

# Conference Summary: New Frontiers in Monetary Policy Design

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**T**he Bank of Canada's annual conference, held in November 2009, was part of a major research program initiated in 2006 in anticipation of the next renewal of the inflation-control agreement in 2011. Although the current inflation-targeting regime has served Canadians well, sound public policy demands the continuous exploration of possible improvements to the monetary policy framework. Research initially focused on two central questions regarding the design of monetary policy: (i) Would an inflation target lower than our current 2 per cent target lead to better economic outcomes? (ii) What are the costs and benefits of price-level targeting relative to inflation targeting? Given the recent experience with policy interest rates near zero, a heavier emphasis has been placed on the implications of the zero bound on nominal interest rates for the design of the monetary policy framework.

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The conference brought together distinguished scholars from academic institutions and monetary authorities around the world to discuss these questions.

Reflecting the original questions asked in 2006, the conference agenda included work that shed new light on the potential costs and benefits of price-level targeting and on the optimal rate of inflation. Other work explored the causes of zero-bound

episodes and the efficacy of potential policies. The conference consisted of two special presentations—a luncheon address by Lawrence Christiano and the John Kuzsckzak Memorial Lecture delivered by Mark Gertler—together with six papers presented over three sessions with two discussants for each paper. The conference concluded with a panel discussion that reviewed the major themes and offered views on select topics.<sup>1</sup>

## Session I: The Zero Lower Bound

The events of the financial crisis that began in 2007 have highlighted the importance of the zero lower bound (ZLB) on nominal interest rates. In many advanced economies, central banks lowered their policy rates to what was considered the effective lower bound, constraining their ability to provide additional monetary stimulus. The frequency and severity of such episodes can have important implications for monetary policy design.

Standard dynamic stochastic general-equilibrium (DSGE) models suggest that the ZLB does not significantly constrain optimal policy. However, in their paper “Risk-Premium Shocks and the Zero Bound on Nominal Interest Rates,” **Robert Amano** and **Malik Shukayev** (Bank of Canada) argue that standard quantitative DSGE models do not fully capture the importance of the ZLB. They point to the experience of the recent crisis as one example. Amano and Shukayev show that one possible explanation for this disconnect is that the standard models omit shocks to the risk premium. Such shocks drive up the rates of return on private assets relative to the policy rate. Risk-premium shocks were particularly prominent during the recent recession and historically

<sup>1</sup> Current versions of the papers presented are listed in the Literature Cited. Some of those still in manuscript form are available on the Bank's website at <[http://www.bankofcanada.ca/en/conference\\_papers/econ\\_conf09/papers.html](http://www.bankofcanada.ca/en/conference_papers/econ_conf09/papers.html)>.

are fairly large. Offsetting the effect of these shocks can require a substantial reaction of the policy rate, thus making the ZLB a potentially important constraint. Other, more standard, shocks are not able to push nominal rates close to zero (e.g., shocks to productivity or government spending). Interestingly, Amano and Shukayev note that price-level targeting could help to manage the impact of risk-premium shocks because it leads to less variability in interest rates and, thus, fewer ZLB episodes.

**Henry Siu** (University of British Columbia) noted that in the real world, risk-premium shocks appear to cause both investment and consumption to fall. In the model, however, only investment falls in response to a positive risk-premium shock, while consumption rises. Siu noted that this discrepancy may be due to the fact that, in reality, movements in the risk premium are correlated with other shocks. He suggested that making the risk premium endogenous might remedy this issue. **Steve Ambler** (Université du Québec à Montréal) agreed that it would be helpful to endogenize the risk premium. He also conjectured that Amano and Shukayev's main result may be an artifact of the way money is introduced in the model. In particular, Ambler noted that hitting the ZLB in the model would require money balances to become very large. Consequently, the elasticity of money demand would tend to infinity. He argued that actual ZLB episodes provided little evidence to corroborate the latter prediction of the model.

During the recent crisis, several central banks provided forward guidance about the path of their policy rate. For example, the Bank of Canada made a conditional statement in April 2009 about the length of time that the policy rate would remain at its effective lower bound.<sup>2</sup> Much of the recent literature on monetary policy at the ZLB has suggested that forward guidance can be a very effective tool in preserving macroeconomic stability in the face of contractionary demand shocks (e.g., Eggertsson and Woodford 2003). Indeed, this strand of the literature goes as far as to suggest that there may be little need for other types of unconventional monetary policy, such as quantitative or credit easing.

In their paper "Limitations on the Effectiveness of Forward Guidance at the Zero Lower Bound," **Andrew Levin, David López-Salido, Edward Nelson, and Tack Yun** (Board of Governors of the Federal Reserve System) use the prototypical New Keynesian model to investigate the extent to which the

effectiveness of forward guidance depends on the magnitude and persistence of shocks to the natural interest rate and the interest elasticity of aggregate demand. They find that forward guidance is effective for shocks of moderate size and persistence but much less effective for larger and more persistent shocks. Moreover, the benefits of forward guidance are quite sensitive to assumptions about the interest elasticity of demand. They conclude that for an episode of the magnitude and persistence of the recent crisis in the United States, forward guidance alone is not very effective. They point to this result as a possible rationale for policies such as credit easing and fiscal stimulus.

**Sharon Kozicki** (Bank of Canada) noted that issues related to credibility and expectations formation could further limit the effectiveness of forward guidance. If the central bank does not have full credibility today that it will follow through on a policy commitment that binds only in the future, a much worse outcome might be obtained. Moreover, she noted that, in the presence of uncertainty, optimal policy includes state-contingent commitments, including state-contingent forward guidance. Kozicki suggested that this, combined with the time inconsistency of optimal policy, could pose significant communications challenges for policymakers. **Marc Giannoni** (Columbia University) was skeptical of the authors' conclusions regarding the limitations of forward guidance. He argued that forward guidance was, in fact, very effective in their model. Giannoni pointed out that although outcomes with forward guidance were not good, they were much better than those without such guidance. Indeed, in the context of the model used by the authors, forward guidance can implement the best possible outcomes. Moreover, he contended that the authors did not make a convincing case for unconventional policy measures.

## Luncheon Address

**Lawrence J. Christiano** (Northwestern University) gave the luncheon address "Implications of 2007–09 for Monetary DSGE Models." He identified two main implications of the crisis for macroeconomic models: (i) the characterization of monetary policy, and (ii) the urgency of modelling financial frictions.

Christiano argued that the crisis should lead the economics profession to change the way it characterizes monetary policy in macroeconomic models. He noted that, before the crisis, policy was modelled as a

<sup>2</sup> The statement was explicitly conditional on the outlook for inflation.

procedure for adjusting a particular short-term interest rate. He suggested that, in light of the actual behaviour of central banks during the crisis, an escape clause for “exigent circumstances” should be added to the standard approach. He proposed a definition of exigent circumstances that would require a drop in demand that leads to a ZLB episode and triggers a downward spiral of spending and inflation.

He observed that during the crisis, the Federal Reserve took policy actions that led it to undertake private financial intermediation. He suggested that the rationale for such policies might be some sort of externality that is operative only in unusual circumstances. He identified a pecuniary externality operating through asset prices as one potential candidate.

Christiano also argued that the crisis has made clear that modelling financial frictions must be a priority for macroeconomics. In particular, he noted that developing models with greater financial detail would allow economists to address such issues as whether or not monetary policy should respond directly to financial variables, and the importance of business-cycle disturbances that originate in the financial sector.

Christiano noted that recent work with models that include a financial sector has already made some progress. As an example, he presented research showing that shocks that make borrowers more or less risky may be particularly important for business-cycle fluctuations.

## Session II: Optimal Inflation

Standard macroeconomic models suggest that the optimal rate of inflation is zero, or even negative. Yet most central banks aim to maintain small positive rates of inflation. One possible explanation for this observation is that it is difficult to reduce nominal wages even when economic circumstances warrant a reduction. In the presence of downward nominal-wage rigidity (DNWR), a higher rate of inflation will allow easier adjustment of real wages—it will “grease the wheels of the economy” (Tobin 1972). In this situation, a lower rate of inflation will lead to real wages and unemployment that are higher, on average. In their paper “Downward Wage Rigidity and Optimal Steady-State Inflation,” **Gabriel Fagan** (European Central Bank) and **Julián Messina** (Universitat de Girona) review the international evidence on DNWR. They conclude that the evidence is consistent with DNWR in the United States, but that the findings for Europe suggest that it is *real* wages that are downwardly rigid. To assess the implications of these findings for

optimal inflation, Fagan and Messina present a model with asymmetric menu costs for wage setting that nests DNWR, downward real wage rigidity, standard menu costs, and flexible wages. They estimate the model using a simulated method of moments to match key features of the cross-sectional wage distribution for various countries. Their findings suggest that optimal inflation for European countries is between 0 and 2 per cent, while for the United States it is between 2 and 5 per cent.

**David Andolfatto** (Federal Reserve Bank of St. Louis) noted several caveats related to the dataset used by Fagan and Messina, including the fact that it includes wage changes only for continuing workers and that it ignores non-wage compensation. He also argued that the labour market might be better modelled as involving enduring relationships rather than as anonymous spot markets. In this case, the relevant concept is the wage profile over the length of the relationship, not at a point in time. **Michael Dotsey** (Federal Reserve Bank of Philadelphia) noted that models in which employers do not observe labour effort also lead to fairly flexible effective wages, even though measured wages are not flexible. Moreover, he cited several other empirical studies that raise doubts about the existence of DNWR. Dotsey concluded that the prevalence of DNWR remains an open question.

In their presentation “Inflation, Nominal Debt, Housing, and Welfare,” **Shutao Cao**, **Césaire Meh**, **Yaz Terajima** (Bank of Canada), and **José-Víctor Ríos-Rull** (University of Minnesota and Federal Reserve Bank of Minneapolis) evaluate the welfare effects of lowering the long-run inflation target in a life-cycle, heterogeneous-agent model of housing, nominal debt, and money. They assume that housing and debt transactions are costly, while money holdings are not subject to any transactions costs. This gives money a natural advantage as a vehicle for self-insuring against idiosyncratic earnings risk. They find that reducing the long-run rate of inflation from 2 per cent to 1 per cent reduces the cost of holding money and therefore facilitates the use of money for self-insurance. They conclude that a reduction in the rate of inflation would not only increase aggregate welfare in the long run, but would also improve the welfare of roughly 68 per cent of the population alive at the time of the change.

**Peter Howitt** (Brown University) noted that the model deals with only a one-time shock to inflation: at all other times inflation is constant and predictable. If the inflation rate were subject to uncertainty, households would allocate their portfolios differently. He also

suggested modifications, including an explanation of the motivation behind the assumption of quadratic costs for bond transactions, the inclusion of other real assets in addition to housing, and the addition of longer-term bonds to the model. Finally, he expressed doubts about households using cash holdings to self-insure and argued that the cash holdings implied by the model were implausibly large.

## John Kuszczak Memorial Lecture

**Mark Gertler** (New York University) delivered the 2009 John Kuszczak Memorial Lecture, “A Model of Unconventional Monetary Policy.”<sup>3</sup> He observed that over most of the postwar period, the Federal Reserve has conducted monetary policy by adjusting the federal funds rate in order to affect market interest rates—it has avoided lending directly in private credit markets. Since the onset of the crisis in August 2007, the situation has changed dramatically, and the Fed has injected credit directly into private markets. Gertler cited statistics indicating that private assets held by the Fed had increased from virtually nothing to nearly \$1.5 trillion. He noted that the Fed had taken these actions in an attempt to offset a considerable fraction of the decline in private financial intermediation by expanding central bank intermediation.

Gertler pointed out that whenever the short-term interest rate is at the zero lower bound, central banks are unable to stimulate the economy using conventional means. In these situations, they must rely exclusively on unconventional balance-sheet operations. He noted, however, that the baseline versions of standard models assume frictionless financial markets. Accordingly, these models are unable to capture financial-market disruptions that could motivate the type of central bank interventions in loan markets observed during the crisis. To remedy this situation, he presented a quantitative macroeconomic model in which it is possible to analyze the effects of unconventional monetary policy.

Gertler’s model incorporated financial intermediaries within an otherwise standard macroeconomic framework. He assumed a simple agency problem between intermediaries and their depositors in order to generate an effect from the balance sheets of intermediaries on the overall flow of credit. The agency problem introduced endogenous constraints on the leverage ratios

of the intermediaries, which link overall credit flows to equity capital in the intermediary sector. In the model, a deterioration of the intermediaries’ capital disrupts lending and borrowing in a way that mimics what happened during the crisis. To study unconventional monetary policy, Gertler allowed the central bank to act as an intermediary, but assumed that public intermediation would generally be less efficient than private intermediation. He showed that the welfare gains from interventions in credit markets could actually be quite large, as long as efficiency costs are sufficiently modest.

## Session III: Price-Level Targeting

Recent research on monetary policy design has produced several results suggesting that price-level targeting (PLT) might yield better results than inflation targeting (IT). The papers in this session evaluated the performance of PLT under alternative assumptions about price setting, and the effectiveness of PLT in managing tail risks.

Studies evaluating the efficacy of monetary policy rules and regimes are often based on a benchmark New Keynesian model in which the parameters are assumed to be policy invariant. It is possible, however, that some key parameters may not be invariant to changes in monetary policy. In “Endogenous Rule-of-Thumb Price-Setters and Monetary Policy,” **Robert Amano**, **Rhys Mendes**, and **Stephen Murchison** (Bank of Canada) use a hybrid New Keynesian Phillips curve to examine the question of IT versus PLT when price-setters endogenously choose to behave either in an optimal forward-looking manner or to follow a simple rule of thumb for setting prices. Although other factors may also be endogenous, they focus on the degree of forward-looking behaviour, since it has been identified in the literature as a crucial parameter affecting the performance of PLT versus IT. They allow firms in their model to choose between using a simple backward-looking rule of thumb (RT) and paying a cost to set prices optimally in a forward-looking (FL) manner. They find that the benefits (relative profitability) of being FL versus RT depend on the regime. In their model, the success of PLT in stabilizing the economy makes the simple rule of thumb relatively more attractive, leading to an increase in RT behaviour. They show that this increase in RT behaviour could reduce the benefits of PLT over IT. They conclude that if a central bank fails to account for the impact of policy changes on the proportion of RT price-setters, outcomes can be significantly worse than anticipated.

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<sup>3</sup> This lecture is funded by the Bank of Canada in memory of our colleague John Kuszczak, who died in 2002.

**Ricardo Reis** (Columbia University) began by pointing out that the literature on monetary policy design has identified a very substantial set of potential benefits of PLT relative to IT. Yet, PLT is almost never implemented in practice. Reis argued that this puzzle is one of the largest gaps between the theory and practice of monetary policy. He went on to question the generality of the results presented by Amano, Mendes, and Murchison. In particular, he noted that the rule of thumb assumed by the authors may, in fact, change with the policy regime. In addition, he argued that the cost of behaving in a forward-looking manner should be included as a resource cost in the model.

**Frank Smets** (European Central Bank) agreed with these points. He also suggested endogenizing some of the parameters of the rule of thumb and considering some alternative policy rules and feedback horizons.

**Roberto Billi** (Federal Reserve Bank of Kansas City) then presented his evaluation of the “risk-management” properties of PLT in “Price-Level Targeting and Risk Management in a Low-Inflation Economy.” He notes that low inflation implies low nominal interest rates and a greater probability of hitting the ZLB. Thus, downside risks to the economy are greater when inflation is low. He demonstrates that PLT mitigates downside tail risks relative to IT, while generating only slightly worse outcomes, on average. He concludes that PLT is a more effective policy framework than IT for the management of downside tail risks in a low-inflation economy.

**Kevin Moran** (Université Laval) suggested that Billi formalize the idea that reducing downside tail risks should be considered desirable. He also expressed surprise that IT dominated PLT in the model in terms of average welfare. He argued that this result may be due to the use of first-difference interest rate rules in the model. **Gauti Eggertsson** (Federal Reserve Bank of New York) agreed that the first-difference rules were the source of the surprising welfare result. He noted that what really mattered in the model was the degree of history dependence in the policy rule, not the specific source of the history dependence. Eggertsson also argued that the fact that PLT appeared to be more robust against “deflationary black holes” could be a rationale for PLT over IT.

## Panel Discussion

The conference concluded with discussion by a panel consisting of **John Murray** (Bank of Canada),

**Vincent Reinhart** (American Enterprise Institute), and **Michael Woodford** (Columbia University).

**Michael Woodford** discussed four related issues: (i) the desirability of a price-level target, (ii) the importance of forward guidance, (iii) reconsideration of optimal inflation targets, and (iv) a role for “unconventional policy.” On the desirability of price-level targeting, Woodford noted that recent research implies that PLT is optimal in the presence of cost-push shocks and a good approximation to optimal policy in the presence of cost-push shocks and a zero bound on nominal interest rates. Work presented at the conference did little to sway Woodford from these conclusions.

Woodford argued in favour of forward guidance (and PLT) and questioned the conclusions of Levin et al., who compared the commitment policy with an unattainable first-best policy instead of the more relevant comparison between commitment and purely forward-looking policy. The real issue concerning the application of forward guidance and PLT, according to Woodford, is whether the central bank can assume full credibility or rational expectations, since their absence would impinge on the efficacy of forward guidance and PLT. He noted, however, that not all ways of moving away from full rational expectations weaken the case for PLT.

The zero bound on nominal interest rates is an issue that has led some to argue in favour of higher inflation targets. Woodford pointed out that this is a very inefficient solution to the zero-bound problem if history-dependent policy can be made credible. He noted that a good policy should promise temporary re-inflation (after a deflation) but not permanently higher inflation, and that PLT is a regime that allows for this. PLT, moreover, may be a good way to explain how temporary re-inflation can be consistent with a commitment to low inflation. On the final point, Woodford sees a case for active credit policy when interest rates approach their zero bound, since policy rates can no longer be used to help offset potential distortions in credit markets.

**Vincent Reinhart** began by discussing the traditional problems with price-level drift. That is, the presence of drift fails to anchor nominal levels; impedes credibility, since by-gones are by-gones; and limits the effectiveness of stabilization policy. Reinhart argued that, given these problems with base drift, PLT may be a useful monetary policy framework, especially in regard to stabilization.

He noted, however, that communication issues may hinder the usefulness of PLT. In particular, he argued

that policy-makers may be reluctant to adopt PLT because they lack confidence in their ability to convey information to the public about more than a single factor. For example, they may be concerned about their ability to communicate how policy would be conducted in a different economic situation or how it might differ in the future relative to the present.

**John Murray** first returned to the two original questions mentioned in the Bank of Canada's 2006 background document on the renewal of the inflation targets. That is, (i) should the inflation target be lower than 2 per cent? and (ii) should we move to a price-level target? To put these questions in context, he also discussed things that we thought we knew in 2006: (i) measurement bias and nominal wage rigidities were not major concerns; (ii) the main impediment to a lower inflation target was the ZLB on nominal interest rates, which, based on past experience and work at that time, was probably rare and manageable; and (iii) according to model simulations and the plausibility of the arguments, PLT seemed to be a promising idea with the added benefit that it might help deal with zero-bound episodes.

Murray then turned to the question, What have we learned since then? To answer this, Murray used the recent crisis and associated events, including the application of unconventional monetary policies as an (unexpected) natural experiment. He concluded that there may be inconsistency between some of the tentative conclusions drawn from previous research and recent real-world events. Murray then turned to the conference papers and divided them into two camps. The first camp offered cautionary messages: namely, zero-bound episodes may be more frequent

than earlier anticipated, the effectiveness of forward guidance may be limited in the face of a serious shock, downward nominal-wage rigidity may be more significant than we think, and endogenous pricing behaviour may reduce the benefits of PLT. The second camp painted a more positive picture: distributional and equity arguments support a lower rate of inflation, PLT may be helpful insurance against downside tail risks, and unconventional monetary policies can work.

*Our success with inflation targeting has raised the bar for a move to another, potentially better, framework for monetary policy.*

To conclude, Murray asked a final question: What do we need to know? With regard to optimal inflation, he suggested that more work on the frequency of future zero-bound episodes and the effectiveness of unconventional policies would be useful. He also wondered whether we need to revise our thinking on downward nominal-wage rigidity. With regard to PLT, Murray asked if economic agents would value greater price-level certainty and if there is a way to test whether agents would understand PLT and change their behaviour accordingly. Finally, he talked about the puzzle mentioned by Ricardo Reis in his discussion and the fact that our success with inflation targeting has raised the bar for a move to another, potentially better, framework for monetary policy.

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