



THE DEUTSCHE BANK PRIZE IN FINANCIAL ECONOMICS 2007

CFS Symposium “The Theory and Practice of Monetary Policy Today”

4 October 2007
Frankfurt am Main



Michael Woodford

The Deutsche Bank Prize in Financial Economics is the most highly endowed international award given for outstanding academic achievements in the fields of money and finance with a practice and policy relevant orientation. It was established in 2005 by the Center for Financial Studies, in cooperation with Frankfurt University. The prize is sponsored by the Deutsche Bank Donation Fund and carries a cash award of €50,000. It is awarded every two years.

*The Deutsche Bank Prize for 2007 was awarded to **Michael Woodford**, Professor of Political Economy at Columbia University. Woodford received the prize in recognition of his fundamental contributions to the theory and practical analysis of monetary policy. According to the international prize jury, Woodford’s research has led to a theory of monetary macroeconomics that holds widespread*

appeal for many researchers owing to its rigorous microeconomic foundations. The jury also praised the high practical value of Woodford’s theories, based on which he analyzes the central role played by expectations and communication in the implementation of monetary policy.

An international scientific symposium headlined “The Theory and Practice of Monetary Policy Today” was organized for the occasion of the prize award ceremony in Frankfurt on 4 October 2007. 11 distinguished speakers, together with more than 200 international participants from academia, central banks, private institutions and banks, reviewed and debated the hypotheses, findings and policy implications of Woodford’s research.

In his welcome address, the symposium organizer and chairman of the prize jury, **Volker Wieland** (CFS and Frankfurt University), congratulated Michael Woodford and stressed his important contributions to the development of the New Keynesian theory of monetary economics, as well as the “immense practical value of this theory for analyzing the central role played by market expectations and central bank communication in the implementation of policy decisions.”

Hermann-Josef Lamberti (Deutsche Bank AG), representing the sponsor of the award and event, complimented the independent jury for electing a very worthy prize winner. He emphasized the practical significance of Woodford’s field of study and noted that financial markets have become so accustomed to an environment of low and stable inflation rates that the monetary policy that creates this environment is easily taken for granted. Lamberti asked “How important is money?” and pointed out that “one of Michael Woodford’s key questions has just recently shown its bite as financial institutions have struggled to find short-



Hermann-Josef Lamberti

term liquidity in anxious markets.” He urged researchers to: continue the theoretical discussion; evaluate changes in the real economy and in financial markets; and reassess the frameworks and strategies for monetary policy. Deutsche Bank envisions the Prize in Financial Economics as a platform for furthering discussion, international networking and the promotion of a deeper understanding of monetary and financial developments.

The New-Keynesian Approach to Understanding the Economy

The first paper elucidating the New-Keynesian approach to monetary economics was presented by **Bennett McCallum** (Carnegie Mellon University), who is himself an eminent monetary theorist and academic. On Woodford’s influential monograph “Interest and Prices”, McCallum commented that it drastically diminishes the role of money in monetary policy analysis, but nevertheless, is “the most important treatise on monetary economics in over 50 years; it seems likely to go down in intellectual history as one of the handful of great books on this topic.” The monograph develops the so-called “New-Keynesian” model that stands at the center of mainstream macroeconomic analysis today. McCallum noted that Woodford’s analysis combines theoretical rigor, concern for empirical veracity, and respect for actual central bank practice to an extent that represents an enormous improvement over the situation of 25 years ago.

McCallum took issue with the common use of the term “New-Keynesian” as a description of the new mainstream approach. Rather, he said, “it has as much reason to be called ‘New-Neoclassical Synthesis’ as it was by Marvin Goodfriend and Robert King in 1997. In fact, in some important aspects the approach is actually closer to that of the ‘monetarists’ of the 1960-70’s than the ‘Keynesians’ who they battled



Bennett McCallum

with.” McCallum proceeded to present the key ingredients of the model, the so-called “New-Keynesian Phillips and IS curves” that, contrary to past Keynesian approaches, assign a primary role to the forward-looking expectations of market participants. He referred to the many useful extensions worked out in Woodford’s monograph that help in fitting this model to empirical data and in linking macroeconomic outcomes and policy objectives to economic welfare considerations.

Jordi Galí (Universitat Pompeu Fabra), who is also an important contributor to the development of monetary policy analysis in the New-Keynesian framework, presented

the second paper in this session. He described several of the insights and lessons gained from using this approach:

- Regarding the benefits of price stability, Galí explained how inflation serves as an indicator of an inefficient level of economic activity when prices are rigid. According to the simplest version of the New-Keynesian Phillips curve, deviations of output from the level that would be realized with fully flexible prices lead to inflation. Galí qualified this finding by pointing towards some arguments for a small, but positive rate of average inflation and the existence of short-run tradeoffs between output and inflation stabilization. These qualifications suggest that the target rate for inflation should be achieved over the medium-run.
- Regarding the role of market expectations, Galí explained the drawbacks of a purely discretionary monetary policy. Instead, he advised incorporating commitment, i.e. rule-like, predictable behavior, in the practical design of policy so as to improve output-inflation tradeoffs.
- Galí presented some of his own research, highlighting the importance of proper identification of the “natural”



Jordi Galí

levels of output and interest rates as policy benchmarks. In particular, he showed that the traditional approach for estimating output gaps (that is, deviations of output from its potential or natural level) implies rather different estimates from those derived on the basis of the New-Keynesian model. Thus, policy approaches using such traditional output gaps would perform badly in this model.

Galí concluded that the New-Keynesian approach represented a flexible tool that had delivered novel insights and proved useful in organizing macroeconomic analysis.

Keynote Speech: Will Monetary Policy Become More of a Science?



Frederic Mishkin

Governor **Frederic Mishkin** (Board of Governors of the Federal Reserve System), a former colleague of Michael Woodford at Columbia University, shared his views on the usefulness of the science of monetary policy for policy practice with the Frankfurt audience, thus providing the perspective of an influential U.S. policy maker. According to Mishkin, the science of monetary policy is a set of principles derived from rigorous theory and empirical research that has helped produce greatly improved macroeconomic outcomes over the

MISHKIN'S TOP 9 ADVANCES IN THE SCIENCE OF MONETARY POLICY

1. Inflation, as explained by the late Milton Friedman, is always and everywhere a monetary phenomenon and, therefore, under the control of central bank policy.
2. Price stability improves economic welfare because it increases the level of resources productively employed in the economy.
3. There is no long-run trade-off between unemployment and inflation, as demonstrated by Nobel Prize winners Milton Friedman and Edmund Phelps. In other words, central banks are not able to lower unemployment permanently by running up inflation.
4. Market expectations play a key role in the transmission of monetary policy to the economy, as shown by Michael Woodford's contributions.

5. The Taylor principle, named after John B. Taylor, emphasizes that central banks' interest rate policy needs to respond to fluctuations of inflation (or inflation expectations) by more than one for one, in order to guarantee price stability in the long-run.
6. The time-inconsistency problem. As shown by Nobel Prize winners Finn Kydland and Edward Prescott, discretionary policy leads to poor outcomes. Unfortunately, however, without institutions that provide a form of commitment, monetary policymakers will find themselves unable to consistently follow an optimal policy over time.
7. Central bank independence, therefore, represents a key element of successful institutional design.
8. Central banks need to commit to a nominal anchor.
9. Financial frictions and financial instability play an important role in the business cycle.

last 30 years. He identified these improvements in the form of lower inflation along with lower volatility of inflation and output. In particular, he provided a list of scientific discoveries of great importance for policy which are summarized above as

Mishkin's TOP 9 Advances in the Science of Monetary Policy.

Furthermore, Mishkin discussed several useful developments in the applied science of monetary policy linked, in particular, to the application of algorithmic methods and the development of econometric models used for the evaluation of alternative monetary policy strategies.

Mishkin acknowledged that despite all these scientific advances, there are good reasons why "art" or judgment will always be needed in monetary policy. Models simply cannot make use of all potentially valuable information. Yet, judgments must be guided by science. He concluded by pointing out a number of important avenues for further research, such as: (i) building models with more sectors and better explanations of sluggish adjustment in nominal variables; (ii) modeling the heterogeneity of households and firms; (iii) including financial frictions in macroeconomic models; (iv) allowing for deviations from fully rational behavior by households and firms; (v) incorporating the learning behavior of economic decision makers; and (vi) further developing methods for evaluating the robustness of different monetary policy strategies under uncertainty about the proper model for the economy.

The papers in the next sections presented new research in two of these areas, namely how to combine judgment with model-based information in forecasting and how to render monetary policy more robust by cross-checking.

The New-Keynesian Approach to Forecasting and Monetary Policy Design

Lucrezia Reichlin, Director General of Research at the European Central Bank, presented a paper that investigates how to incorporate conjunctural analysis in structural models of the New-Keynesian provenance. Reichlin emphasized the significance of Woodford's first attempts at estimating small scale New-Keynesian models together with Julio Rotemberg in 1997. Since then, larger and richer models of this type have been developed and are now used routinely in the forecasting exercises of many central banks. In her presentation, Reichlin explained how to combine such models with conjunctural analysis. In doing so, her objective is to improve forecasting and to use models to interpret conjunctural news.

Traditionally, the basic goal of conjunctural analysis has been to exploit early releases to judge the current state of



Jan Krahnert, Lucrezia Reichlin, Volker Wieland

the economy, in particular current quarter GDP. Qualitative judgment is typically combined with simple small-scale models sometimes termed "bridge equations". These equations provide a bridge between the information contained in

one or a few key monthly indicators and the quarterly growth rate of GDP, when measurements on the latter are not yet available.

The methodological advances presented by Reichlin help improve forecasting in real time by

- using a large number of data series,
- updating now-casts and measures of their accuracy in accordance with the real time calendar of data releases, and
- “bridging” monthly data releases with the now-cast of quarterly GDP.

Such forecasting approaches have been implemented at the ECB, the Federal Reserve Board and the central banks of New Zealand and Norway. Reichlin concluded that quantitative New-Keynesian models that have become a regular element of the forecasting process can be complemented with reduced form models developed to interpret data flow in real time in order to improve forecasting performance and interpret shocks in real time.

The paper by **Volker Wieland** (CFS and University of Frankfurt) investigates the robustness of monetary policy under uncertainty. Wieland, who praised Michael Woodford for his tremendous contributions to monetary theory and practice, suggested honoring Woodford also by debating one of his more controversial propositions. The award of the Deutsche Bank Prize 2007 to Michael Woodford had triggered substantial press and media interest in Germany in the run-up to the symposium due to Woodford’s outspoken criticism of the ECB’s two-pillar strategy, in particular, the prominent role of money in this strategy.



Volker Wieland, Lucrezia Reichlin

Wieland quoted Nobel Prize winner Robert Lucas who wrote in 2007 that “events since 1999 have not tested the importance of the (ECB’s) second, monetary pillar ... I am concerned that this encouraging but brief period of success will foster

the opinion, already widely held, that the monetary pillar is superfluous, and lead monetary policy analysis back to the kind of muddled eclecticism that brought us the 1970s inflation.” Lucas noted the increasing reliance of central bank research on New-Keynesian modeling and questioned whether this approach was able to satisfactorily explain the relation between trend money growth and inflation. Lucas concluded that “this remains an unresolved issue on the frontier of macroeconomic theory. Until it is resolved, monetary information should continue to be used as a kind of add-on or cross-check, just as it is in the ECB policy formulation today.”



Zvi Eckstein, Alex Cukierman

Wieland’s paper, written jointly with CFS fellow Günter Beck, uses the New-Keynesian model to address the concerns expressed by Robert Lucas. Money is present in this model but does not play a causal role in inflation determination once the effect of a central bank’s interest rate policy on output and that of output on inflation is taken into account. The paper allows for imperfect knowledge and persistent central bank misperceptions regarding the natural rates of interest and output. These misperceptions are shown to cause sustained policy mistakes and trends in money and inflation like those pointed out by Lucas.

Wieland then presented a strategy that normally follows optimal decisions based on the New-Keynesian model (recognizing that central banks act under discretion), but is combined with cross-checking against long-run money growth. He demonstrated that such a strategy would improve inflation control in the case of persistent central bank misperceptions. “The policy rule with cross-checking ensures that sustained deviations of money growth and inflation from target due to policy mistakes are eventually corrected,” according to Wieland. For example, such a correction occurs even when model-based inflation forecasts indicate that demand is sufficiently weak to return inflation on track. Cross-checking is designed as a statistical test that triggers

policy adjustments only in the event of sustained deviations. If the central bank's model estimates are correct, this strategy reaps the benefits of policy design in the New-Keynesian

model, but if they are persistently mistaken, cross-checking improves inflation control and renders the policy strategy more robust.

Expert Panel: The Theory and Practice of Monetary Policy Today – Successes, Failures and Open Questions



Michael Binder, Michael Woodford, Norbert Walter, Stefan Gerlach, Patrick Lane, Otmar Issing

The symposium concluded with a panel of academic, central-bank and market experts, starting with the prize winner.

Michael Woodford (Columbia University) noted that he agreed with Governor Mishkin's statement that inflation is always a monetary phenomenon but suggested that this statement is not always understood the same way.



Michael Woodford

According to Woodford, modern theory makes an important proposition by stating that inflation is almost entirely a consequence of central bank policies. In the models he uses, the inflation trend as well as shorter run fluctuations of inflation are critically determined by the actions and commitments of central banks. Based on these models, however, the proposition that inflation is a monetary phenomenon does not have much to do with historical correlations between inflation and particular measures of the money supply. Nor is the money

demand equation connecting the money supply and the general price level necessarily a key relationship in his model of the effects of monetary policy on inflation and output. Woodford, therefore, restated the principle of inflation being a monetary phenomenon as follows: the economic principle involved is the one according to which real factors in the economy determine at what equilibrium relative prices of goods and services are in the economy or what they will be once wages and prices have adjusted, but cannot determine what the absolute monetary level of the price of anything should be. Rather, it is only monetary policy commitments that can determine the latter.

Woodford then referred to the remarks of Robert Lucas quoted by Volker Wieland. Regarding the question on money growth and inflation trends, Woodford cited a paper he had written. This paper shows that inflation trends in the New-Keynesian models may be determined by the inflation target of the central bank without any relation to what is happening to the money supply. Woodford, however, acknowledged that the question of guarding against making mistakes because of inaccurate measurements of the economy that is addressed in Wieland's paper is a very important one. Woodford suggested the question of policy under uncertainty and cross-checking is an interesting topic for further research. However, Woodford expressed skepticism on whether monetary cross-checking constitutes the best approach to guarding against the kind of policy mistakes analyzed by Wieland, and suggested to use past inflation.

Finally, Woodford expressed support for the list of important research topics presented by Governor Mishkin. In particular, Woodford emphasized the need for developing a more satisfactory model of the financial sector and the effects of financial frictions, and for investigating the robustness of monetary policy to alternative assumptions regarding expectations formation.

Next, **Norbert Walter** (Deutsche Bank AG) provided the perspective of a practitioner who has been responsible for short- and medium-term forecasting for many years. According to Walter, the successes of monetary policy are very clear: namely the anchoring of inflation expectations at such low levels in so many countries in a world of a fiat currency. This success has really come as a surprise. Walter doubted that many people would have predicted such an outcome 20 years ago. He urged central banks around the world to follow the example of those that had secured these achievements. He stated that central bank independence is an important reason for these achievements, but not the only one. Walter also speculated that the forces of globalization, in particular increased wage competition on a global level, made it easier for central banks to keep inflation low and anchor inflation expectations.



As to the failures of monetary policy, Walter said that obviously central banks have not been able to avoid asset price bubbles. Time and time again the world has seen financial crises due to market inefficiencies. Despite adamant support for flexible exchange rates, we have experienced exchange rate changes that have been multiples of the differences in price and cost differentials between currency areas. Thus, there are a number of open questions regarding monetary strategy that need to be addressed. On money supply, Walter suggested that at times of massive financial innovation and disproportional increases in the demand for financial assets, the implications of these effects need to be accounted for in terms of the ECB's monetary pillar. Walter underscored the uncertainties

regarding concepts such as “natural” output or unemployment rates given the difficulties in measuring productivity and the effects of extensive off-shoring and trade in services.



Norbert Walter, Stefan Gerlach

Stefan Gerlach (Frankfurt University) elaborated on the achievements of monetary policy. In particular, he highlighted the important role of central bank independence and the successes in managing monetary policy as a technical undertaking relying on economic analysis and economists in central banks. He noted that research has contributed to central bank independence as well as improved our understanding of the transmission mechanism. As to open questions, Gerlach asked whether more transparency would always improve policy performance or whether there are limits to transparency. He mentioned the benefits that may be obtained by organizing decision-making by monetary policy committees rather than by individuals, and noted the importance of outsiders as external members of such committees. Regarding the inflation process itself, Gerlach considered the first generation of New-Keynesian Phillips curve models too simple and suggested a greater role for globalization. In Gerlach's judgment, inflation targeting strategies have been so successful simply due to the greater focus on inflation rather than the various technical features. Finally, he emphasized that the proper policy response to asset price inflation remains an important open question.

Patrick Lane (The Economist) also noted the success of monetary policy in achieving low and stable inflation. He considered it an enormous achievement given the state of many economies in the 1970s. But, one explanation could be just luck. Even Alan Greenspan speaks in his memoirs of having been to a certain extent lucky. What other elements may there be behind this success? First, there has been a remarkably successful move away from politics. Second, central banks have concentrated on a nominal anchor for fiat money. Third, the role of expectations has been recognized in monetary theory and practice. Fourth, it has been understood

that it is key for central banks to keep their promises. Thus, a great deal has changed in central bank communication in past years. Failures in policy are unlikely to be avoided because the world is uncertain. Studying the implications of such failures or misperceptions is certainly an important area for research. There are many open questions. For example, what prices should central banks aim to stabilize? How should central banks communicate with the market and the public? And given the turmoil of the past couple of months, what role should be given to the financial industry and credit in monetary policy analysis?

In conclusion, **Otmar Issing**, President of the Center for Financial Studies and former ECB chief economist, concentrated on the fundamental challenges the ECB faced when preparing for the start of monetary policy. As a new institution, one without a track record and responsible for a currency still to be born, the ECB had to overcome a lot of skepticism. But the ECB lived up to the challenge to anchor inflation expectations on a level consistent with its mandate and to maintain price stability, and has proved to be successful. The ECB achieved this by convincing markets and the public that it was determined to make the euro a stable currency and that it would be able to do so. By announcing its quantitative definition of price stability in the form of the two-pillar strategy, the ECB set an important milestone.

Communication, transparency and a clear commitment to the policy goal are the same principles that can be found at the core



Patrick Lane, Otmar Issing

of Michael Woodford's book "Interest and Prices". Thus, in this regard, Issing agreed with Woodford. He disagreed, however, on the role of money. "In a world in which financial markets play an ever increasing role, can we really rely on models that do not include a fully developed financial sector?" Issing asked. While many have criticized the ECB's strategy, in particular the role of money and cross-checking, Issing said he considered it the best available approach. In his view, ignoring money and credit is not the solution.

Issing concluded that central banks have probably never been so successful in achieving low inflation. The big failures have occurred when central banks have tried to fine tune the economy and ignored money. Furthermore, some open questions still remain, which is encouraging for younger and older economists alike.

Celia Wieland (CFS)



Josef Ackermann, Chairman of the Management Board and the Group Executive Committee of Deutsche Bank AG, presented the Deutsche Bank Prize in Financial Economics 2007 to Michael Woodford during the Award Ceremony that followed the Symposium