BANK OF CANADA

PUBLICATIONS

2001

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Bank of Canada
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INTRODUCTION

The Bank of Canada produces a wide variety of publications of interest to business and banking professionals, policy-makers, academics, and the general public. In addition to the research documents listed on the following pages, they include:

Annual Report
Published in March. No charge.

Monetary Policy Report
Published in April and October. No charge.

Monetary Policy Report Update
Published in January and July. No charge.

Renewal of the Inflation-Control Target: Background Information
Also two technical background documents: *Document 1: A Brief Review of the Literature on Whether a Low-Inflation Regime Leads to Economic Difficulties*, and *Document 2: Lower Rates of Inflation and Improved Economic Outcomes*. May. No charge.

Speeches and Statements
by the Governor. No charge.

Bank of Canada Banking and Financial Statistics
Published monthly.*

*For subscription prices see pages 25–26.

Weekly Financial Statistics
Published each Friday.*

The Thiessen Lectures
January. No charge.

Bilingualism at the Bank of Canada
Published annually. No charge.

All Bank publications, except for the *Bank of Canada Banking and Financial Statistics*, are available on our Web site: <http://www.bankofcanada.ca>.

BANK OF CANADA
REVIEW

The **Bank of Canada Review** *is a quarterly publication of interest to business and banking professionals, academics and educational institutions, libraries, and the general public. It combines economic commentary and feature articles related to the Canadian economy and to central banking with summary statistical tables. Articles are available on the Bank's Web site (http://www.bankofcanada.ca/en/review/revlist.htm).*

Winter 2000–2001

Dynamic General-Equilibrium Models and Why the Bank of Canada is Interested in Them
Kevin Moran

In this article, the author describes the main features of dynamic general-equilibrium models (DGEMs) and outlines their contribution to economic research performed at the Bank. He notes that the basic principle of DGEMs is that the modelling of economic activity, even on a scale as large as the economy of a country, should start with a series of microeconomic problems (at the scale of individuals), which, once resolved, are aggregated to represent the macroeconomic reality described by the model.

The Bank of Canada's Management of Foreign Currency Reserves
Jacobo De León

This article describes the Bank's management of the liquid foreign currency portion of the government's official reserves. It broadly outlines the operations of the Exchange Fund Account (EFA), the main account in which Canada's reserves are held. It then briefly reviews the evolution of the objectives and management of the EFA over the past 25 years, particularly in light of the changing level of reserves and developments in financial markets. The article focuses on the comprehensive portfolio framework used to manage the EFA, which matches assets and liabilities.

The Federal Government's Use of Interest Rate Swaps and Currency Swaps
John Kiff, Uri Ron, and Shafiq Ebrahim

Interest rate swaps and currency swaps are contracts in which counterparties agree to exchange cash flows according to a pre-arranged formula over a period of time. Since 1985, the federal government has been using such swaps to manage its liabilities in a cost-effective and flexible manner. The authors outline the characteristics of swap agreements and the ways in which the government uses them. They show that the swap program has been cost-effective, estimating that past and projected savings exceed $500 million. The authors also discuss the methods that the government uses to monitor the counterparty credit risk associated with these transactions.

Spring 2001

Reforming the International Financial System
James Powell

This article examines the efforts of the major advanced countries to strengthen the international financial system in order to avoid financial crises such as those that occurred in emerging-market economies in the 1990s. These efforts have focused on crisis prevention and crisis management. The prevention of such crises has necessitated the formation of new international groups that include emerging markets in their membership. To reduce the vulnerability of countries to financial crises, measures have been taken that centre on the need for sustainable exchange rate regimes, sound domestic financial systems, and prudent risk management.

Core Principles for Systemically Important Payments Systems and Their Application in Canada
Clyde Goodlet

Systemically important payments systems are systems that, because of the size or nature of the payments they process, could trigger or transmit serious shocks across domestic or international financial systems if they were insufficiently protected against risk. This article describes the framework of core principles developed for the design, operation, and oversight of such systems. It reviews the role of the task force established to develop the core principles, examines the principles themselves, and examines the role of central banks in overseeing major payments systems and in applying the core principles to them. The focus is on the Bank's oversight responsibilities and on Canada's systemically important payments system—the LVTS.

www.bankofcanada.ca—The Bank on the World Wide Web
Brent Eades

This article by the Bank's Web master details the development of the Bank's Web site and highlights some of its special features. It includes a description of *dataBANK*, a custom-built interface to the Bank's economic databases that gives visitors access to 220 data series. It also provides a mini tour of monetary policy material "on site," as well as a taste of things to come. Above all, this article invites you to come and visit our site.

Summer 2001

The Changing Effects of Energy-Price Shocks on Economic Activity and Inflation
Gerald Stuber

The author examines the effects that major changes in energy prices in recent years have had on inflation and on the pace of economic expansion. These are then compared with the effects of the oil-price shocks that occurred in the 1970s and early 1980s. Changes in the intensity of energy use are examined, as well as developments in Canada's merchandise trade surplus in energy commodities and products. The author also considers the effects that a monetary policy anchored to low and stable inflation could have on price-setting behaviour and thus on the pass-through of higher energy costs to core inflation in Canada and in other industrial countries.

Innovation and Competition in Canadian Equity Markets
Serge Boisvert and Charles Gaa

Innovations in communications technology and the related globalization of financial markets have created the potential for important changes to the structure of Canadian equity markets. While regulators see innovation as positive for the development of Canadian markets, there is some concern that market liquidity may be fragmented in the short run. The Canadian Securities Administrators have proposed a framework that attempts to address this issue and that would allow alternative trading systems to compete with traditional exchanges for the first time. The authors describe the Canadian equity market and its structure, focusing on these recent developments.

Analyzing the Monetary Aggregates
Dinah Maclean

The author describes how the monetary aggregates are used in the formulation of monetary policy analysis at the Bank, outlining the key tools and models used. The most important money-based model is the M1-VECM, in which deviations in the money supply from the long-term demand for money cause changes in inflation. The author describes the "active-money" paradigm underlying this model and explains the key equations within it. Also described are single-equation indicator models for output based on the narrow aggregates, a neural network, and a model based on the broader aggregate M2++. A technical annex details model equations and coefficient values.

Autumn 2001

A New Measure of Core Inflation

Tiff Macklem

While the Bank's inflation-control target is specified in terms of the rate of increase in the total consumer price index, the Bank uses a measure of trend or "core" inflation as a short-term guide for its monetary policy actions. When the inflation targets were renewed in May 2001, the Bank announced that it was adopting a new measure of core inflation. This measure excludes the eight most volatile components of the CPI and adjusts the remaining components for the effect of changes in indirect taxes. The author describes some of the advantages of the new measure over the previous one.

Predictability of Average Inflation over Long Time Horizons

Allan Crawford

The adverse effects of inflation uncertainty can be reduced by adopting a policy framework that makes future inflation more predictable over long time horizons. When the inflation-control target was renewed in May 2001, the agreement affirmed that monetary policy will be directed at moving inflation to the 2 per cent midpoint of the target range over a six-to-eight-quarter horizon. The author describes how this policy commitment increases the predictability of average inflation over periods longer than one year. This relationship is illustrated using the Canadian experience from the inflation-targeting period.

Factors Affecting Regional Economic Performance in Canada

Brigid Brady and Farid Novin

This article examines three shocks that affected Canada's economy during 2001 from a regional perspective. The downturn in the U.S. economy, high energy prices, and low lumber prices affected Canada's regions to varying degrees. The relative size of the various economic sectors in each region is important in determining the intensity of a region's response to an economic shock. The article presents some stylized facts on the sectoral mix of each region and analyzes the effects of the three shocks on the regional economies. An outlook is presented that highlights the results of a survey by the Bank's regional offices in the summer of 2001.

Conference Summary: Revisiting the Case for Flexible Exchange Rates

Larry Schembri

This article summarizes the proceedings of an international research conference hosted by the Bank of Canada in November 2000. The conference marked the fiftieth anniversary of Canada's adoption of a flexible exchange rate, and its title recognizes the seminal contribution of Professor Milton Friedman's article, "The Case for Flexible Exchange Rates." His keynote address to the conference is summarized. The conference papers re-examine many of the arguments raised by Friedman using recent developments in economic theory and econometric techniques.

CONFERENCE PROCEEDINGS

Price Stability and the Long-Run Target for Monetary Policy

On 8 and 9 June 2000, the Bank held a seminar to examine key issues affecting the upcoming decision on Canada's inflation-control target for the period after 2001. The research papers presented at the seminar were published in April 2001. The papers are available on the Bank's Web site (http://www.bankofcanada.ca/en/conference/con2000.htm).

Downward Nominal-Wage Rigidity: A Critical Assessment and Some New Evidence for Canada

Jean Farès (Bank of Canada) and Thomas Lemieux (University of British Columbia)

The authors provide new evidence on the aggregate effects of downward nominal-wage rigidity in Canada. They test whether the real-wage Phillips curve—defined as the relationship between the growth in real wages and the unemployment rate—became flatter during the period of low inflation in the 1990s. They conclude that their findings suggest that downward nominal-wage rigidity did not significantly affect aggregate wages and employment during the post-1991 period of low inflation in Canada. They suggest that disaggregated evidence helps to explain why downward nominal-wage rigidity appears to have had little effect on aggregate real wages.

What Happened to the Phillips Curve in the 1990s in Canada?

Paul Beaudry and Matt Doyle (University of British Columbia)

The authors test for a change in the slope of the Phillips curve using data for Canada and the United States from 1961–99. Their empirical results suggest that, in both countries, the slope fell after peaking in the early 1980s. There was a particularly sharp reduction in the estimated slope of the Canadian Phillips curve in the 1990s. Whereas a traditional interpretation would link this decrease to wage- and price-setting institutions, the authors argue instead that it reflects changes in the behaviour of the monetary authorities.

When Is Price-Level Targeting a Good Idea?

Richard Barnett (University of Arkansas) and Merwan Engineer (University of Victoria)

The authors review the literature to evaluate the validity of the arguments in favour of price-level targeting. They conclude that the case for price-level targeting depends on various factors, including whether the monetary authority can credibly commit to future policy or whether it sets a new plan each period, whether current inflation is controllable by the monetary authority, and how inflation expectations are formed.

Price-Level Targeting—The Role of Credibility

Dinah Maclean and Hope Pioro (Bank of Canada)

This paper attempts to examine how much credibility is needed for some degree of price-level targeting to reduce inflation and output variability. For this purpose, the authors make various assumptions about the expectations process and then examine the variability of inflation and output in an economic model that is subjected to repeated shocks. They use the Bank's Quarterly Projection Model and shocks designed to broadly represent the historical distribution of shocks in Canada. Their results suggest that some degree of price-level targeting is appropriate if the regime is highly credible or if most agents are forward-looking.

Issues in Inflation Targeting

Frederic Mishkin (Columbia University)

Mishkin considers key issues related to the design of an inflation-targeting regime. He advocates an inflation target rather than a price-level target. He concludes that downward nominal-wage rigidity is *not* a persuasive reason for setting a positive level for the long-run inflation target, and he suggests that a reasonable long-run target is about 2 per cent. He recommends that policy focus on a target two years ahead. He believes that a point target is better than a range, and that ways other than a range should be used to communicate to the public that the central bank does not have precise control over inflation.

What Have We Learned About Price Stability?

Michael Parkin (University of Western Ontario)

Parkin's paper discusses what kind of targets for the behaviour of the price level would lead to a monetary policy that contributes most to the economic welfare of Canadians. He concludes that inflation targeting helps to achieve and maintain low inflation by influencing inflation expectations. He also concludes that a system with formal targets should be continued in Canada.

Revisiting the Case for Flexible Exchange Rates

The Bank's tenth annual research conference, held in November 2000, marked the fiftieth anniversary of Canada's adoption of a flexible exchange rate. The conference re-examined the case for a flexible exchange rate (with some form of price-level or inflation target) against the alternative of a more permanently fixed regime, such as a common currency, in light of new theoretical and empirical developments. Published April 2002. The proceedings are available on the Bank's Web site (http://www.bankofcanada.ca/conference2000/papers.htm).

The Economic Consequences of Alternative Exchange Rate and Monetary Policy Regimes in Canada
Tiff Macklem, Patrick Osakwe, Hope Pioro, and Lawrence Schembri (Bank of Canada)

The authors use a calibrated, three-sector, dynamic general-equilibrium model of the Canadian economy (resources, manufacturing, and non-traded goods) to analyze the impact of stochastic shocks to the terms of trade under alternative exchange rate and monetary policy regimes. The two regimes considered are a flexible exchange rate with a price-level target, which is similar to Canada's current regime, and a permanently fixed exchange rate such as that under a currency union.

Monetary Policy, Exchange Rate Flexibility, and Exchange Rate Pass-Through
Michael Devereux (University of British Columbia)

The author stresses the importance of the pricing behaviour of firms in the traded-goods sector on the choice of exchange rate regimes. He argues that if firms in the traded-goods sector practice pricing to market and thus prevent the immediate pass-through of exchange rate movements into domestic prices, then a flexible exchange rate will likely be preferred over a fixed exchange rate system. His model incorporates a forward-looking Phillips curve, and he considers five alternative monetary policy rules, including a pegged exchange rate and two inflation-targeting rules with flexible exchange rates.

Shocks Affecting Canada and the United States and the Flexible Exchange Rate's Contribution to Macroeconomic Adjustment
Ramdane Djoudad, Céline Gauthier, and Pierre St-Amant (Bank of Canada)

Using quarterly data for Canada and the United States from 1973 to 1999 to estimate a structural vector autoregression model, the authors obtain the following results: Canada's flexible nominal exchange rate facilitates macroeconomic adjustment by accelerating the realignment of the real exchange rate; including the real prices of primary materials in the model does not change the key results of earlier studies, which find that most of the variation in the real exchange rate and output is explained by real demand shocks and supply shocks; monetary shocks do not play a large part in explaining movements in the real exchange rate.

Common-Currency Areas in Practice
Andrew Rose (Walter A. Haas School of Business, University of California)

The author examines the impact of common currencies on economic integration. By drawing on his previous research and performing some new empirical work, he compares the economic integration of countries within currency unions with the integration of regions within a country and with integration among countries with different currencies. He argues that the greater trade integration of currency unions is important because increased trade generates more output. As a caveat, he notes that it would require a leap of faith to apply his results, based on a sample of mainly small and poor currency-union members, to larger, more developed countries.

The Role of Chartists and Fundamentalists in Currency Markets: The Experience of Australia, Canada, and New Zealand

Ramdane Djoudad, John Murray, Tracy Chan, and Jason Daw (Bank of Canada)

The authors find that in Canada, Australia, and New Zealand, on more tranquil trading days (70 per cent of all trading days), chartists dominate, while fundamentalists are more active during turbulent times. The results suggest that central bank intervention is not needed to help stabilize markets, since sharp increments in the exchange rates of the three countries are typically driven by fundamentalists pushing these currencies back to their equilibrium values. The authors argue that changes in monetary conditions caused by exchange rate movements should not necessarily be resisted by policy-makers because they usually reflect changes in the underlying fundamentals.

Trade Flows, Prices, and the Exchange Rate Regime

Philippe Bacchetta (Study Center Gerzensee and Université de Lausanne) and Eric van Wincoop (Federal Reserve Bank of New York)

The authors develop a theoretical general-equilibrium model with multiple sources of uncertainty to analyze the relationship between trade flows and fluctuations in the nominal exchange rate. They find that under reasonable parameter values, most firms would price to market because it reduces risk by stabilizing sales volumes. Their model predicts that as asset markets become more complete, firms will hedge their risks directly and move away from pricing-to-market behaviour. Thus, the influence of the exchange rate regime on trade is likely to diminish.

Exchange Rate Variability and Investment in Canada

Robert Lafrance and David Tessier (Bank of Canada)

The authors investigate the effect of exchange rate variability on investment in Canada. They distinguish between the effects that may be caused by the potential misalignment of the exchange rate level and those that may result from the volatility of the exchange rate. The authors use Granger causality tests to investigate both types of effects and find that neither the misalignment of levels nor the volatility of the bilateral real exchange rate affects total domestic investment spending, investment in machinery and equipment, or foreign direct investment.

Is There a Case for Exchange-Rate-Induced Productivity Changes?

Richard Harris (Simon Fraser University and Canadian Institute for Advanced Research)

The author argues that recent depreciation of the nominal exchange rate in Canada has had a negative impact on Canadian productivity. He notes that although most theory would predict that exchange rate depreciations should raise demand, factor utilization, measured productivity, and investment, the reverse has been true for Canada. Harris maintains that real depreciations, by sheltering inefficient industries and raising input costs, lead to lower productivity. He identifies three mechanisms through which productivity is reduced: relative factor costs, a gap in innovation, and a slowdown in creative destruction.

Exchange Rate Regimes and Economic Growth in Emerging Markets

Jeannine Bailliu, Robert Lafrance, and Jean-François Perrault (Bank of Canada)

The authors examine the relationship between the exchange rate regime and the growth rate in emerging-market economies. They also develop a method for classifying exchange rate regimes based on the observed degree of exchange rate flexibility. By means of multivariate regression, they test several hypotheses linking growth and exchange rate regimes for a sample of 25 developing countries, using data over the period 1973–98. They find that flexible exchange rate regimes are associated with higher growth for countries that are open to capital movements.

The Mirage of Floating Exchange Rates

Carmen Reinhart (University of Maryland)

Although official data from the International Monetary Fund show a large movement by emerging-market economies towards more flexible exchange rate regimes, the author argues that these regime descriptions are misleading, since many of the countries described as floaters do not allow their currencies to float because they fear the impact of exchange rate fluctuations on their economies. Analyzing a sample of more than 150 exchange rate arrangements, the author finds that many floaters have quite stable exchange rates and show considerable movements in reserves and interest rates because they are intervening to stabilize their exchange rates.

Panel Discussion 1

Michael Bordo (Rutgers University)

Bordo reviews the history of Canadian monetary regimes from 1820 to 2000. Over this period, Canada has experienced alternating fixed and floating regimes. Bordo's remarks focus on the determinants of these regimes.

Panel Discussion 2

Richard Lipsey (Simon Fraser University and Canadian Institute for Advanced Research)

Lipsey organizes his remarks around five issues raised by the papers presented at the conference: the current flexible exchange rate regime; an alternative regime; the Bank's exchange rate equation is not well understood; Canada is best served by a flexible exchange rate; and productivity and technological change.

Panel Discussion 3

John Helliwell (University of British Columbia)

Helliwell's comments focus on the various papers presented. He notes that much of the research presented finds systematic advantages of flexible exchange rates over fixed. Levels of GDP per capita across industrialized countries are not very different. The segmentation of national markets, although not fully understood, strengthens the case for flexible rates.

Keynote Address: Canada and Flexible Exchange Rates

Milton Friedman (Hoover Institution)

Friedman reviews Canada's history with flexible and fixed exchange rates, and concludes that it was because of the flexible exchange rate that Canada avoided a crisis like those that occurred in various countries in the 1990s. Such crises are always and everywhere caused by pegged exchange rates.

WORKING PAPERS AND TECHNICAL REPORTS

Working papers report on research work in progress. Technical reports present studies on economic and financial subjects. Both series are of interest to business and banking professionals, academics and educational institutions, and libraries.

The Bank's Web site contains working papers from 1994 (http://www.bankofcanada.ca/en/wp(y).htm), and technical reports from 1982 (http://www.bankofcanada.ca/en/trlist.htm).

Working Papers

2001-1
The Elements of the Global Network for Large-Value Funds Transfers
James F. Dingle

The author describes the various elements of the global payment network for large-value funds transfers (G-LVTN). The short form G-LVTN is used to name the totality of the relevant national payment systems and cross-border banking arrangements that comprise the global whole. Policy issues relevant to the G-LVTN that have arisen over the last decade are summarized, as are the principal actions taken by central banks and others to address those issues. The paper concludes by examining three trends that are affecting the processing of large cross-border funds transfers and how those trends may affect the global network in the future.

2001-2

Exact Non-Parametric Tests for a Random Walk with Unknown Drift under Conditional Heteroscedasticity

Richard Luger

This paper proposes a class of linear signed rank statistics to test for a random walk with unknown drift in the presence of arbitrary forms of conditional heteroscedasticity. The class considered includes analogues of the well-known sign and Wilcoxon test statistics. The exactness of the proposed tests rests only on the assumption that the errors are symmetrically distributed. Simulations confirm the reliability of the proposed tests; their power is superior to that of the parametric variance-ratio test. The inference methods developed are illustrated by a test of the random-walk hypothesis in exchange rates for five major currencies against the U.S. dollar.

2001-3

On Commodity-Sensitive Currencies and Inflation Targeting

Kevin Clinton

Two aspects of the recent monetary history of Canada, Australia, and New Zealand stand out: inflation targeting and the sensitivity of their dollars to prices of resource-based commodities. Various aspects of these phenomena are explored using standard empirical models and an investigation of the approaches to inflation targeting in the three countries to assess how well a floating currency serves a resource-rich economy, and how monetary policy should be conducted during periods of turbulence in commodity and currency markets.

2001-4

On the Nature and the Stability of the Canadian Phillips Curve

Maral Kichian

In this paper the author empirically determines why, during the 1990s, inflation in Canada was consistently more stable than predicted by the fixed-coefficients Phillips curve. A time-varying-coefficient model, where all the parameters adjust simultaneously, shows that the behaviour of expectations was probably a major contributing factor. A decrease in the value of the coefficient on the first difference of the output gap also seems to have influenced the observed pattern of inflation. Finally, pass-through of relative price shocks into domestic prices is shown to have been low since 1983.

2001-5

Reactions of Canadian Interest Rates to Macroeconomic Announcements: Implications for Monetary Policy Transparency

Toni Gravelle and Richhild Moessner

The authors find that Canadian interest rates react little to Canadian macroeconomic news but are significantly affected by U.S. macroeconomic news. There is little evidence that Canadian interest rates have become more sensitive to Canadian macroeconomic announcements over time. They hypothesize that the lack of fixed monetary policy announcement dates in Canada prior to December 2000, and the Bank's occasional efforts to smooth destabilizing fluctuations in foreign exchange rates, have contributed to the inability of Canadian market participants to better understand the monetary policy reaction function.

2001-6

The Zero Bound on Nominal Interest Rates: How Important Is It?

David Amirault and Brian O'Reilly

The authors survey the literature and address questions ranging from the conditions under which the zero bound on the nominal interest rate might occur to policy options to avoid or use to exit from such a situation. There seems to be a consensus in the literature that the probability of encountering the zero bound is relatively low, especially if the inflation target established for the monetary authority is 2 per cent or more. There is some indication in the model work that the likelihood of encountering the zero bound increases at an increasing rate for lower inflation targets.

2001-7

Downward Nominal-Wage Rigidity: Micro Evidence from Tobit Models

Allan Crawford and Geoff Wright

The authors use Tobit models and data for union contracts to examine the extent of downward nominal-wage rigidity in Canada. To be consistent with important stylized facts, the models allow the variance of the notional wage-change distribution to be time-varying and test for menu-cost effects. The empirical results confirm the importance of using a general specification with a time-changing variance and menu-cost effects. On balance, the evidence suggests that the long-run trade-off between inflation and the unemployment rate is close to vertical at inflation rates of 2 per cent or more if productivity growth is near the average in recent decades.

2001-8

How Rigid Are Nominal-Wage Rates?

Allan Crawford

The author examines the effect of nominal-wage rigidities on wage growth in Canada using a hazard model and micro data for union contracts. The hazard model allows flexibility in the shape of the estimated notional wage-change distribution, which is compared with the observed distribution to estimate the net effect of downward nominal-wage rigidity and menu costs on wage growth. Estimates from alternative versions of the model suggest that the net effect on the average annual growth rate of wages was in the range of 0.10 to 0.18 percentage points in the unionized private sector during the low-inflation period of the 1990s.

2001-9

Testing for a Structural Break in the Volatility of Real GDP Growth in Canada

Alexandre Debs

This study follows the methodology of McConnell and Quiros (1998). A break is found in the first quarter of 1991. Based on disaggregated data, the tests indicate a break in the volatility of the rate of change of investment in residential structures and a break in the volatility of the rate of growth of personal expenditures on goods. Three possible explanations are given: a more service-oriented economy, improved inventory management, and a change in monetary policy.

2001-10

The Future Prospects for National Financial Markets and Trading Centres

Charles Gaa, Stephen Lumpkin, Robert Ogrodnick, and Peter Thurlow

The authors investigate the effects of the continuation of globalization and technological developments on the future of national-level financial markets and trading centres, particularly in smaller countries such as Canada. They foresee the development of a single global market in the most-liquid assets based on equity-market linkages. Thus, they see this global market being accessed by national-level trading centres. Moreover, they see a remaining role for national-level intermediated markets for less-liquid products. This could pose problems, since the scale of the latter could diminish over time.

2001-11
Gaining Credibility for Inflation Targets
James Yetman

Optimal monetary policy entails endogenizing the learning process of agents and solving the resultant "optimal-control" problem. The author shows that a linear approximation of the optimal-control problem is observationally equivalent to a "conservative central banker" in the sense of Rogoff (1985), results in most of the gains that are available from pursuing a higher-order approximation for reasonable degrees of initial credibility, and may actually be preferable if agents cannot determine the exact weights with which to update their view of the target. A conservative central banker is especially beneficial if society places a high weight on output deviations from target.

2001-12
Evaluating Linear and Non-Linear Time-Varying Forecast-Combination Methods
Fuchun Li and Greg Tkacz

The authors propose, among the non-linear methods evaluated, a nonparametric kernel-regression weighting approach that allows maximum flexibility of the weighting parameters. A Monte Carlo simulation study compares the performance of the different weighting schemes. The simulation results show that the non-linear combination methods are superior in all scenarios considered. When forecast errors are correlated across models, the nonparametric weighting scheme yields the lowest mean-squared errors. When no such correlation exists, forecasts combined using artificial neural networks are superior.

2001-13
Predetermined Prices and the Persistent Effects of Money on Output
Michael B. Devereux and James Yetman

The authors develop a model of *predetermined pricing*, based on the work of Fischer (1977), where firms set a fixed schedule of nominal prices at the time of price readjustment. This type of price-setting specification cannot produce any excess persistence in a fixed-duration model of staggered prices, but they show that with a probabilistic model of price adjustment, as in Calvo (1983), a predetermined pricing specification can produce excess persistence. Moreover, in response to a money shock, the aggregate dynamics are very similar to those under a specification of *fixed prices*, the assumption underlying most recent dynamic sticky-price models.

2001-14
L'effet de la richesse sur la consommation aux États-Unis
Yannick Desnoyers

The substantial growth in wealth over the course of the second half of the 1990s generated the equivalent of a certain level of savings, while simultaneously causing household savings rates to fall significantly. The author uses the methodology developed by King, Plosser, Stock, and Watson (1991) to explain the decline in savings observed since 1995. In contrast to the results obtained in other studies, those presented here demonstrate that the wealth effect on consumption is transitional rather than permanent, dissipating quite rapidly.

2001-15
Affine Term-Structure Models: Theory and Implementation
David Jamieson Bolder

Affine models describe the stylized time-series properties of the term structure of interest rates in a reasonable manner, they generalize easily to higher dimensions, and there is a vast academic literature on their implementation. These characteristics make the affine class a natural introductory point for modelling interest rate dynamics. The author summarizes and synthesizes the theoretical and practical specifics relating to this analytically attractive class of models. This paper takes a first step towards advancing the Bank's research in this area, with a view to using these models to assist with practical debt and risk-management problems currently under study.

2001-16
Implications of Uncertainty about Long-Run Inflation and the Price Level
Gerald Stuber

This paper surveys recent developments in the theoretical and empirical literature on the economic implications of uncertainty about the longer-term outlook for inflation. The linkages between inflation, long-run inflation uncertainty, and aggregate economic activity in industrial economies have become better understood during the past decade. Recent empirical work for Canada and elsewhere strengthens the view that reducing long-run inflation uncertainty can have beneficial effects on financial markets, capital spending, and aggregate economic activity. Recent theoretical developments have improved our understanding of why this is so.

2001-17
Why Do Central Banks Smooth Interest Rates?
Gabriel Srour

It is commonly observed that central banks respond gradually to economic shocks, moving the interest rate in small discrete steps in the same direction over an extended period. The author examines the empirical evidence regarding central banks' smoothing of interest rates, paying particular attention to the case of Canada. He then reviews the alternative explanations of the stylized facts that have recently emerged in the literature.

2001-18
Evaluating Factor Models: An Application to Forecasting Inflation in Canada
Marc-André Gosselin and Greg Tkacz

Using a dimension-reduction method similar to traditional principal-components analysis, the authors extract a small number of factors from a sample of both Canadian and U.S. data and construct four different factor models. Using parametric and non-parametric tests, they compare the forecasting performance of the factor models with that of various benchmark forecasting models. They conclude that factor models are as good as more elaborate models in forecasting Canadian inflation. They also find evidence that a model estimated using only U.S. data is helpful in predicting changes in the Canadian inflation rate.

2001-19
Employment Effects of Restructuring in the Public Sector in North America
Paul Fenton, Irene Ip, and Geoff Wright

Using changes in public sector employment, the authors examine whether restructuring in the public sector contributed to slower cyclical recovery in Canada than in the United States during the 1990s. The analysis reveals that, in Canada, changes in employment in the "standardized" public sector were negative during much of the 1990s, in contrast to the continued, steady expansion of this sector in the United States. The authors conclude that public sector restructuring did contribute to the slower recovery in employment in Canada in the 1990s.

2001-20
The Resolution of International Financial Crises: Private Finance and Public Funds
Andy Haldane and Mark Kruger

Over the past year and a half, the Bank of England and the Bank of Canada have been developing a framework for the resolution of international financial crises that aligns incentives for all parties to deal with a crisis and preserve the integrity of the international financial system. The framework is built on principles, not rules. It attempts to be clear about the respective roles and responsibilities of the public and private sectors. Characterized by constraints, clarity, and orderliness, the framework has the potential to reduce the incidence and cost of financial crises.

2001-21
A Consistent Bootstrap Test for Conditional Density Functions with Time-Dependent Data
Fuchun Li and Greg Tkacz

The authors describe a new test applicable to forecasting problems. They show that the test statistic is asymptotically distributed standard normal under the null hypothesis, and diverges to infinity when the null hypothesis is false. A bootstrap algorithm is used to approximate the distribution of the test statistic in finite samples and show that the bootstrapped distribution converges to the asymptotic distribution in probability. A Monte Carlo simulation study reveals that the test works well and is highly robust to the value of the smoothing parameter in the kernel density estimator. An application to inflation forecasting demonstrates the test's use.

2001-22
On Inflation and the Persistence of Shocks to Output
Maral Kichian and Richard Luger

The possibility that the effects of shocks to output depend on the level of inflation is empirically investigated. The analysis extends Elwood's 1998 framework by incorporating in the model an inflation-threshold process that can potentially influence the stochastic properties of output. The value of this threshold parameter, if it exists, is considered to be unknown and is estimated in the model. The results indicate that shocks to output do indeed have asymmetric effects, depending on the level of inflation: negative shocks are more detrimental when inflation is high and positive shocks are more persistent when inflation is low.

2001-23

Modelling Mortgage Rate Changes with a Smooth Transition Error-Correction Model

Ying Liu

A smooth transition error-correction model (STECM) is used to model the one-year and five-year mortgage rate changes. The model allows for a non-linear adjustment process of mortgage rates towards their long-run equilibrium. Time-varying thresholds are also introduced into the standard STECM specification to capture the gradual structural changes in the error-correction term. The author finds that the STECM, whether with fixed or time-varying thresholds, yields better in-sample fit and lower forecast errors than the linear benchmark and univariate models.

2001-24

Price-Level versus Inflation Targeting in a Small Open Economy

Gabriel Srour

This paper compares two types of monetary policy: price-level targeting and inflation targeting. It reviews recent arguments that favour price-level targeting and examines how certain factors, such as the nature of the shocks affecting the economy and the degree to which agents are forward-looking, affect the arguments. The paper then extends the analysis to a small open economy such as Canada's and considers whether it is practical for this country to pursue price-level targets if its dominant trading partner, the United States, allows the price level to drift.

2001-25

New Phillips Curve with Alternative Marginal Cost Measures for Canada, the United States, and the Euro Area

Edith Gagnon and Hashmat Khan

The authors assess the use of alternative measures of marginal cost to improve the empirical fit of the new Phillips curve (NPC). Their research indicates that: (i) ignoring aggregation factors gives implausibly large estimates of the duration of price stickiness—in this respect, the aggregation factors improve the fit of the NPC substantially; (ii) the marginal cost measures based on constant elasticity of substitution technology improve the fit of the NPC relative to the Cobb-Douglas technology, particularly for Canada and the euro area; (iii) for Canada, the backward-looking component of inflation is quite strong relative to the United States and the euro area; and (iv) the incorporation of open-economy considerations for Canada does not yield better estimates of the NPC.

2001-26

An Estimated Canadian DSGE Model with Nominal and Real Rigidities

Ali Dib

A dynamic, stochastic, general-equilibrium (DSGE) model for the Canadian economy is developed and used to evaluate the real effects of monetary policy shocks. The estimated nominal and real rigidities impart substantial real and persistent effects following a monetary policy shock. The results show that the monetary authority has accommodated technology shocks and has successfully insulated the Canadian economy from demand-side disturbances, by responding to technology and money-demand shocks.

2001-27
The Monetary Transmission Mechanism at the Sectoral Level
Jean Farès and Gabriel Srour

Using simple vector autoregression, the authors investigate the transmission mechanism in broad sectors of the Canadian economy at the level of final expenditures and at the level of production. At the level of final expenditures, they find that a monetary contraction affects exports relatively quickly, and it affects investment much more substantially than the consumption of goods, while it does not seem to affect services. Durables respond to a monetary contraction much more substantially than semi-durables, while non-durables do not respond significantly. At the level of production, construction reaches the trough of the cycle first, after a monetary contraction, although, cumulatively, manufacturing reacts twice as strongly.

Technical Report

No. 89
Core Inflation
Seamus Hogan, Marianne Johnson, and Thérèse Laflèche

The Bank of Canada uses a measure of underlying or *core* CPI inflation as the operational guide for monetary policy. Following a discussion of conceptual issues, the authors introduce and evaluate alternative measures of core inflation, focusing on the suitability of various measures for policy purposes. They find the alternatives quite similar in many respects. However, a closer assessment suggests that different measures do well along different dimensions.

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