined to 5.3 per cent, and the Board staff was forecasting that the unemployment rate would fall to 5 per cent – an outcome that followed by mid-year. The forecast of a 5 per cent unemployment rate was well below most estimates of the NAIRU (non-accelerating inflation rate of unemployment). As a result, the staff forecast was for a rise in inflation (Svensson and Tetlow 2005). The staff forecast and the recommendation in the February *Bluebook* suggested that a period of monetary policy tightening would be needed to 'forestall a continuous rise in core inflation' (Federal Reserve Board 1997, p. 7). Although the FOMC did raise the federal funds rate in March 1997, it desisted from raising rates further; in fact, the FOMC reduced the federal funds rate in autumn 1998 after the episode involving the Long-term Capital Management hedge fund and the Russian bond meltdown. Despite an unemployment rate continually below estimates of the NAIRU, the outcome was not the acceleration that the Board staff's models predicted (Svensson and Tetlow 2005; Tetlow and Ironside 2006) but instead a decline in the inflation rate.

Why did the FOMC hold off and not raise rates in the face of economic growth that was forecast to be far in excess of potential growth – a decision that, *ex post*, appears to have resulted in desirable outcomes for inflation and employment? The answer is that Fed Chairman Greenspan guessed correctly that something unusual was going on with productivity. For example, he was hearing from businesspeople

that new information technologies were transforming their businesses, making it easier for them to raise productivity. He was also a big fan of the historical work by Paul David (1990), which suggested that new technological innovations often took years to produce accelerations in productivity in the overall economy (Meyer 2004). Greenspan was led to the conclusion that the trend in productivity growth was accelerating, a conclusion that the Board staff's forecast did not come to fully accept until late 1999 (Svensson and Tetlow 2005). Moreover, he appeared to be convinced that the acceleration in productivity would cap inflationary pressures, implying that inflation would not accelerate even with rapid economic growth. His view prevailed in the FOMC (Meyer 2004).[19]

The types of information used to foresee the effects of a productivity acceleration are inherently difficult to incorporate into formal models. This is obvious with respect to the anecdotes I have mentioned above, but even the systematic data available at the time required the use of judgement. For example, part of the story of the late 1990s reflected the different signals being sent by real-time measures of gross domestic product and gross domestic income – or at least the component of the latter produced by non-financial corporations, which is perhaps better measured (Corrado and Slifman 1999), and provided some advance signal of the productivity acceleration. Of course, these two measures – GDP and GDI – are the same in our formal models, and only a judgemental filtering of the information content in each can be useful in real time.

Good judgement benefits not only from a good feel for the data and the successful processing of anecdotal information but also from the use of scientific models, and the late 1990s episode is no exception. At the July 1997 FOMC meeting, the Board staff presented simulations using the FRB/US model examining what would happen if productivity were to accelerate (Meyer 2004; Tetlow and Ironside 2006). Their simulations produced several results that were consistent with what seemed to be happening. An acceleration of productivity would raise profits and the value of equities, which would boost aggregate demand because higher stock values would stimulate business investment and boost consumer spending through wealth effects. The acceleration in productivity would also be disinflationary and could therefore explain why inflation would fall despite a declining unemployment rate. An unexpected rise in productivity growth would not be immediately reflected in higher wage rates, so unit labour costs (wages adjusted for productivity growth) would fall, leading to a decline in inflation. Another way of looking at this is through the NAIRU framework. For a given rate of unemployment, an unexpected acceleration in productivity would produce an inflation rate lower than it otherwise would be, so that the NAIRU at which the unemployment rate would not lead to an acceleration of inflation would decline. As events unfolded in line with these simulation results, the FOMC became more convinced that a productivity boom was under way and that there was less need for a monetary tightening.

The two episodes discussed here illustrate several points about the art of central banking. First, monetary policy is more likely to produce better outcomes when central bankers recognize the limitations of their formal models. However,

judgement cannot be undisciplined. The accuracy of judgement is likely to be enhanced when it is informed by the science of monetary policy, either through the use of model simulations or applications of basic scientific principles.

Further advances to make monetary policy more of a science

Although art will always be a feature of monetary policy, the science of monetary policy will keep advancing, making it more of a science. In this section I will briefly discuss where I think future advances in the science of monetary policy are likely to be made.

The push to build sound microfoundations into general equilibrium macroeconometric models is ongoing, as the expanding literature on DSGE models indicates (see the survey in Gali and Gertler (2007), the discussions of model enhancements in Erceg *et al*. (2006), and in Edge *et al*. (2007)). However, these DSGE models are only now starting to be brought to the data and are not nearly as rich in their coverage of features of the economy as are older, more Keynesian models such as FRB/US.[20] Models like FRB/US do have elements that are more *ad hoc*, but at the current juncture central bankers see them as more realistic. Building macroeconometric models thoroughly grounded on solid microfoundations, but with treatment of more sectors of the economy, will be one of the main challenges for the science of monetary policy in the future.

Nominal rigidities are central to understanding quantitatively the impact of monetary policy on the economy. The canonical DSGE model makes use of a simple new-Keynesian Phillips-curve framework because it makes the model very tractable.[21] This framework is highly stylized, however, and does not allow for endogenous changes in how often contracts are renegotiated. Furthermore, there may be other reasons why prices are not reset too often, such as rational inattention.[22] Better explanations – and more empirical validation – regarding the source of nominal rigidities may lead to important advances in the science of monetary policy.[23]

Tractability has led to models based on microfoundations, such as DSGE models, to rely on representative agents, which is a serious drawback. I have a strong sense that what drives many macroeconomic phenomena that are particularly interesting is heterogeneity of economic agents. Building heterogeneous agents into macroeconometric models will by no means be easy, but it has the potential to make these models much more realistic. Furthermore, it may allow us to understand the link between aggregate economic fluctuations and income distribution, a hot topic in political circles. Heterogeneity of economic agents is also crucial to understanding labour market frictions. In some DSGE models, all fluctuations in employment are from variation in hours per worker, and yet in the real world, changes in unemployment are a more important source of employment fluctuations. Bringing the search and matching literature more directly into microfounded macroeconometric models will make them more realistic and also allow better welfare comparisons of different monetary policies.

Although, as discussed above, monetary policy-makers understand the importance of financial frictions to the business cycle, general equilibrium macroeconometric models, for the most part, ignore financial market imperfections. Research has begun to incorporate financial market imperfections into quantitative dynamic general equilibrium models (e.g. Bernanke *et al*. 1999), and some of this research has even begun to estimate these types of DSGE models (e.g. Christiano *et al*. 2007). But we need to know a lot more about how to *scientifically* incorporate financial frictions into policy deliberations. For the time being, the role of art in this area is very important.

The new field of behavioral economics, which makes use of concepts from other social sciences such as anthropology, sociology and, in particular psychology, suggests that economic agents may not always be the rational, optimizing agents we assume in our models. Embedding behavioural economics into macro models can make a major difference in the way these models work (Akerlof 2007). How important are deviations from rationality to our views on the monetary transmission mechanism, and what are welfare-enhancing monetary policies? How can systematic deviations from rationality be modelled in a serious way and built into macroeconometric models? Answers to these questions may further enhance the realism of macroeconometric models used for policy purposes.

One of the rationales for the use of judgement (art) in the conduct of monetary policy is that the economy is not stationary, but rather is changing all the time. This means that economic agents are continually learning about the state of the economy, so the rational expectations assumption that depends on stationarity to derive expectations may often not be valid. Research on the how agents learn and its implications for business cycles is an active area of research (Bullard and Mitra 2002; Evans and Honkapohja 2003) that should have a major pay-off in helping us to better understand the impact of monetary policy on the economy.

Another rationale for keeping art in monetary policy-making is that we can never be sure what is the right model of the economy. As I mentioned earlier, this argues for humility at central banks. It also argues for advances in scientific techniques to think about which monetary policies are more robust in producing good economic outcomes. Research in this area is also very active. One approach examines parametric uncertainties in which methods are examined to ensure that a prescribed policy works well in an entire class of models (e.g. Levin *et al*. 1999). Non-parametric approaches look at designing policies that protect against model misspecifications that cannot be measured (e.g. Hansen and Sargent 2007; Tetlow and von zur Muehlen 2001).

The list of areas here that will advance the science of monetary policy is necessarily incomplete. Some of the most important advances in economic science are often very hard to predict.

Concluding remarks

The science of monetary policy has come a long way over the past fifty years, and I would argue that its advances are an important reason for the policy successes

that so many countries have been experiencing in recent years. Monetary policy will however never become as boring as dentistry. Monetary policy will always have elements of art as well as science. However, the advances in the science of monetary policy that I have described here suggest that monetary policy will become more of a science over time. Furthermore, even though art will always be a key element in the conduct of monetary policy, the more it is informed by good science, the more successful monetary policy will be.

Acknowledgement

The views expressed here are my own and are not necessarily these of the Board of Governors or the Federal Reserve System. I thank Michael Kiley, Andrew Levin and Robert Tetlow for their helpful comments and assistance.

Notes

1 Given that my wife was a dentist, I have to say that Keynes may have been unfair to dentists. I am sure that many of them find their work very exciting.
2 Furthermore, monetarist research led Keynesian economists – for example, Franco Modigliani – to search for transmission mechanisms linking monetary policy to output and inflation (Mishkin 2007a, ch. 23).
3 Of course, economic theory implies that inflation can be either too high or too low. The discussion has emphasized costs associated with high inflation. But there are also potentially important costs associated with rates of inflation that are very low. For example, Akerlof *et al*. (1996) suggest that downward nominal wage rigidity could result in severe difficulties for economic performance at some times when inflation is too low. Other research has shown that the zero lower bound on nominal interest rates can lower economic efficiency if inflation is too low (e.g. Reifschneider and Williams 2000). Eggertsson and Woodford (2003) discuss strategies to address the zero-lower-bound problem.
4 A further possibility is that low inflation may even help increase the rate of economic growth. While time-series studies of individual countries and cross-national comparisons of growth rates were not in total agreement (Anderson and Gruen 1995), the consensus grew that inflation is detrimental to economic growth, particularly when inflation rates are high.
5 The deleterious effects of inflation on economic efficiency imply that the level of sustainable employment is probably lower at higher rates of inflation. Thus, the goals of price stability and high employment are likely to be complementary rather than competing, and so there is no policy trade-off between the goals of price stability and maximum sustainable employment, the so-called dual mandate that the Federal Reserve has been given by Congress (Mishkin 2007b).
6 The 1976 Lucas paper was already very influential in 1973, when it was first presented at the Carnegie-Rochester Conference. Note that although Muth (1961) introduced the idea of rational expectations more than ten years earlier, his work went largely unnoticed until resurrected by Lucas.
7 Indeed, one implication of rational expectations in a world of flexible wages and prices was the policy ineffectiveness proposition, which indicated that if monetary policy was anticipated, it would have no real effect on output; only unanticipated monetary policy could have a significant impact. Although evidence for the policy ineffectiveness proposition turned out to be weak (Barro 1977; Mishkin 1982a, 1982b, 1983), the rational expectation revolution's point that monetary policy's impact on the economy

is substantially influenced by whether it is anticipated or not has become widely accepted.

8 Of course, the recognition that management of expectations is a central element in monetary policy-making raises to the forefront the credibility of monetary policy authorities to do what they say they will do. It does not diminish, however, the importance of actions by the monetary authorities because 'actions speak louder than words': Monetary authorities will be believed only if they take the actions consistent with how they want expectations to be managed.

9 Although Lucas (1976) was a critique of the then-current practice of using econometric models to evaluate specific policy actions, it leads to the conclusion that monetary policy analysis should involve the comparison of economic performance arising from different rules.

10 Variants of the Taylor rule also allow for interest rate smoothing, as in Taylor (1999).

11 In contrast, Orphanides (2003) argues that the Federal Reserve did abide by the Taylor principle but pursued overly expansionary policies during this period owing to large and persistent misperceptions about the level of potential output and the natural unemployment rate.

12 See e.g. the estimates in Mishkin (1981, 1992).

13 For an example of how the time-inconsistency problem can be modelled as resulting from political pressure, see Mishkin and Westelius (forthcoming). Instrument independence also insulates the central bank from the myopia that can be a feature of the political process. Instrument independence thus makes it more likely that the central bank will be forward-looking and adequately allow for the long lags from monetary policy actions to inflation in setting their policy instruments.

14 The distinction between goal and instrument independence was first made by Debelle and Fischer (1994) and Fischer (1994).

15 Brayton and Mauskopf (1985) describe the MPS model. As pointed out by Gramlich (2005), the researchers at the Federal Reserve were instrumental in building this model and it might more accurately be described as the Fed-MIT model or the Fed-MIT-Penn model.

16 Spain and Finland gave up inflation targeting when they entered the euro zone.

17 The housing channel is one example in which the monetary transmission mechanism has changed substantially and is likely to continue to do so over time (e.g. Bernanke 2007; Mishkin 2007c).

18 Because subtle details matter, there is an important rationale for the use of case studies to research best practice in central bank communication strategies and this is why I have been drawn to case study research (Bernanke and Mishkin 1992; Bernanke *et al*. 1999b; Mishkin 1999).

19 Greenspan's successful use of judgement during this period is one reason why he was dubbed the 'maestro' by Woodward (2000).

20 To be fair, models like FRB/US do have much in common with DSGE models in that many of their equations, but not all, are built on solid microfoundations.

21 These models often use the Calvo (1983) staggering construct or the quadratic adjustment costs of Rotemberg (1982); these specifications yield identical Phillips-curve specifications.

22 Mankiw and Reis (2002) introduce this type of model; Kiley (2007) compares the ability of this type of model to improve upon the fit of more familiar sticky-price models.

23 Microeconomic studies have begun to make interesting progress (e.g. Bils and Klenow 2004; Nakamura and Steinsson 2006).

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Discussion

Richard H. Clarida

I would like to thank Axel Weber for inviting me to this splendid conference and, more broadly, for his leadership at the Bundesbank, an institution that has, in so many ways, been a leader in the practice of central banking. I am also so pleased to have this opportunity to discuss this fine chapter by Governor Mishkin, a leading scholar in the field whose work has certainly influenced my research.

Mishkin's chapter does a very good job of providing an overview of the foundations of modern central banking practice and their academic and empirical origins. In my own work with Mark Gertler and Jordi Gali (Clarida *et al*. 1999, 2000) we certainly thought of ourselves as highlighting a set of essential, necessary pillars for monetary policy, but did not suggest that the 'art' of monetary policy was unimportant. We sought to relate these pillars of monetary policy – and in particular the forward-looking nature of 'best practice' monetary policy – to observable, empirically testable implications of the theory.

Our focus was on deriving some empirically testable propositions from the hypothesis of inflation targeting. As is pointed out in the chapter, in practice inflation targeting is inflation forecast targeting. This is so due to the 'long and variable lags' in the transmission of monetary policy. In my way of thinking, whereas Milton Friedman concluded that targeting money growth was appropriate given long and variable lags, the modern approach focuses on anchoring inflation expectations. If that is best achieved through a constant rate of money growth, so be it. But in practice, this has turned out not to be a reliable guide to the month-by-month decisions that central bankers must make. Thus money growth targeting is not inconsistent with inflation targeting, but it is not a necessary condition for its success. In that regard, it strikes me that the ECB's attention to the medium-term prospects for growth in monetary aggregates is worthwhile, although I for one would not elevate this to a 'second pillar'.

On the subject of rules versus discretion, I differ somewhat in the way I would describe the issues at hand and lessons learned. Rules and commitment are important to anchor the goals for monetary policy – the numerical inflation target, for example. The current practice of monetary policy is best described, as it has been by Governor Mishkin and others, as constrained discretion. Under certain circumstances, optimal policy under constrained discretion takes the form of a Taylor rule. Policy-makers can do better under commitment, for example, by

pursuing a strategy of price-level targeting; but no central bank I am aware of has a commitment technology that can deliver price-level targeting. Under discretion, the best a central bank can do in a time-consistent fashion is inflation targeting.

Governor Mishkin points out, and rightly so, that the 'systematic component of [monetary] policy plays . . . a critical role'. However, I would point out that for ten to fifteen years, academic research from the early 1980s to the mid-1990s did not take this seriously, and in particular, empirical work simply ignored this dimension of monetary policy. I am particularly aware of this because our original research was at first criticized by some for its focus on estimating and testing hypothesizes about forward-looking monetary policy decision rules (reaction functions). While there is a great deal that can be learned about how the economy responds to a surprise in monetary policy, there is broad agreement today that it does not make sense to ignore the systematic part of policy as was common until twelve or so years ago.

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Discussion

Manfred J. M. Neumann

This chapter provides an excellent overview of the progress made by the profession in monetary macroeconomics during the past forty years. Frederic Mishkin lists nine theoretical, if not empirical, insights which have implications for the conduct of monetary policy and which most economists subscribe to today. He calls them 'principles'. I would prefer to reserve the word 'principle' for an axiomatic statement describing a rule of conduct derived from an empirical law, a model or some ethical belief. For example, the Taylor principle is indeed a principle. From all macroeconomic theories we know, it follows that the central bank must respond to observed excess inflation by raising the real rate of interest, not just the nominal rate, if inflation is to be stabilized.

For comparison, consider Milton Friedman's famous statement 'Inflation is always and everywhere a monetary phenomenon'. Is it a principle? It is rather a universal statement similar to the statement 'All swans are white', which can be rejected by empirical evidence.

As regards substance, we all agree, I believe, with the main points Frederic Mishkin presents in the first two sections of his chapter. Yes, inflation is a monetary phenomenon and price stability is beneficial. Yes, expectations are crucial for actual economic outcomes, and it follows that there is no long-run trade-off between inflation and unemployment, and, furthermore that the commitment of monetary policy to a nominal anchor is indispensable. Yes, the Taylor principle is stabilizing, central bank independence is fundamental, and, finally, financial shocks and frictions are potentially harmful for the real economy, though we do not know enough about how to model the interdependence of financial markets and the business cycle.

Frederic Mishkin notes, as principle No. 6, the well-known time-inconsistency problem, as discovered by Kydland and Prescott (1977) and beautifully applied by Barro and Gordon (1983) to a central bank that takes orders from the government. Private agents will anticipate that the government, and therefore the central bankers, are tempted to exploit the short-run Phillips trade-off between inflation and employment. As a result, the agents' inflation expectations will exceed the central bank's announced inflation target and, in equilibrium, this will force the central bank to validate the excessive expectations.

But is time inconsistency a real(-world) problem? I doubt whether it is, and I wonder whether it ever has been. I have never met a central banker who believed or believes that monetary policy can be used to raise output permanently. Of course, thirty years ago when Kydland and Prescott (1977) wrote about time inconsistency for the first time, almost all central banks were government-dependent and most of them were probably asked by their ministers of finance to aim for an overly ambitious output or employment goal. But these days the central banks of most industrialized countries are independent. True, the status of independence is not set in stone. It can be changed by politicians, and this might happen should the day come when the median voter is no longer satisfied with the central bank's performance. Fortunately, the median voter is an employed person, and, hence, has nothing to gain from an ambitious employment target (Herrendorf and Neumann 2003). This minimizes the danger. Finally, even the economic layman politician appears to have learned the Friedman-Phelps theorem that there is no long-run trade-off between inflation and unemployment. From this I draw the conclusion that the time-inconsistency problem can be safely set aside.

In the third section, Frederic Mishkin explains the 'art' of central banking. 'Art' is defined as the use of judgement where judgement is 'informed by economic theory and data but in a manner that is less explicitly tied to formal models'. Why may judgement be needed for the conduct of monetary policy? Mishkin provides a list of compelling arguments:

- there is no single best model but several models that need to be regularly checked for their informational content;
- there is information in high-frequency data that is difficult to feed into quarterly macroeconometric models used for diagnosis;
- there is useful anecdotal evidence from interviews (*Beigebook*);
- finally, conditioning assumptions are needed as inputs for projections.

These four arguments explain why the central bank's staff produces judgemental projections rather than mechanical forecasts. Frederic Mishkin adds another argument in favour of judgement:

- structural relationships are unlikely to remain stable, which implies that econometric results may be unreliable. Therefore, the *policy-makers* must sometimes make 'informed guesses'.

The argument apparently serves to defend the fact that the policy-makers sometimes take a decision that deviates from what was implied by the staff's judgemental projections.

Now, we can all agree that 'good decisions require judgement to be disciplined and not too *ad hoc*, and this, I believe, makes it advisable that policy-makers and staff openly and critically discuss the artistic element and its hazards, such as a selective reading of the available data, hidden inconsistencies in the data interpretation or an overemphasis of the most recent data observations. More

fundamentally, the question is whether there is a cognitive basis that entitles us to assume that policy-makers tend to know better than the staff.

Frederic Mishkin points to two episodes of US monetary policy that may be taken as evidence of the positive role of judgement by policy-makers, notably Chairman Alan Greenspan's judgement. Indeed, it appears that during both episodes – 1989 to 1992 and 1997 to 1999 – the maestro's judgement pointed in the right direction: 'Let's have lower interest rates.' With respect to the first episode, the so-called 'financial headwinds period', it is noteworthy, however, that the FOMC's policy of holding the federal funds rate well below what the Taylor rule suggested was apparently the right thing to do, but was probably done for the wrong reason. There is no conclusive evidence that the weakness of the upturn in the US economy following the 1990 to 1991 recession was reinforced by the supposed financial headwinds, an unusual reluctance by banks to lend and a reluctance by firms and households to borrow. This, at least, is the conclusion of Reifschneider *et al*. (1997), who were Federal Reserve Board economists at that time and who examined in detail whether the structural and the prediction errors of the MPS model – the staff's primary model at the time – could be explained by financial factors. To quote them: 'Even now, we do not believe that there is a well-understood or widely accepted answer as to why economic activity was as weak as it was during that period' (Reifschneider *et al*. 1997, p. 22).

Well, if the wrong reasoning somehow leads policy-makers to make the right decisions, that's fine. We must not forget the famous saying that 'if you have success, you are forgiven'. Fortunately, monetary policy decisions are not made by a single person but by a committee, which implies that artistic deviations are averaged.

The need for judgement in the – fortunately – rare case of a sudden upheaval or crisis in financial markets is probably a more exciting aspect of the art of central banking than the routine application of judgement on the state of the business cycle. The type of judgement needed in such cases is quite different from worrying about errors in the diagnosis of the strength of the economy and the outlook for inflation. Since financial assset markets are forward-looking and appear to have a long memory, any wrong move by the central bank can create lasting constraints for future monetary policy by conditioning the bank's expectations. Let us briefly consider the different responses of central banks to the crisis in the US subprime mortgage market and its international spillovers.

As a reminder, one major source of the recent crisis was banks' practice of securitizing medium- to long-term (subprime) mortgages by means of special investment vehicles that refinance themselves by selling short-term commercial paper. Given the rise in default rates on mortgages, vehicles find it increasingly difficult to refinance themselves. Banks which created such vehicles have to step in, which raises their demand for liquidity and drives up inter-bank rates. If this process goes unchecked, drying credit markets will raise the cost of borrowing, reduce the banks' profits, and eventually affect the economy. This may, but does not necessarily, lead to serious damage, depending on the size of total portfolios involved.

The proper response by a central bank when a financial sector crisis is imminent, I believe, is to provide markets immediately with a perspective on how policy-makers will react. Two aspects should to be covered. *First*, the immediate deviation from the current policy stance, and *second*, the expected return to that policy stance when financial markets have normalized.

As regards the first aspect, it is useful to declare that guaranteeing the stability of the financial sector will be the most important objective for a while, measured in weeks rather than months, and that this objective will be achieved by the central bank's readiness to supply any amount of liquidity that solvent banks may demand, at the prevailing supply price of central bank money, i.e. the given bank rates. As regards the second aspect, the expected return to the inherited policy path, it is advisable to remind the public that the central bank's interest rate policy is not designed to subsidize financial institutions' imprudent behaviour, but is intended to hold the economy on a stable path. Consequently, a downward adjustment of bank rates will be considered only in the case where the economy is expected to deteriorate.

How did the ECB fare in this respect? Generally speaking, the ECB helped to restore confidence by immediately supplying the liquidity demanded. In addition, the ECB postponed for a month or two the decision to raise the bank rates by twenty-five basis points. This took the pressure off financial markets.

However, the ECB is sending problematic price signals. *First*, the ECB has permitted the overnight rate to decline below the current 4 per cent level of the main refinancing rate on eight out of fourteen business days in September, even down to 3.6 per cent; *second*, the ECB stepped up the volume of its frequent three-month loans (from €50 bn to €75 bn) on 13 September and lowered the marginal lending rate by twenty basis points. Taken together, the measures create the impression that the ECB desires lower interest rates, even though the strength of the economy and the inflation outlook call for the opposite. An increase in the main refinancing rate from 4 per cent to 4.25 per cent should remain on the ECB's agenda.

More difficult to judge is the most recent interest rate decision by the Fed, given that the US economy is slowing. Supposing the crisis of August had not happened, the Fed would have probably reduced the federal funds target by no more than 25 basis points, if at all, given the risk of rising inflation. Choosing instead the large cut of 50 basis points appears to be an unfortunate signal. 'Today's action is intended to help forestall some of the adverse effects on the broader economy that might otherwise arise from the disruptions in financial markets and to promote moderate growth over time' (Board of Governors 2007). In my judgement, the size of the cut must be understood as a signal that the Fed is ready for bail-out. This will sink into the memory and, consequently, the future behaviour of financial institutions and markets. If anything, it is likely to promote moral hazard and flippancy.

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Discussion

Lucas Papademos

Introduction

The subject of this session requires a number of core issues to be addressed, pertaining to the effective conduct and successful performance of monetary policy. It is a subject not only of academic interest but one that also has important policy implications. The choice of this topic is very appropriate for a conference organized to mark the fiftieth anniversary of the Deutsche Bundesbank, a great institution which has been very successful and influential in the conduct of monetary policy aimed at preserving price stability. I am delighted to participate in this celebration and thank you for this invitation.

So, will monetary policy become more of a science? The way the question has been posed may implicitly reflect two presumptions, namely that first, monetary policy does not rely sufficiently on scientific principles and methods at present, and second, there is some doubt or scepticism as to whether monetary policy will acquire more elements of a science in the future, which would be desirable. I would not agree with these implicit presumptions, although it goes without saying that the conduct of monetary policy will always require judgement, given our imperfect knowledge and the inevitable uncertainty about the functioning of the economy and the impact of monetary policy actions.

Frederic Mishkin has provided us with a comprehensive review of the progress made by monetary policy in becoming more of a science over the past fifty years and an assessment of the limitations to the science of monetary policy.[1] He also highlighted two recent episodes in the United States in which 'judgement' was informed by 'science' and resulted in appropriate monetary policy decisions in a changing and uncertain economic environment; and he discussed some of the gaps in the science of monetary policy that are likely to be filled in the future. I broadly agree with his review of the advances made in recent decades towards making monetary policy more of a science. These advances have allowed monetary policy to be based on a set of 'scientific principles' and to rely more on concrete econometric models – of increasing sophistication and policy relevance – when making decisions about the appropriate monetary policy stance. His review and assessment of scientific principles and econometric models that can, respectively, guide and provide a useful basis for decision-making reflect his knowledge and contribution

as an academic and his experience as a central banker. In addition, I fully share the view that there is a need to continue pursuing research and analysis that can provide a stronger scientific basis for monetary policy, while of course recognizing that monetary policy-making will never be transformed into a routine process of the mechanical application of principles and rules. Nevertheless, there are several issues I would like to elaborate on further, pertaining to (1) the role and importance of the core (scientific) principles that should guide monetary policy; (2) the current state and limitations of the scientific aspects of monetary policy-making; and (3) the orientation of our future efforts towards enhancing the science and effectiveness of monetary policy.

The science of monetary policy: the role and significance of core principles

In order to assess whether and to what degree monetary policy may be characterized as a science or has features of a science, it is useful to keep in mind that the two concepts 'science' and 'policy' are rather distinct and to explain what precisely we mean when we ask whether monetary policy will become more of a science. After all, the science of a specific subject is the systematic and organized body of knowledge on that subject, knowledge which is founded on objective principles involving the observation of, and experiment with, certain phenomena. The subject we have in mind is not monetary economics but monetary policy; that is, a course of action adopted by an authority to achieve certain objectives. All this may sound a bit too philosophical or abstract, but we need some precision and a systematic approach to address the issue in a meaningful way. To this end, it is necessary to define monetary policy in greater detail.

In trying to identify the 'systematic knowledge' and 'core principles' of monetary policy, and how these in turn derive from theoretical propositions and are supported by the empirical evidence, I find it useful to think of monetary policy as comprising three essential components:

- the institutional setting;
- the policy framework, which includes the policy objective and the analytical foundations – theoretical and empirical – linking objectives and instruments;
- the communication and the actual conduct of policy.

Monetary policy has become more of a science over the past fifty years because all its main components are now based on core principles derived from theoretical propositions or arguments that have been scrutinized and tested, to different degrees, on the basis of the available empirical evidence; that is, by observing reality: the practice and performance of monetary policy.

Let me elaborate on the nine principles presented by Frederic Mishkin, also in relation to the monetary policy framework of the European Central Bank (ECB). The first three principles – (1) that inflation is fundamentally a monetary phenomenon, (2) that price stability has important welfare benefits, including its

contribution to sustained growth and reduced output volatility, and (3) that there is no long-term trade-off between unemployment and inflation – are widely accepted and clearly underpin and are reflected in the ECB's mandate and primary policy objective.[2] The first and third principles are also incorporated into its analytical framework, as they are overwhelmingly supported by the empirical evidence. These first three principles and the eighth principle, the importance of central bank commitment to a nominal anchor, imply that price stability (or an inflation target) should be the primary, overriding objective of monetary policy. This is a derived principle, which is fully in line with the mandate of the ECB.

The fourth principle, concerning the crucial role of expectations in the determination of inflation dynamics and in the transmission of monetary policy, is also universally recognized and constitutes one of the key advances in the analytical foundations of monetary policy.[3] The role of inflation expectations as a main channel of the monetary policy transmission mechanism motivates the focus placed by central banks on the analysis and use of several indicators of inflation expectations, and explains the importance attached to the anchoring of expectations to price stability, also in the ECB's communication policy. This is an area, however, where more progress is necessary, as I will discuss below, in order to better measure, understand and favourably influence the inflation expectations of the public at large.

Two other principles, (1) the importance of central bank independence in improving the effectiveness and efficiency of monetary policy, and (2) the need to ensure the consistent implementation of monetary policy over time, are reflected in the institutional set-up of most central banks, including the ECB. Political authorities, however, occasionally seem to ignore or forget the significance of central bank independence, which they themselves enshrined in the Treaty establishing the European Community precisely on the basis of past experience and worldwide evidence clearly demonstrating its contribution to effective decision-making that preserves price stability and helps minimize output volatility. Central bank independence is also crucial for ensuring that another principle – the commitment to a strong nominal anchor – is credible and thus effective in ensuring price stability. For the ECB, the unambiguous commitment to price stability is reflected in the quantification of its policy objective and in its communication, but most importantly in its determination and consistency in pursuing price stability (the nominal anchor).

So far, I have fully agreed with the role and significance of seven out of the nine principles proposed by Frederic Mishkin for the scientific underpinning of monetary policy. There are two principles, however, that I do not consider as having been fully and widely accepted and reflected in the practice of monetary policy: the principle concerning the role and usefulness of monetary policy rules and that pertaining to the role of financial frictions in business cycles. These two principles do not belong, at least not yet, to the core propositions underlying the science of central banking, not because their content is not important but for other reasons. In the case of policy rules, the simple reason is that they are not used – by most central banks – in the actual conduct of monetary policy, although they may

be used for analytical purposes and as benchmarks for comparison of the policies implemented in practice. There are several reasons why such rules are not used in the practice of monetary policy. One such reason, which I will highlight below, is related to the imperfect information available for reliably estimating key variables included in these rules, in real time.

In the case of the role of financial frictions – which I consider to be especially important – I am somewhat sceptical of its inclusion in the core principles at this stage, because we have not yet reached the state of knowledge to incorporate financial frictions fully in the monetary policy framework in a generally acceptable manner. This principle is likely to be included in the core principles in the future, but only after further analysis and once there is greater empirical support for its validity and robustness.

There is, moreover, a notable omission from the list of the key principles to guide the thinking at central banks and the conduct of monetary policy: the role of money, or more precisely monetary and credit aggregates, in the monetary policy transmission mechanism and in the assessment of the medium- and long-term risks to price stability as well as to financial stability. This principle provides one of the foundations of the ECB's analytical framework. I recognize that in recent years its role and significance has been de-emphasized by some economists and at some central banks, but as I have argued previously,[4] the fundamental role of money in the conduct of monetary policy should not be ignored, but rather emphasized and further explored. This should be part of the research agenda that will help us to further advance the science of monetary policy.

Knowledge gaps and challenges in the science of monetary policy

Despite the progress made over the past decades, there are still important knowledge gaps in our understanding and modelling of the monetary policy transmission mechanism; and there are also a number of analytical and statistical (measurement) challenges that must be addressed in order to further advance the science of monetary policy. I prepared a list of such gaps and challenges before reading Frederic Mishkin's chapter. A comparison with his list of further likely advances in the science of monetary policy showed a very large overlap with regard to both the areas for further research and the reasons given to justify the need for, or likelihood of, further progress. What I would like to do is highlight a number of the generally identified knowledge gaps and analytical issues, define priorities and raise some additional issues that deserve further analysis.

The role of money, credit and the financial system

In order to enhance our analysis and assessment of the impact of monetary policy on price developments, as well as on output fluctuations and asset price dynamics, in a modern economy with a sophisticated financial sector, priority must be given

to the further development of structural models that incorporate a banking sector, other financial intermediaries and a richer specification of the structure and functioning of financial markets. The integration of the financial system, and of the banking sector in particular, in a state-of-the-art dynamic stochastic general equilibrium (DSGE) model that is empirically estimated would provide a theoretically consistent framework – based on sound micro-foundations – that would allow for an analysis of the role of money and credit – of liquidity and financing conditions – in the transmission of the effects of monetary policy on the economy. Such models have been or are being developed at the ECB, other central banks and universities, but there is scope for further extensions and improvements.[5]

Although the task is challenging owing to the complexities involved in incorporating a realistic specification of the financial sector – with financial market frictions (or imperfections) – into such models, it is important from a policy point of view that we deepen our understanding of this transmission channel of monetary policy and its implications for price and output dynamics. Moreover, as Bernanke, Mishkin, Gertler and others have shown, and as recent experience has vividly demonstrated, information asymmetries and other financial market imperfections play a crucial role in determining the stability of the financial system and business cycle fluctuations.[6]

The analysis of the role of money and credit (1) in the transmission of the effects of monetary policy, and (2) as information variables that can provide useful signals for the assessment of risks to price stability and financial stability need not be confined to the further development of DSGE models. These models have great merits but also limitations. They may not be able to capture (adequately or realistically) important features of markets such as financial innovations and other structural changes or the behaviour of different groups of agents characterized by fundamental differences in preferences, asymmetric information and alternative approaches to forming expectations. For example, in recent years, the supply of credit by banks has been affected by financial innovations – the securitization of bank assets and the development of the credit risk transfer market – which resulted in the so-called 'originate and distribute' business model pursued by banks, and we have all witnessed recently some of the consequences of this bank business model and certain other features of financial markets.[7] Moreover, capital requirements, the processes of financial integration and consolidation (both within Europe and more generally at the global level) and the increasing role of non-bank financial institutions have also been influencing the expansion of credit and the creation of (monetary) liquidity. Consequently, a better understanding and modelling of these innovations and processes, as well as of the determinants of asset prices and of the sectoral demand for money and credit, is necessary in order to improve both our economic and monetary analysis and our assessment of the likely impact of a change in the monetary policy stance on financial market conditions and price developments. To this end, various avenues of analytical work are being pursued at the ECB, and more generally at the Eurosystem central banks, which draw on a wide range of complementary models and analytical tools, and involve the development of new models and tools.[8]

The broader aim of this research on the role of money, credit and the financial system in the monetary transmission mechanism is to enhance the scientific basis – to strengthen the analytical framework – of our policy deliberations. I am confident that the outcome of this research will provide further theoretical and empirical support to two of the core principles that should guide the conduct of monetary policy: (1) the principle I added on the role of money and credit in the monetary policy transmission mechanism and the assessment of medium to longer term risks to price stability, and (2) a generalization of the principle on the role of financial frictions in the business cycle and, I would add, 'for financial stability'.

Recent events have amply manifested the importance of financial stability for the functioning of the economy. What is less manifestly obvious is the precise relationship between financial stability considerations and monetary policy. Two aspects require, in my view, further analysis and research. First, our monitoring and assessment of financial stability so far relies mainly on qualitative evaluations and judgements. Further progress is necessary towards methods to quantify risks and vulnerabilities identified in the various segments of the financial sector and to relate them, in a theoretically sound and empirically robust manner, to our overall assessment of financial stability. Second, and even more challengingly, we need to understand in a more detailed and verifiable manner the precise relationship between the causes and implications of financial instability and monetary policy.

Expectations

Another priority in our research agenda is to enhance our understanding of the way expectations are formed by different agents in the economy, and how they can be managed successfully so as to improve the effectiveness of monetary policy. Inflation expectations play a crucial role in determining the impact of monetary policy on the economy and in shaping the dynamic response of prices and output to shocks. Forecasts of future price developments and policy simulations based on macroeconometric models depend critically on the modelling of expectations.

By now it is widely accepted that expectations are, by and large, formed 'rationally' in the sense that they take into account all relevant available information concerning the structure and functioning of the economy and the factors and policies – notably monetary policy – that may affect future price developments. This broad formulation about the nature and formation of expectations is perfectly reasonable, appropriate and superior to any mechanical backward-looking specification of expectations formation. In practice, however, there are crucial issues that must be addressed as to how exactly 'all available relevant information concerning the economy's structure and functioning' is obtained and processed by economic agents. Often the hypothesis of 'rational expectations' is incorporated into theoretical and econometric models by making simplified and rather unrealistic assumptions about the information available to agents, on the basis of which they can make 'optimal forecasts' about the future. These assumptions, which essentially relate to the nature and modalities of the associated learning and information-extracting processes and the homogeneity of agents, play a crucial

role in determining the dynamics of the economy and the magnitude of, and time lags in, the effects of a change in the monetary policy stance on the price level and output over time.[9]

An important implication of the central role of expectations in the monetary policy transmission process and of the 'rationality' of expectations – in a broad sense – is that the effectiveness of monetary policy depends on the expectations of the markets and of the public about future policy actions. This is the fundamental reason why the adoption and public announcement of a quantitative definition of price stability (or an operational inflation objective), the credible commitment of the central bank to this objective, and the effective communication of its policy decisions aimed at achieving this goal are crucial for the anchoring of inflation expectations to price stability.

Our own experience and the track record of the ECB since 1999 have been very positive in this respect: despite the fact that the ECB, as a newly created central bank, did not have a previous track record of successful policy-making, financial markets immediately understood the ECB's commitment to price stability as credible and factored it into their expectations. Ever since 1999 all indicators have suggested that expectations of future inflation have remained remarkably well anchored to the ECB's definition of price stability.[10] For example, expectations derived from the prices of nominal and indexed-linked bonds provide compelling evidence that long-term inflation expectations are well anchored in the euro area.

However, while market expectations appear to be 'rational' in that they are in line with the ECB's commitment and demonstrated ability to preserve price stability, the process of expectation formation among the general public appears to be rather more complex. Survey evidence suggests that in a number of euro area countries a sizeable portion of the general public perceives inflation to deviate sometimes significantly from actual inflation or expects inflation to remain at elevated levels which bear little resemblance to actually recorded inflation or market expectations of future inflation. More analysis is needed to understand this discrepancy – and some promising work has already been done at the ECB in this respect. More generally, research aimed at incorporating empirically plausible theories of expectations formation into our models is of particular relevance.[11] This will require the introduction and testing of hypotheses of how economic agents learn about the evolving structure and functioning of the economy,[12] and it may lead to a relaxation of the assumption of the representative agent which is characteristic of most of our models, including the DSGE models, and thus allow for the heterogeneity of agents and expectations.

Some modelling and methodological challenges

This brings me to some key modelling and methodological challenges that deserve more attention in order to enhance the analytical tools of monetary policy:

- first, how to develop models that overcome the restrictions inherent in the stylized assumption of the representative agent;

- second, how to cope with statistical uncertainty and data revisions, and their impact, in particular, on our estimates of important economic concepts that are relevant for policy formulation but not directly observable, such as the potential output growth and the equilibrium values of the unemployment rate and the real interest rate;
- third, how to deal with possible non-linearities in economic relationships.

Today's dynamic macroeconomic (DSGE) models, with their sound microfoundations and ability to ensure internal consistency and invariance of the reduced form parameters to policy changes, have many merits, as I said. However, they also have limitations; for example they model aggregate economic variables by using one 'representative' optimizing agent, whose choices coincide with the aggregate choices of the underlying group of heterogeneous individuals. Clearly, this assumption is made for analytical convenience. Yet the conclusions drawn from these models may have far-reaching implications.[13] In real economies agents are organized into groups and firms, each pursuing their own economic interest. These distinct individual activities are more or less coordinated, and some kind of order emerges – this is what Adam Smith called the 'invisible hand'. However, the pursuit of individual optimizing behaviour does not necessarily imply, a priori, optimal outcomes at an aggregate level. Indeed, many interactions in the economy that require coordination among economic agents may result in suboptimal aggregate outcomes, even if all agents pursue the same interests. In addition to coordination failures, models involving representative agents appear particularly ill-suited to address distributional issues, for example, those involving employed and unemployed workers. Developing richer multiple-agent models is unquestionably difficult but should nevertheless be part of the longer term research agenda, as the potential benefits for policy-making are significant.

We live – and have to make decisions – in a world of pervasive uncertainty. However, while the academic profession has made tremendous progress in analysing risk in well-defined stochastic economies, the 'Knightian' uncertainty that confronts central bankers is of an altogether different dimension. Among the various forms of uncertainty that central bankers face, the uncertainty about how their policy instruments affect inflation and economic activity – the monetary transmission mechanism – and the uncertainty about the (statistical) measurement of the current state of the economy – the data – appear to weigh particularly heavily. Central bankers need to have a good understanding of the timing and the ultimate effects of changes in monetary policy instruments on inflation and economic activity. For this purpose, monetary policy-making requires more than just the qualitative information that theory provides. It also needs quantitative information about magnitudes and lags, even if that information is imperfect. At the same time, caution and circumspection in the face of such model and data uncertainty are clearly warranted. Model uncertainty suggests that further analysis of the robustness of the effects of monetary policy actions across a variety of models would be valuable.[14]

Recent research has shown that central banks should moderate the responsiveness of their policy decisions to real activity when underlying data are known to be subject to measurement error. After all, a strong policy response to *mismeasured* data will induce unnecessary fluctuations in the economy.[15] In view of this, the weight given to the individual information variables should depend on how precisely those variables are measured. This is especially applicable to variables that are not directly observable but which are relevant for policy formulation, such as the potential output growth and the equilibrium values of the real unemployment rate and the real interest rate. It would therefore not be advisable for central banks to rely heavily in their policy decisions – and in the respective communication – on models or policy rules that place an inordinate weight on such unobservable parameters, which are difficult to measure in real time and subject to considerable uncertainty of the underlying data.

My final remark on model and methodological challenges concerns the fact that most macroeconomic models today are solved and estimated in linear form, essentially relying on the linear stochastic difference approach used in macroeconomics since the 1950s. Again, this feature has merits and limitations: linear modelling techniques are powerful and easy to handle, and can be scaled to larger and more complete models. But there are a number of essential policy questions that simply cannot be addressed within linear frameworks.

One prominent question relates to the emergence of time-varying risk premia that are apparently influencing the behaviour of the long end of the yield curve. Research carried out at the ECB has shown that such time variation appears to be important for understanding the behaviour of long yields and that these premia are systematically related to economic fundamentals.[16] Modelling them, however, requires non-linear economic frameworks. Similarly, we may possibly need non-linear techniques to answer the question of how policy should deal with really large shocks. Linear models may give sufficiently accurate answers for dealing with small to medium-sized shocks, but if economic relationships are essentially non-linear, then such models may make considerable prediction errors in a situation where large shocks carry the economy far away from a state characterized by 'average behaviour'.[17] For all these reasons, it seems important from a policy perspective to develop and employ non-linear modelling and estimation techniques.

Concluding remarks

To sum up, over the past decades, tremendous progress has been made towards making monetary policy more of a science. Undoubtedly, this has contributed to enhancing the effectiveness of monetary policy. At the same time, there is still room – and indeed a need – to further advance the scientific elements of monetary policy-making by addressing a number of conceptual, methodological and empirical challenges. Some of these challenges are a consequence of the nature of the economic system and the uncertainty surrounding its evolution over time. The economic environment is continuously changing, and at a fast pace, as a result

of the actions of economic agents. Technological advances, financial innovations, the process of globalization and even changing preferences are influencing the structure and functioning of markets and the monetary policy transmission mechanism. Monetary policy-makers have to take decisions against the background of the evolving economic environment and then face a host of uncertainties. This makes our task challenging – but admittedly also more exciting. Moreover, these observations have two important implications for monetary policy. First, the ability to combine 'science' and 'art' in a well-structured, balanced, prudent and effective way will always remain a key feature of the successful performance of monetary policy. Second, in an environment of continuous change and considerable uncertainty, it is essential that central banks provide an anchor of stability and certainty: through their commitment to and delivery of price stability. This conclusion is directly linked to the purpose of this conference, to celebrate the Bundesbank's 50-year-long unwavering dedication to its task of 'safeguarding the currency', *'die Währung zu sichern'* as it is stated in the Bundesbank Act. I am confident that fifty years from now, on the occasion of the hundredth anniversary of the Bundesbank, a conference may again be organized to celebrate this great achievement: 'stable money for Germany and Europe'.

Notes

1 Mishkin (2007).
2 See e.g. Lucas (1996, 2000) on the first and second principle, and Friedman (1968) and Phelps (1967) on the third principle.
3 This goes back to Lucas (1972). See Woodford (2003) for recent advances on this topic.
4 See Papademos (2007).
5 See Christiano *et al*. (2007) for a recent example.
6 See Bernanke and Gertler (1989); Bernanke *et al*. (1999); Mishkin (1991, 1996).
7 For a discussion from a financial stability perspective, see ECB (2007).
8 For relevant work at the ECB, see von Landesberger (2007); Moutot *et al*. (2007); Detken and Smets (2004). Examples of pertinent research at Eurosystem national central banks include Greiber and Setzer (2007), and Brissimis and Magginas (2007).
9 This is discussed, for example, in Orphanides and Williams (2005).
10 See, for example, the analysis in Bowles *et al*. (2007).
11 Recent advances include the work of Milani (2007).
12 See Adam (2007) for some empirical evidence.
13 Kirman (1992) provides a critical assessment.
14 Hansen and Sargent (2003) and Levin and Williams (2003) present advances along this dimension.
15 Orphanides (2003) discusses this in detail.
16 Hördahl *et al*. (2006).
17 See, for example, Adam and Billi (2007).

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4 Monetary policy, labour markets and fiscal policy

Olivier Blanchard

Why is inflation targeting so popular, both among central banks and among academic economists? For two conceptually separate reasons:

- The first is the obvious one. Stabilizing inflation is good per se. The signals sent by both intratemporal and intertemporal prices are much easier to read, and decisions are easier to take when inflation is low and stable.
- The second is less obvious but even more important. It is that changes in inflation are a signal that output is either too high or too low. Thus, keeping inflation constant is a way of achieving the right level of output.

The argument behind the first proposition is very general. The argument behind the second proposition is model dependent. It is exactly true in some of the simpler models we use to think about monetary policy, such as the benchmark new-Keynesian model. In that model there is, as Jordi Gali and I have christened it, a 'divine coincidence'.[1] Stabilizing inflation in the face of either taste or technology shocks indeed yields the right level of output from a welfare viewpoint.

This divine coincidence breaks down however when the benchmark model is extended to allow for additional distortions, be it distortions in asset, goods and labour markets, or distortions coming from fiscal policy. In the presence of such distortions, it is typically the case that stabilizing inflation does not generate the right level of output, or, put the other way, that maintaining the right level of output requires deviations from stable inflation.

What should the central bank do in such cases? The general answer, which is not much help, is to be more flexible. But how and how much depends on the specific distortion. In this sense, the topic I was allocated is much too large for me to do it justice here. Doing it justice would imply identifying all relevant distortions, and working out the implications of each one for optimal monetary policy. We are a long way from being there. In my remarks I will outline how I believe we should think about the issue, and then take a stab at what I see as some of the most relevant distortions coming from the structure of labour and goods markets, and from fiscal policy. You will see that I have more questions than answers.

A theoretical detour, with apologies

To think about the issue, one must keep in mind three different concepts of output (careful readers of Woodford (2003) will see that I simplify a bit, but this is for a good cause):

- The *efficient* (or constrained-efficient, or first-best) level of output. What output would be if chosen by a central planner, given tastes and technology. That level of output is typically unattainable. From a welfare viewpoint, the best that can be done is to keep output at a constant distance below first best.
- The *natural* (or second-best) level of output. What output would be with existing distortions, but abstracting from nominal rigidities.
- The *constant x-inflation* level of output. What output would be if inflation, using price deflator x, were kept constant; x may be the CPI, the GDP deflator, the nominal wage index, or some other index.

In general, these three concepts do not coincide. In the benchmark New-Keynesian model (a model with constant elasticity demand functions, monopolistic competition in the goods markets and Calvo price-setting) however, it turns out that they are closely related:

- The (log) distance between the efficient and the natural levels of output is constant, unaffected by technological and supply shocks (such as changes in productivity growth, or changes in the price of imported oil).
- The natural level of output is the same as the constant inflation level of output, when inflation is computed using the domestic output deflator.

Together, these two relations imply that the optimal monetary policy is to keep domestic output price inflation constant. Constant inflation delivers the natural level of output, and keeps the distance from the efficient level of output constant.

Being a central banker in this environment is a dream. There is no trade-off between stabilizing inflation and doing what is right for output, namely stabilizing the welfare-relevant output gap. But we do not live in the benchmark model, and, in real life, being a central banker is not so easy.

Think of shocks which leave efficient output unaffected, but decrease natural output. This may come from the interaction of shocks and distortions, or from changes in distortions. A textbook example would be an increase in monopoly power, leading firms to increase their markups, and leading in turn to a decrease in the natural level of output. In this case, keeping output at the natural level may be very bad from a welfare viewpoint.

Or think of shocks which affect efficient and natural output levels in the same way, but where achieving the natural level of output requires stabilizing not price inflation, but some other rate of inflation, for example, wage inflation. In this case, stabilizing price inflation may be again very bad from a welfare viewpoint.

All this probably sounds a bit abstract; this is indeed the characteristic of theoretical detours. Let me try to make it more concrete by exploring the

implications of specific distortions in goods and labour markets, or distortions coming from fiscal policy.

Labour and goods markets: nominal wage and price setting

The benchmark model assumes that only final goods prices are subject to nominal rigidities. This is surely not the case. Wages are also set in nominal terms, often for up to a year. What happens when both prices and wages are subject to nominal rigidities? The answer was given by Erceg *et al*. (2000): when there is both staggered wage and price setting, then stabilizing price inflation does not deliver the natural level of output. Absent other distortions, it is still desirable to stabilize output at its natural level. This may be done by stabilizing a proper weighted average of wage and price inflation.

This pair of results is potentially very relevant. In an earlier set of comments on this topic (Blanchard 2007), I focused on the evolution of price and wage inflation in transition countries in the early 1990s. The differences between the two rates of inflation in a given year were often extremely large. In this environment, stabilizing price inflation would have implied large deviations from the natural level of output, and thus potentially large welfare losses.

The question here is how relevant this issue is today in the euro area. Figure 4.1 shows the evolution of euro-area wage and CPI inflation since the early 1990s. The two lines are quite close, so the issue may not be so important. But the warning is still very relevant. What should the central bank do in an economy where most of the nominal rigidities come from wage setting? How much attention should it pay to nominal wage inflation versus price inflation?

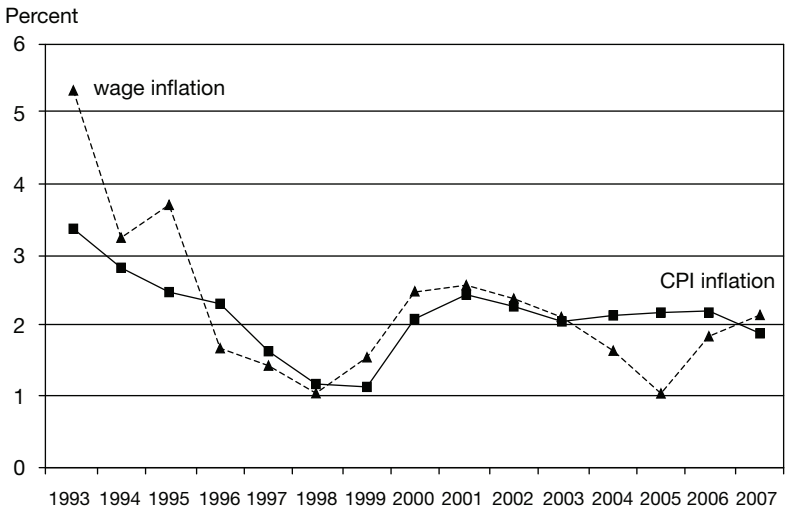

Figure 4.1 The evolution of euro-area wage and CPI inflation since the early 1990s

Goods markets: variations in markups

The benchmark model assumes constant markups of price over marginal cost. But markups are not constant, and variations in the markup present central banks with an obvious trade-off.

By assumption, the efficient level of output does not change, but, if labour supply is short of totally inelastic, an increase in markups will decrease natural output. In this case, stabilizing inflation is clearly not the optimal policy. Stabilizing inflation still delivers the natural output level, but this level is no longer optimal. The optimal policy takes the following form. In response to temporary increases in markups, allow for a temporary increase in inflation, a temporary deviation of output above the natural level. In response to temporary decreases, do the opposite. In other words, follow a flexible inflation-targeting policy.

How relevant are variations in markups? I suspect that they are very relevant. From software to drugs, there is an increasing number of goods with large fixed costs, and low marginal cost. For these goods, markups, not marginal cost, account for most of the price. And markups change frequently. Think of the programmes now used by airline companies to set prices for specific flights, and which change prices many times during the day, often by large amounts (I realize these changes could be due to changes in marginal cost; however, many of them seem to reflect changes in the perceived elasticity of demand).

Or take the recent micro evidence on pass-through of exchange rate movements (Gopinath *et al*. 2007). For many imports, the evidence is that exchange rate movements have very limited effects on the price, even over long horizons. This in turn implies large movements in markups for the producers of those imports. This in turn suggests movements in markups in response to movements in exchange rates, and so, in response to monetary policy. (Again, I realize that some of these products may sell in competitive markets, with foreign producers having no price-setting power. Many of them however appear to be differentiated goods, where price setters have some monopoly power.)

Or take the large medium-run movements in the labour share, which have characterized many European countries over the past thirty years. Figure 4.2 shows, for example, the large decline in the labour share, adjusted for self-employment, in the Euro 12, since 1990. What this implies, if anything, for monetary policy depends on the causes of this evolution. It may partly be due to changes in production functions owing to technological progress. But it may also be due to changes in markups, in which case it does have implications for monetary policy.

What is the decline in the labour share due to? What do we know about markups and exchange rate movements? What do we know about movements in markups in general? The common answer is, unfortunately, very little. This is clearly an important area for research, and one with implications for monetary policy.

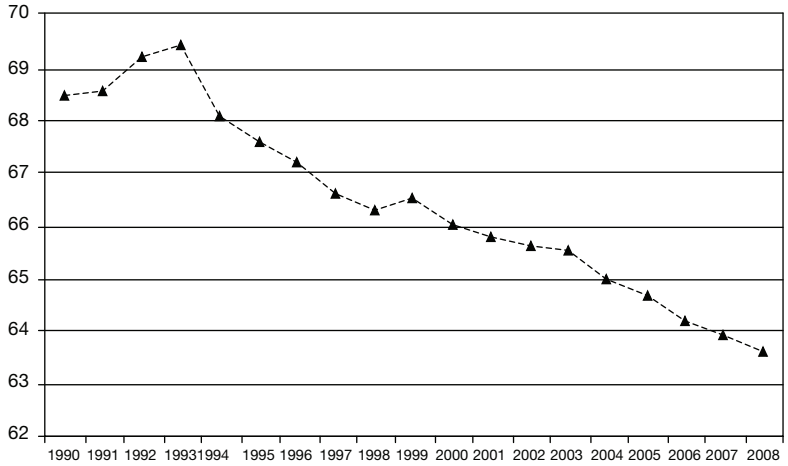

Figure 4.2 The decline in the adjusted labour share in the Euro 12 since 1990

Labour markets: real wage rigidities

The benchmark model has flexible real wages. In response to, say, an increase in the price of oil, workers accept a real wage cut sufficient to avoid, or at least limit, the decrease in employment.

There are good reasons to think that, in reality, real wages are much less flexible than in this benchmark. Adverse shifts in labour demand are more likely to translate into employment decreases rather than in large real wage declines in the short run. Using the terminology introduced earlier, they are likely to lead to a much larger decrease in the natural level of output than in the efficient level of output.

If this is the case, this again has important implications for monetary policy. Keeping inflation stable in the face of such adverse supply shocks will still maintain output at its natural level, but this natural level will be inefficiently low. Or, to use simpler language, keeping inflation stable may lead to an inefficient recession. In this case, the optimal policy is to allow output to exceed the natural level until real wages have adjusted, thus allowing for temporarily higher inflation in response to adverse supply shocks – symmetrically, to allow for temporarily lower inflation in response to favourable supply shocks (for a more formal treatment, see Blanchard and Gali 2007a).

How flexible should monetary policy be? This depends in turn on how rigid real wages are, and, on this also, the evidence is not clear-cut. Figure 4.3, taken from Blanchard and Gali (2007b), shows the impulse responses of the CPI, the nominal wage, the GDP deflator, employment and output in response to a 10 per cent increase in the price of oil, estimated over two separate samples: 1960:1 to 1983:4, and 1984:1 to 2005:4, for the United States.

The first subsample strongly suggests the presence of real wage rigidities. The increase in the price of oil leads to an increase in the CPI, which leads in turn to

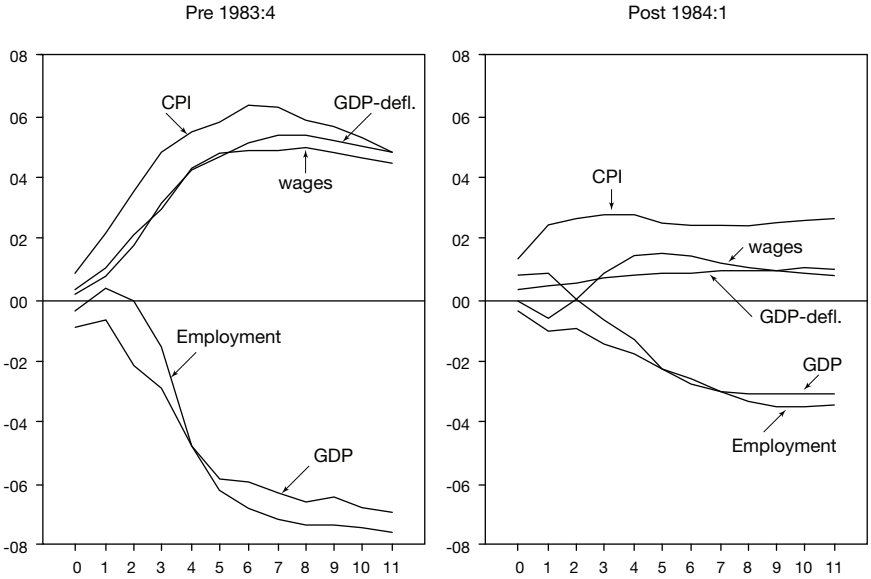

Figure 4.3 The US-impulse responses in response to a 10 per cent increase in the price of oil

Source: Blanchard and Gali (2007b).

an increase in nominal wages and an increase in the GDP deflator, despite a decrease in output and employment. But real wage rigidity seems to be virtually absent in the second subsample. The increase in the CPI is not followed by an increase in wages, while the decrease in employment is much smaller. Blanchard and Gali have not carried out a similar exercise for the euro area as a whole; but our examination of the IRFs for France, Germany and Italy suggests very much the same pattern for the post-1984 period: little increase in wages in response to the CPI increases, after an increase in the price of oil. This is suggestive of a sharp decrease in real wage rigidities, even in Europe. How we can reconcile this with continuing high unemployment in some of the euro countries is yet another puzzle we need to solve.

So my bottom line is: monetary policy should not be conducted independently of the characteristics of labour markets. Nominal wage rigidity implies paying more attention to nominal wage inflation. Real wage rigidity requires more flexible inflation targeting in the face of supply shocks.

Before moving on to fiscal policy, let me take up one potential objection to this line of argument, namely that the problem is more game-theoretic than I have made it sound. Perhaps real wage rigidity is not exogenous with respect to monetary policy. Flexible inflation targeting, if too flexible, may encourage real wage rigidity, and strict inflation targeting may in turn encourage real wage flexibility. How much weight this objection carries depends on a number of factors. It depends

on the structure of bargaining, and is more relevant the more centralized is wage bargaining. It also depends on what inflation does to income distribution. In the benchmark model, inflation is a way of decreasing markups, and thus decreasing the profits of firms; in this context, there are indeed strong incentives for unions to want more inflation, and for real wage rigidities to be stronger, the more accommodative is monetary policy. In a richer and perhaps more realistic model however, inflation may also be a way of decreasing real wages. In this case, it is not obvious that unions have an incentive to want inflation. This is, again, an issue that needs to be explored further.

Fiscal policy and distortions

There are (too) many ways to think about the interactions of fiscal policy and monetary policy.

At one end, one may think of fiscal and monetary policy as jointly and optimally determined, an approach explored by Benigno and Woodford (2003), for example. At the other end, one may think of fiscal policy as barely responsible, operating in an environment of high government debt and potential monetization. The first approach is of normative, but little positive, relevance. The second approach is unfortunately often more relevant (Blanchard 2005), but neither seems the right frame to think about the interactions between fiscal and monetary policy in the euro area. Current fiscal policy is far from optimal, but also far from committing the excesses of the past. In some countries the ratio of government debt is high, but still far from unsustainable – an assessment reflected in the very small premia on national government debts. And, given the rules in place, the risk of large-scale monetization of government debt seems extremely remote.

In that environment, how should the central bank take into account its effects on fiscal policy? A relevant channel seems to be through the effects of changes in interest rates on interest payments on government debt.

Increased interest payments may lead to larger deficits and higher debt over time, and to increases in distortionary taxation, now or later. In this context, think of a shock which, absent fiscal policy implications, would lead the central bank to sharply increase interest rates. Now reintroduce the fiscal policy constraint, and suppose increased interest payments lead, now or later, to an increase in distortionary taxes and thus to a decrease in the natural level of output. Under these assumptions, optimal monetary policy is likely to imply a smaller increase in interest rates, and thus, again, more flexible inflation targeting than in the absence of this fiscal policy channel (Benigno and Woodford (2007) formalize this point very nicely).

One can attack this argument in at least two ways.

The first is that the effect may be too small to worry about. Even for a country with a 100 per cent debt to GDP ratio, an increase in the short real interest rate of, say, 5 per cent for a few years requires a modest permanent increase in taxes, and thus a small distortion. Even if financed by a larger, transitory, tax increase, the

effect may still be too small to worry about. How relevant this counter-argument is can only be settled through quantification, and I have not done it.

The second, which parallels the argument made earlier about real wage rigidities, is that advocating for flexible inflation targeting in this context ignores the game-theoretic nature of the relation between the fiscal and the monetary authorities. By increasing interest rates less, the monetary authority in effect partly validates the bad behaviour of the government. Symmetrically, by increasing interest rates as it would absent high government debt, the monetary authority may force the government to be more responsible. This counter-argument does not strike me as irrelevant, although I suspect we overestimate the effects of tough monetary policy on the fiscal authorities.

Conclusions

One can think of many other distortions, each with specific implications for monetary policy. If, in response to a shock, the monetary policy needed to achieve the natural level of output comes, for example, with distorted relative prices, then the optimal policy may be to limit the distortion and not to try to achieve the natural level. The argument may apply to exchange rates, or to bubbles and fads. I shall stick to my assigned topic, and not go there in this chapter.

I draw two conclusions from my very tentative explorations and speculations. In the presence of distortions, monetary policy is likely to involve flexible inflation targeting. The big practical issue is how flexible. Here, it is clear that we do not have enough understanding of the relevant set of distortions and of their empirical magnitudes to give very precise answers. Central banks will have to keep an open mind, and feel their way over time, seeing how flexible they need to be, while making sure that medium-run expectations remain anchored. On this anniversary day, I wish them the best of luck.

Note

1 Blanchard and Gali (2007a).

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Discussion

Wolfgang Franz

Olivier Blanchard raises the question of whether and under which conditions it is optimal if central banks stabilize inflation rates. He makes the point that such a strategy is to be recommended in an 'ideal' world. However, in the real world with many distortions he suggests using flexible inflation targeting. One of the distortions he underlines results from the labour markets and real wage rigidities.

The topic of my presentation is the interactions between monetary policy and labour markets in the European Monetary Union (EMU). More precisely, after having briefly highlighted major features of European labour markets I shall discuss two different but not mutually exclusive questions. First, how and to what extent does and should monetary policy influence labour markets and, in particular, institutional arrangements and their widely demanded reforms? Second, by which actions and channels do labour markets influence the conduct of monetary policy or, in other words, which are the demands made by monetary policy on labour markets in order to pursue a successful stability-oriented monetary policy?

Main features of European labour markets

There is a rich literature on the nature and causes of European unemployment including several important papers by Olivier Blanchard (e.g. Blanchard 2006). Before embarking on these issues one important caveat is in order. Although it may be convenient to lump all countries of the EMU together this may result in a too broad-brush analysis. For example, virtually each country of the EMU has specific institutions which differ substantially from each other. However, it goes without saying that a detailed description of each national labour market cannot be carried out here.

Having emphasized this, a widely relevant characterization of European labour markets runs as follows. The initial increase in unemployment in the mid-1970s was primarily caused by adverse supply shocks such as the spurt in raw material prices and a slowdown in productivity growth. These shocks were, by and large, common to all economies. However, the subsequent development of unemployment differs between countries such as the United States and Europe. While unemployment in the United States tended to return to pre-shock levels in the course of the 1980s, European unemployment suffered from high persistence.

Several ratchet effects prevented unemployment in Europe from declining more substantially, let alone falling back to pre-shock levels. The literature has so far identified institutional arrangements and their changes as a major cause for the persistence of European unemployment. Not only did different institutional frameworks lead to different unemployment outcomes due to the shocks, but governments in various countries tried to reduce the burden of unemployment by measures such as higher employment protection, more generous unemployment benefits, and a more powerful enforcement of active labour market policies. Moreover, while bargaining outcomes were to a substantial amount responsible for the increase in European unemployment, it should be noted that bargaining rules and outcomes are far from being exogenous but can, to some extent, be explained by supportive institutional arrangements.

It is by now common wisdom that European labour market institutions have to become much more flexible, especially in this country. Some governments have partly reversed the early changes in institutions, while other countries are more reluctant and lagging behind. Of course, a more precise analysis has to go beyond the statement that labour market institutions matter but to identify which ones and how.

This admittedly broad-brush picture of the European labour market seems suitable enough to serve as a prerequisite for an informed discussion about the interactions between monetary policy and labour markets.

How does monetary policy affect labour markets?

Against the background of highly persistent unemployment in EMU countries, an obvious starting point is to discuss the influence of monetary policy on labour markets by relying on the concept of the natural rate of unemployment or, more precisely, its empirical counterpart, the non-accelerating inflation rate of unemployment (NAIRU). However, it is one thing to call for a use of this tool and another to provide reliable estimates. By any method, simple or complex, the NAIRU is extremely hard to determine, as my own sorrowful experience suggests. In the extreme case of full hysteresis the NAIRU may not even exist. But most empirical studies reject full hysteresis for European labour markets in favour of persistence, i.e. partial hysteresis. Persistence in unemployment is a major problem in Europe in contrast to the United States and the best policy is, of course, to prevent unemployment right at the beginning from becoming persistent. Some authors argue that monetary policy should have been more expansive in order to produce an initially rapid recovery, as is claimed by Ball (1999). I will come back to the issue of an active monetary policy to improve labour market outcomes.

Estimates of the NAIRU for the Euro area wind up with a number of around 8 per cent for the year 2006 which approximately equals the actual unemployment rate (ECB 2007, p. 73).

Does monetary policy affect the NAIRU? Of course not if the Phillips curve is vertical, which is the requirement for calculating a NAIRU. But empirical studies, notably for Germany, conclude that the Phillips curve may be negatively sloped

under some circumstances.[1] In this case the traditional NAIRU concept breaks down because inflation rates do not cancel out in equilibrium, i.e. for stable inflation rates, as is required by the NAIRU concept. And here monetary policy which is successful in maintaining low inflation rates gets involved.

There are several arguments as to why at *low* inflation rates there may be a long-run trade-off between output and inflation. One idea is put forward repeatedly by Akerlof (2007) and refers to behavioural macroeconomics. Inflation may not be salient when it is low and, as a consequence, anticipated future changes in the price level are ignored in wage bargaining. Put differently, the crucial parameter under consideration in the Phillips curve represents a combined effect of how people form expectations and how they use them. At higher inflation rates, wage bargaining takes expected inflation into account and the Phillips curve may become vertical indeed. At low inflation, workers are (voluntarily) fooled and there is a negatively sloped Phillips curve. Another argument refers to staggered nominal wage contracts and their interaction with money growth which may give rise to a long-run inflation unemployment trade-off (Graham and Snower 2002). Finally, as has also been pointed out by Akerlof (2007), workers resist, and firms rarely impose, cuts in nominal pay. Both low inflation *and* nominal wage rigidity then form a major obstacle against a downward adjustment of real wages. In other words, there may be a possible benefit of low inflation serving as a lubricant for labour market adjustment. With a little (more) inflation, real wages can adjust (more rapidly) and aggregate unemployment falls.

The upshot of these remarks is that despite the fact that a negatively sloped Phillips curve seems to be an offence and/or taboo for many economists, it may nevertheless exist. Hence, the NAIRU depends on a tolerable inflation rate (Franz 2005). This does not mean that governments are free to move along the Phillips curve and choose their preferred combination of inflation and unemployment. The above arguments mostly refer to *low* inflation rates. *High* inflation rates, in contrast, may give rise to even upward sloped Phillips curves if workers gain satisfaction only from wage increases that exceed inflation.

The consequences for monetary policy are obvious. On the one hand, the European Central Bank (ECB) should avoid high inflation; on the other hand, too low an inflation target may deprive labour markets of a useful tool of necessary real wage adjustments in the presence of nominal wage rigidities. My guess-estimate is that inflation rates between one and two percentage points fulfil these requirements.

Another but related issue is the question whether the ECB should play an active role in supporting reforms of the institutional arrangements on the labour and goods markets ('structural reforms'). While some progress has been made with those reforms in recent years (ECB 2007), governments are reluctant to implement necessary and more far-reaching reforms because they fear losing voters' support and, hence, future elections (Leiner-Killinger *et al*. 2007). Introducing those reforms may entail short-term costs while their positive long-term advantages are difficult to impart to voters. Besides the possibility of a better design of reform packages which raise their acceptance by voters (Heinemann 2004) it is

argued that appropriate macroeconomic policies, including monetary policy, could mitigate short-term costs by expansionary demand policies. Put differently by referring to the NAIRU, such reforms lead to a more or less immediate decline of the NAIRU which will then fall short of actual unemployment which in turn gives room for an expansionary demand stimulus. However, these arguments are anything but convincing. The ECB is definitely not the institution to mitigate possible short-term costs of reforms for the following reasons.

'Such an ex-ante coordination between monetary policy and "structural reforms" gives rise to implementation problems and incentive distortions for the actors involved.'[3] Not only is the timing of such a monetary policy crucial and burdened with the well-known problem of considerable impact lags but which holds also for the extent of the stimulus because the importance of these reforms will differ across EMU members, if pursued at all. In addition, the timing of the reforms in the countries had to be coordinated. After all, the ECB may be blamed for the failure of misguided reforms. The task of the ECB is to establish a credible stability-oriented environment, thus contributing to the efficient functioning of the supply side of the economy. Hence, to involve the ECB in macroeconomic dialogues of more or less formal types runs the risk of damaging their independence. The same holds for more or less resolute calls by politicians for special monetary policy actions or non-actions, respectively.

How do labour markets affect monetary policy?

There are at least three channels through which labour market issues have an impact on monetary policy. Changes in non-cyclical unemployment affect potential output which in turn is an important determinant of monetary targets, regardless of whether one supports the 'two-pillar view' of inflation targeting. Second, increases in unit labour costs (properly measured) will sooner or later result in higher inflation rates *ceteris paribus*. Third, asymmetric shocks (i.e. shocks which hit EMU member states differently) require labour markets to be flexible enough to absorb these shocks.

I have referred already to the necessity of institutional reforms in order to make labour markets more flexible. The necessity for this increases with the likelihood that the shocks will have an asymmetric impact on EMU member states. The nature of the shocks themselves may be similar – such as a spurt in raw material prices – but the impact may be different due to the extent of dependence on oil in each country, for example. Since asymmetric shocks cannot be ruled out, inflexible labour markets would produce greater imbalances between EMU member states and thus cause problems for monetary policy.

Wage policy may be another obstacle to price-level stability and thus affect monetary policy. As pointed out earlier, wage bargaining is anything but an exogenous variable but is influenced by institutional arrangements such as the degree of centralization of wage bargaining, the jurisdiction concerning employment protection, the importance of labour market policies, and so on. While in some countries, such as Germany, a moderate wage policy has been carried out

in more recent years there are signs of a more aggressive wage policy in the future. Some union officials still dislike the idea of negative dependence of employment on wages. In their view unemployment is always caused by something else, preferably by cyclical downswings which have to be ironed out by fiscal and monetary policy. It is much easier to blame the ECB for an 'antisocial policy' rather than to first put one's own house in order. The more this misleading view is supported by politicians or political parties the greater the political pressure on the ECB if these groups gain greater political importance.

Taken together, wage and price rigidities are a handicap for monetary policy because changes in demand, stemming from monetary policy, will not or will to a lesser extent translate into wages and prices. The ECB will then face a worsened output inflation trade-off. On a more positive note, fears that labour market rigidities might render the EMU a 'Mundellian nightmare' (Burda 2001) did not prove to be right.

Final remark

To conclude: there is every reason to argue that monetary policy affects labour markets and, in turn, labour market institutions affect the conduct of monetary policy. Inflation rates above the target set by the ECB constitute a burden to labour markets, but, on the other hand, too low inflation rates may deprive labour markets of a useful tool of necessary real wage adjustments in the presence of nominal wage rigidities. The ECB should not play an active role in supporting reforms of the institutional arrangements on labour markets but the necessity of those reforms in order to make labour markets more flexible is out of the question.

Notes

1 See Fitzenberger *et al*. (2007); Franz (2005); Schreiber and Wolters (2007).
2 ECB, quoted in Leiner-Killinger *et al*. (2007, p. 22).

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Discussion

Hans-Werner Sinn

The divine coincidence

Olivier Blanchard makes the point that stabilizing inflation is not, in general, the same as stabilizing real output through monetary policy.[1] The divine coincidence between these two goals that Goodfriend and King (1997) derived under the condition of temporary nominal price rigidity as described in the staggered contracts model devised by Calvo (1983) breaks down if there is a downward rigidity of real wages. There is thus a trade-off between inflation and output stabilization that involves more difficult monetary policy decisions.

At first glance, the result may be interpreted as supporting Nicolas Sarkozy's view of the world, i.e. that price stability is too narrow a goal for the ECB and that it should attempt to actively stabilize the business cycle of the real economy at the expense of price stability. It would therefore appear as though Olivier Blanchard had provided the French president with a theoretical base for his new policy approach which would dwarf the concerns of Claude Trichet.

However, closer scrutiny reveals that this is not the case. One reason is simply that price stability is not the same as inflation stability. The Maastricht Treaty does not stipulate that the ECB should aim at stabilizing the inflation rate, but rather at stabilizing the price level, and this, of course, is something different. The central bank might, for example, take the view that it is better to have an unstable inflation rate hovering slightly around 1 per cent than persistent hyperinflation at a constant rate of 50 per cent per annum. True, in practice, both issues are often related insofar as a high variance of the inflation rate tends to come together with a high average inflation rate. But this is not necessarily and not always the case.

Thus, I fear that the 'divine coincidence' between inflation and output stability is much less divine than the term suggests.

I also take a somewhat different view of the economic distortions resulting from non-stable prices. In Blanchard (2009) and in Blanchard and Galí (2007), the repercussions on the real economy all operate via the real wage level, staggered wage formation and corresponding labour demand decisions from firms. That is certainly one channel through which monetary policy is transmitted to the real economy. However, there are many more such channels, possibly of even greater importance, and from a policy perspective these must all be taken into account.

This is not a criticism of the Blanchard-Galí paper, which is indeed brilliant. It is clear that a formal paper needs to restrict its focus in order to remain tractable. However, for the remarks at the Bundesbank's fiftieth Anniversary Conference, it may be useful to broaden the view somewhat.

I would therefore like to define the divine coincidence somewhat differently to Olivier Blanchard. He speaks of a coincidence between output and inflation stabilization. Let me instead speak here more generally of the potential coincidence between price-level stability on the one hand and a maximum of economic welfare on the other, where economic welfare may be understood in a broader sense, including allocative efficiency and distributional neutrality. With this definition in mind, I would like to return to the question of whether the ECB should aim at stabilizing the price level or whether there are other considerations that should induce it to allow for a small amount of inflation. The topics I want to address include classical monetarist arguments, public finance arguments and adjustment arguments applicable to the starting phase of a monetary union.

Credit contracts

Let me begin with the role of price stability for long-term credit contracts. If the buyers and sellers of loans know what the future price level is, they are able to write meaningful long-term credit contracts that satisfy their mutual needs. If they do not, things are more difficult. With an unknown future price level and nominal contracts, neither party knows how large the real debt service will be. Price instability therefore imposes a risk premium on both sides of the market and operates like a transactions cost, which tends to destroy the market for long-term loans. This has devastating implications for the economy's ability to invest in long-term real capital and is hence a serious impediment to economic growth.

The importance of this effect may clearly be seen in the case of Spain and other previously inflationary countries that entered the euro zone. The euro has brought Spain more price stability than ever before and enabled the country to establish markets for long-term fixed interest loans that did not previously exist. This is one of the major reasons why Spain has experienced a construction boom and why it has recovered so well in recent years from its historical stagnation period.

Friedman's argument

I would now like to turn to the argument in favour of a low or even negative inflation rate that was made by Milton Friedman (1969) many years ago. As the only cost involved in producing money is the printing expenditure, which is close to zero, the central bank should induce people to hold enough money so that the marginal liquidity service of money holding is zero. In reality, however, people choose the amount of money so as to equate the marginal liquidity service with the nominal rate of interest, which implies that the actual quantity falls short of the optimal quantity of money.[2]

The central bank can solve this problem by pursuing an appropriate deflationary policy. If the rate of price deflation equals the real rate of interest, the nominal rate of interest would be zero, and money holding would indeed be at its optimal level. The stock of real balances would be much higher than today, although the central bank would have to gradually shrink the nominal stock year by year.

I do not know of anyone who would endorse Friedman's recommendation for practical policy-making, as a deflationary policy seems dangerous for a number of reasons. However, the argument as such is valid and implies that a low inflation rate is better than a high one. Even if we do not want to go as far as Friedmanian deflation, we should at least try to avoid inflation.

Seignorage

However, Phelps (1973) presents a counter-argument asserting that the seignorage collected by the central bank should be part of an optimal tax system. Since seignorage revenue is the product of the nominal rate of interest and the monetary base, the Phelps argument implies a deviation from the Friedman rule in the direction of a less deflationary policy with a positive nominal rate of interest.

While this is also a valid economic argument, I fail to see its quantitative importance. Seignorage revenue is typically a tiny fraction of GDP, generally only a fraction of a percentage point. In my opinion there is therefore no need to over-emphasize this point.

It is, moreover, unclear whether the argument implies a need for inflation or simply less deflation than Friedman recommended.

Cold progression

Much more important from a quantitative perspective is the 'cold progression' of the tax system. At a certain point in history, the government designs a progressive tax system in line with its redistributive preferences. Now suppose there is inflation. The price level rises, and with it comes a proportional increase in all wages, so that gross income distribution remains unchanged in real terms. Because inflation pushes taxpayers into higher tax brackets with higher marginal and average tax rates, the real net-of-tax income distribution changes nevertheless. The real tax revenue rises, as does the government share in GDP.

In Germany, this mechanism has greatly contributed to the rise of the government sector in the 1970s and 1980s. True, from time to time the government adjusted for this effect with a tax reform lowering the rates, but over long periods of time it enjoyed the extra tax revenue and spent it for dubious purposes. Germany's excessive expansion of the welfare state in the 1970s and 1980s was facilitated by the cold progression of the tax system.

Lags in the pension formula

A countervailing effect was exerted by the lags in the German pension formula. In the German pension system, nominal pensions follow nominal wages, but only with a delay. The delay used to be three years, and has now been shortened to one. The lag implies that the higher the inflation rate, the lower the replacement rate. With an inflation rate of 2 per cent, for example, the pension level used to be 6 per cent lower in real terms than it would have been with a constant price level. This resulted in an unintended, presumably suboptimal, pension level.

Interest income taxation

Another non-neutrality of inflation concerns the taxation of the inflation component in the interest rate; in Germany, we call this an ostensible tax on interest (*Scheinzinsbesteuerung*). Part of the nominal interest income is not a real return but merely a compensation for the inflation-induced loss of capital. As the government does not exempt this part of the nominal interest income from the tax base, it imposes a burden on the real interest income that increases proportionately with the inflation rate. There have been periods in which this has involved a tax burden of more than 100 per cent of the real rate of interest for savers in high income tax brackets.

If the effect is foreseen by savers and investors and debt interest is tax deductible, the nominal interest rate will adjust accordingly, keeping the real net-of-tax interest rate constant (Tanzi effect[3]). The real allocation of resources would not be affected in this case. If, however, there are borrowers who cannot deduct the interest from their tax base, there are serious economic distortions, because inflation increases the wedge between the effective real interest paid and received, exacerbating the distortions from capital income taxation.

Historical cost accounting

There are, moreover, severe economic distortions resulting from historical cost accounting. This is not the same as the taxation of the inflation component of interest rates but is rather an additional and probably much more severe effect. Historical cost accounting means that firms are allowed to reduce the full historical purchasing value of their assets for income tax purposes. The goal is to keep the replacement investment, which is necessary in order to keep the stock of capital intact, tax exempt. In the event of inflation, this goal is obviously violated. As the assets needed for replacement become more expensive from year to year, the depreciation allowances are smaller than the funds needed for replacement investment. Thus, effectively, the corporate income tax imposes a burden not only on profits but also on the real stock of capital invested in the firm.

This effect implies that the greater the inflation rate, the larger the intertemporal distortion resulting from capital income taxation becomes. Thus, inflation slows down economic growth to a pace far below the socially optimal growth path.[4]

Moreover, this implies a serious intersectoral distortion as its strength depends on the longevity of assets. Assets that are long-lived are affected very little, because their depreciation rate is low. However, short-lived assets such as vehicles, computer equipment and inventory stocks are heavily burdened with additional taxes. In the end, inflation reallocates the economy's stock of capital from short-lived to long-lived assets, creating Harberger-type economic distortions and windfall gains for owners of long-lived assets.[5]

Balassa-Samuelson, the welfare state and the labour market

While all of these arguments legitimate the goal of aiming at price stability, I would now like to turn to an important counter-argument, the Balassa-Samuelson effect, which has been discussed frequently in recent years.[6]

According to the Balassa-Samuelson effect, real economic convergence implies a convergence of price levels. Countries that are still lagging behind others in terms of labour productivity have lower wages and hence lower prices for non-traded, labour-intensive goods, which implies a lower price level in general. When their labour productivity catches up, their wage and price level will do the same. During the transitional phase towards factor price equalization, they will necessarily have a higher inflation rate than the more advanced countries.

The European Central Bank has frequently been asked to take this effect into account and be more tolerant with regard to the inflation rates of those countries in EMU that are still in the midst of their convergence process. I personally think that this is a justified demand, because an overly tight euro-wide inflation goal could, in principle, force the more advanced countries with relatively high wages into a deflationary scenario or, if deflation is prevented by price and wage rigidities, into a recessive adjustment period.

Germany has been through such a painful adjustment period in recent years, although this now fortunately seems to have come to an end. From 1999 to 2006, the country experienced a trade-weighted real devaluation relative to the other euro-area countries of 5.3 per cent. This did not mean that prices on average had to deflate, but it was nevertheless a difficult period in which many goods prices fell and, in particular, many people had to accept lower wages, especially those who found employment in the rapidly increasing labour-leasing industry. Rising and falling prices always coincide in a dynamic economy. The lower the inflation rate is on average, the larger the proportion of the economy forced to make painful downward adjustments in prices and wages.

The process is efficient if prices and wages are fully flexible, but in reality there are important reasons for downward rigidities. The literature has emphasized psychological reasons and menu costs (as costs of rewriting price lists).[7] The staggered price adjustment process *à la* Calvo modelled by Blanchard and Galí (2007) may be explained in this way.[8] However, arguably, the most important reason for Germany and other Western European countries is the existence of a welfare state which pays wage replacement incomes that are defined in nominal terms. The income that the welfare state provides to unemployed persons defines

a reservation wage or minimum wage demand that the private economy has to offer if it wants to attract workers. Germany's current problem is that this minimum wage demand is quite high and drives a large fraction of the unskilled labour force into unemployment. Although the country is currently booming, its unemployment rate of unskilled workers is still among the highest in the euro area.[9]

The problem has been exacerbated by the intense low wage competition that came with the fall of the Iron Curtain and the EU's Eastern enlargement. It will be further aggravated when more Eastern European EU countries are admitted to the euro area. In a longer transitional phase, it may therefore be necessary for the ECB to exempt the 'catching-up countries' from its inflation targets.

Conclusion

In conclusion, I find strong arguments for the divine coincidence between price stability and economic efficiency as I define it. Together, long-term credit contracts, Friedman's argument, and a tax system with a nominally defined progression in interest rates as well as nominal interest taxation and historical cost accounting make a truly strong case for aiming at price stability. The only major qualification I would make refers to the Balassa-Samuelson effect in the context of the European welfare states with all the nominal wage rigidities they cause. The adjustment of wage structures necessitated by including the former Eastern Bloc countries in the world market economy would without doubt be facilitated by a looser monetary policy.

Fortunately, we have the Bundesbank! With its long experience of successful monetary policy it may be able to give the ECB valuable advice as to what the compromise between these different arguments should mean for practical policy-making.

Notes

1 See also Blanchard and Galí (2007) and Blanchard (2009).
2 See Lucas (2000) and Sinn (2001) for a discussion of the quantitative importance of this effect.
3 See Olivera (1967); Wielens (1971); Tanzi (1978).
4 See Sinn (1987).
5 See Sinn (1983).
6 See Balassa (1964); Samuelson (1964); Sinn and Reutter (2000a), (2000b); ECB (2003); Katsimi (2004).
7 See Bewley 1999; Keynes (1935, p. 14).
8 See Calvo (1983).
9 See Sinn (2007, p. 116).

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Index

Note: 'n' after the page number refers to a note.