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CONTENTS

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 July and January. No charge.

Financial System Review.
Published semi-annually. No charge.

Speeches and Statements by the Governor.
No charge.

Bank of Canada Banking and Financial Statistics.
Published monthly.*

Weekly Financial Statistics.
Published each Friday.*

Bank of Canada Publications Catalogue.
Published annually. No charge.

*For subscription prices see pages 29–30.

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 **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 2001–2002

The Resolution of International Financial Crises: Private Finance and Public Funds
Andy Haldane (Bank of England) and Mark Kruger (Bank of Canada)

Since mid-2000, 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.

The Canadian Fixed-Income Market: Recent Developments and Outlook

Éric Chouinard and Zahir Lalani

The simultaneous shrinking of the federal government's financial requirements and steady rise in issuance of corporate securities have altered the composition of Canada's fixed-income market. The reduced issuance of federal government securities has contributed to a decline in the liquidity of the benchmark market. The federal government is committed to preserving the integrity of the market for benchmark issues and is adopting initiatives to enhance market liquidity and alleviate some of the pressures on the effective supply of these securities. The authors also examine the emergence of electronic trading platforms and discuss their possible effects.

Risk Management in the Exchange Fund Account

Michel Rochette

The author briefly describes the initiatives undertaken to identify, analyze, model, and manage the principal risks inherent in the transactions of the Exchange Fund Account (EFA), where the international reserves of the federal government are held. He focuses on five types of risk: credit risk, market risk, liquidity risk, operational risk, and legal risk. In addition, the author presents the risk-management principles underlying the activities of the EFA and the governance structure of the Account.

Spring 2002

Inflation and the Macroeconomy: Changes from the 1980s to the 1990s

David Longworth

Over the last 10 years, the level of inflation has been much lower than in the previous two decades. At the same time, the behaviour of inflation has changed profoundly. By surveying the data and the economic research, the author first examines changes in the variability, growth rates, and behaviour of some of the major macroeconomic variables during the 1980s and 1990s. He then looks at how these changes are linked to a shift in the approach of monetary policy over the period. Lastly, he reviews the economic benefits that these changes have had for Canada.

Trends in Productivity Growth in Canada

Allan Crawford

The author describes the major trends in the growth of labour productivity in Canada since the early 1960s and summarizes current knowledge about the causes of the historical patterns. Particular attention is given to the period since the mid-1990s, during which time productivity growth has been significantly higher in the United States than in Canada. The author reviews the empirical evidence on the contribution of information and communication technology to this difference. Other determinants of a country's productivity performance are also examined. The article concludes with an assessment of the prospects for an increase in the trend rate of productivity growth in Canada over the coming years.

Private Capital Flows to Emerging-Market Economies
Jean-François Perrault

The author explores the evolution of capital flows to emerging markets over the last 30 years, placing emphasis on the past decade. Capital markets in emerging-market economies have evolved substantially over the period, becoming increasingly deep and resilient. The author looks at how capital flows to these countries have changed in terms of magnitude, geographical distribution, the financial instruments used, and the country of origin. He also examines how changes in the investor base have affected these flows and reviews the factors underlying the growth of private capital flows in the 1990s.

Foreign Takeovers and the Canadian Dollar: Evidence and Implications
Lawrence Schembri

Since 1995, acquisitions of foreign firms by Canadian residents and acquisitions of Canadian firms by foreign residents have increased. This recent upward trend is part of the globalization process as firms consolidate and rationalize their operations, and is not related to the value of the Canadian dollar. Standard models of international asset pricing imply that there should not be a relationship between the Canadian exchange rate and foreign takeovers of Canadian firms. Transactions between foreign and domestic residents are voluntary, and they imply that the foreign buyers expect to obtain higher profits from the firms' assets.

Summer 2002

Special Issue on the Conduct of Monetary Policy

Monetary Policy and Uncertainty
Paul Jenkins and David Longworth

Central banks must cope with considerable uncertainty about what will happen in the economy when formulating monetary policy. The authors describe the different types of uncertainty that arise and look at examples of uncertainty that the Bank has recently encountered. They then review the strategies employed by the Bank to deal with this problem.

Information and Analysis for Monetary Policy: Coming to a Decision
Tiff Macklem

The author outlines one of the Bank's key approaches to dealing with the uncertainty that surrounds decisions on monetary policy: the consideration of a wide range of information from a variety of sources. More specifically, he describes the information and analysis that the monetary policy decision-makers—the Governing Council of the Bank of Canada—receive in the two or three weeks leading up to a decision on the setting of the policy rate—the target overnight interest rate. The author also describes how the Governing Council reaches this decision.

Models in Policy-Making

Don Coletti and Stephen Murchison

The authors examine the Bank's use of carefully articulated models to produce economic forecasts and to examine the implications of the various risks to those forecasts. Economic models are deliberate simplifications of a complex world that allow economists to make predictions that are reasonably accurate and that can be easily understood and communicated. By using several models, based on competing paradigms, the Bank minimizes policy errors that could result from relying on one view of the world and one philosophy of model design. The authors review some of the models currently used at the Bank, as well as the role of judgment in the projection process.

The Role of Simple Rules in the Conduct of Canadian Monetary Policy

Denise Côté, Jean-Paul Lam, Ying Liu, and Pierre St-Amant

The authors provide an overview of the recent research regarding the usefulness and robustness of simple monetary policy rules, particularly in models of the Canadian economy. They also describe and explain the role of simple rules in the conduct of monetary policy in Canada.

Autumn 2002

Is Canada Dollarized?

John Murray and James Powell

There is an animated debate in Canada concerning the potential benefits of formally adopting the U.S. dollar as our national currency. Some observers suggest that the Canadian economy is already highly "dollarized." The authors examine the available data and draw some tentative conclusions about the extent to which Canada has become informally dollarized. The evidence that they present suggests that many of the concerns that have been expressed about the imminent dollarization of the Canadian economy are misplaced. The Canadian dollar continues to be used as the principal unit of account, medium of exchange, and store of value within our borders, and there is no indication that dollarization is likely to take hold in the foreseeable future.

CLS Bank: Managing Foreign Exchange Settlement Risk

Paul Miller and Carol Ann Northcott

Credit risk is the most serious risk among many in the foreign exchange market, where average daily turnover amounts to trillions of dollars and trades span time zones, legal systems, and domestic payments systems. Central banks, private sector financial institutions, and the operators of domestic payments systems laboured for more than a decade to create the CLS Bank and its payment-versus-payment arrangement that virtually eliminates credit risk. Opened in September 2002, the CLS Bank, with the participation of the world's largest foreign-exchange-dealing institutions, has the potential to become the dominant global mechanism for settling foreign exchange transactions.

Purchasing-Power Parity: Definition, Measurement, and Interpretation

Robert Lafrance and Lawrence Schembri

The authors examine the concept of purchasing-power parity (PPP) and its implications for the equilibrium value of the Canadian exchange rate. As a theory of exchange rate determination, PPP is mainly useful as a reminder that monetary policy has no long-run impact on the real exchange rate. As a means of comparing living standards across countries, PPP rates help to provide comparable measures of purchasing power but are not an accurate measure of the equilibrium value of the exchange rate. Thus, the current deviation of the Canadian exchange rate from the PPP rate does not imply that the exchange rate is undervalued, but that this deviation reflects the impact of persistent real factors, particularly lower commodity prices.

CONFERENCE PROCEEDINGS

Financial Market Structure and Dynamics

On 29 and 30 November 2001, the Bank held a conference to examine issues related to market structure and the dynamics of markets. Most of the papers presented at the conference could be considered to be within the "market microstructure" literature, a relatively new branch of financial economics that seeks to explain how latent supply and demand for financial assets are transformed into transactions, and how this process drives asset-price dynamics. The conference proceedings were published in December 2002. The Bank does not supply individual copies of papers from Bank conference proceedings.

The Microstructure of Multiple-Dealer Equity and Government Securities Markets: How They Differ
Toni Gravelle (Bank of Canada)

The author compares and contrasts market structures and practices in multiple-dealer equity markets with those in government securities markets and demonstrates that there are subtle and important differences between the two (at first glance, quite similar) types of dealership markets. Intrinsic differences in the two types of securities, the nature of the investors, the degree of centralization, and transparency regimes are highlighted. The author also suggests that these structural differences are likely to significantly affect the activities of market-makers and therefore the amount of liquidity that they provide.

Optimal Market Structure: Does One Shoe Fit All?
Nicolas Audet (University of Michigan), Toni Gravelle (Bank of Canada), and Jing Yang (Bank of Canada)

The authors approach the question of optimal market structure by developing a model in which customers choose to trade in either a dealership or a limit-order-book market. Their findings suggest that a dealership market will be preferred by investors in an environment where customer trading is relatively thin and "lumpy," and by investors who are subject to relatively large liquidity shocks. This is consistent with the observation that markets dominated by a relatively small number of institutional investors tend to be organized as dealership markets.

The Development of Alternative Trading Systems in the U.K. Gilts Market: Lessons and Implications

Allison Holland (United Kingdom Debt Management Office)

The author describes the phenomenon of electronic trading in the U.K. debt markets. She outlines the Debt Management Office's (DMO) policy response to the challenges raised. The DMO's decision to introduce a central, committed interdealer market, while leaving the customer market and the overall level of transparency in the gilt market essentially unchanged, was taken on the basis of an assessment of the fundamental differences between the various market segments.

Liquidity, Transactions Costs, and Reintermediation in Electronic Markets

Ian Domowitz (Investment Technology Group Inc. and Pennsylvania State University)

The author examines the relationship between trading costs, technology, and the role of intermediaries in financial markets. He shows that the pursuit of lower trading costs has led to the introduction of new, automated trading mechanisms and venues, resulting in potential disintermediation for some intermediaries (traditional retail brokers and stock exchanges, for instance). The move towards limit-order-book markets is discussed. The author suggests, however, that this new landscape brings with it a fresh set of challenges, such as liquidity management for participants, which create opportunities for disintermediated entities to reinvent or "reintermediate" themselves.

Should Securities Markets Be Transparent?

Ananth Madhavan (Investment Technology Group Inc. and University of Southern California), David Porter (University of Wisconsin), and Daniel Weaver (Baruch College)

The authors investigate the effect on market liquidity of an increase in pre-trade transparency on the Toronto Stock Exchange that occurred in April 1990. Contrary to the assumption that higher transparency would lead to higher quality markets, the authors find evidence that market liquidity suffered as a result of the change.

The Effects of Bank Consolidation on Risk Capital Allocation and Market Liquidity

Chris D'Souza and Alexandra Lai (Bank of Canada)

The authors examine consolidation among market-makers. They demonstrate that if the merged entity has a greater risk-bearing capacity than the original pre-merger entities (through a greater degree of diversification among its business lines), consolidation may lead to a net increase in the amount of risk capital allocated to market-making activities, improving market liquidity and investor welfare.

Detecting Shift Contagion in Currency and Bond Markets

Toni Gravelle (Bank of Canada), Maral Kichian (Bank of Canada), and James Morley (Washington University in St. Louis)

The authors develop a model-based technique for identifying periods of high and low variances by the study of "shift contagion," where correlations between market prices systematically increase during crisis periods. Their methodology has the added advantage that the source of a crisis need not be known. The authors find evidence of shift contagion in the currency markets of developed countries, but not in the bond markets of emerging-market economies.

Price Discovery in a Market Under Stress: The U.S. Treasury Market in Autumn 1998
Craig H. Furfine and Eli M. Remolona (Bank for International Settlements)

Focusing on the interdealer U.S. Treasury market during the Long-Term Capital Management crisis in the autumn of 1998, the authors examine how different price discovery is in a market under stress. They find that trade flows have an increased impact on prices during periods of heightened trading activity and when market depth is asymmetric. Their findings also suggest that trading had a greater price impact during the crisis, even after controlling for the effects of heightened activity and asymmetric depth.

Portfolio Balance, Price Impact, and Secret Intervention
Martin D.D. Evans (Georgetown University) and Richard K. Lyons (University of California, Berkeley)

The authors estimate the price impact of wholesale trades in foreign exchange markets, and they find strong evidence of temporary and (economically significant) persistent price effects from portfolio rebalancing. They also find that these effects are greater when the flow of macroeconomic news is strong. With respect to intervention in currency markets, these findings imply that intervention trades will have a significant price impact if they are sterilized, secret, and provide no policy signal, and that this intervention will have the strongest impact when markets are reacting to macroeconomic news. Within this specialized model, the authors present a methodology for estimating the impact of such action.

Panel Discussion 1
John Chant (Bank of Canada)

Chant comments on the conference papers in the context of two issues that the conference has addressed: the nature of a central bank's stake in issues of financial structure and dynamics, and the ways in which the papers benefit central banks by providing better understanding related to their stake. He describes how the papers address issues of vital concern to central banks in their roles as protector of price stability and guardian of financial stability.

Panel Discussion 2
Dino Kos (Federal Reserve Bank of New York)

Kos discusses liquidity and explains why it is something that central banks should care about. He describes why it is very difficult, from the public sector perspective, to manage and foster an increase in liquidity once all of the obstacles that may have hindered development of the market have been taken away. The market has to—and does—find its own level of liquidity, even though the process does not always appear smooth when we are going through it.

Panel Discussion 3
Richard K. Lyons (University of California, Berkeley)

Lyons comments on how the conference has bridged a disconnect between micro- and macroeconomics. Macroeconomists are beginning to appreciate that there is a different way of approaching certain issues that may be relevant at both the macro and micro policy levels. Microstructure models can be used as vehicles for understanding a very large macro event.

Lyons also describes policy issues that the conference papers addressed, and research suggested by some of the conference discussions.

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

2002-1
Taylor Rules in the Quarterly Projection Model
Jamie Armour, Ben Fung, and Dinah Maclean

The reaction function in the Bank of Canada's Quarterly Projection Model (QPM) is an inflation-forecast-based (IFB) rule. Overall, this study suggests that Taylor-type rules do not perform well in QPM compared with the base-case IFB rule, since they are associated with significantly higher variabilities of inflation, output, and interest rates. However, of the Taylor-type rules considered, the authors find that a simple rule with a coefficient of 2 on the contemporaneous inflation gap (versus 0.5 in Taylor's original rule) and a coefficient of 0.5 on the output gap is the most appropriate. Furthermore, the gains from using open-economy rules seem to be limited.

2002-2
Asset Allocation Using Extreme Value Theory
Younes Bensalah

The author focuses on the allocation problem faced by an extremely risk-averse institution, such as a central bank. The optimal portfolio in terms of excess return over the risk-free rate per unit of risk is also described. An example of asset allocation is presented using a 1-year treasury bill and a 5-year zero-coupon bond. The allocation is conducted using different risk measures. The implications of the results on optimal allocation of capital under stressed market conditions are discussed. Some practical issues concerning the use of the results are described, such as who should allocate capital based on extreme values.

2002-3
An Introduction to Wavelets for Economists
Christoph Schleicher

Wavelets are mathematical expansions that transform data from the time domain into different layers of frequency levels. Compared with standard Fourier analysis, they have the advantage of being localized both in time and in the frequency domain, and enable the researcher to observe and analyze data at different scales. A number of successful applications indicate that wavelets are on the verge of entering mainstream econometrics. The author gives an informal and non-technical introduction to wavelets, and describes their potential for the economic researcher.

2002-4
Does Micro Evidence Support the Wage Phillips Curve in Canada?
Jean Farès

The author examines the dynamics of the aggregate wages in Canada, and tests whether real wages and unemployment have a long-term *level* relationship. The results indicate that a simple aggregate wage Phillips curve continues to describe the behaviour of aggregate wages in Canada quite well. The micro evidence, however, does not unequivocally support one specification against the other; rather, what seems to emerge is more complex wage dynamics better described in an error-correction specification. Wage changes reflect the short-run movement in the unemployment rate, while they adjust towards a long-run equilibrium level, as could be described in a wage curve model.

2002-5
The Effects of Bank Consolidation on Risk Capital Allocation and Market Liquidity
Chris D'Souza and Alexandra Lai

The authors show that an increase in financial market consolidation can have ambiguous effects on liquidity in foreign exchange and government securities markets. The framework employed assumes that financial institutions use risk-management tools (for example, value-at-risk) in the allocation of risk capital. The allocation of risk capital within financial institutions has implications for the types of mergers among financial institutions that can be beneficial for market liquidity. The results suggest that, when faced with a proposed merger between financial institutions, policy-makers and regulators should examine the correlations among division cash flows.

2002-6
Currency Fluctuations, Liability Dollarization, and the Choice of Exchange Rate Regimes in Emerging Markets
Patrick N. Osakwe

Traditional models of exchange rate regimes ignore the destabilizing effects of sharp and unanticipated exchange rate movements. Recent research, however, has shown that these movements have real costs in emerging markets owing to liability dollarization, financial fragility, or balance-sheet vulnerabilities. The author evaluates the performance of an emerging-market economy under a credibly fixed-rate, a collapsing fixed-rate, and a flexible-rate regime using a speculative attack model that takes into account the destabilizing effects of unanticipated movements in exchange rates. The model is applied to South Korea to determine the dominant exchange rate regime.

2002-7
Contribution of ICT Use to Output and Labour-Productivity Growth in Canada
Hashmat Khan and Marjorie Santos

There is ample evidence that information and communication technologies (ICT) contributed significantly to the surge in output and labour-productivity growth in the United States in the late 1990s. Does Canada share the U.S. experience? Has ICT influenced the trend productivity and output growth? Answers to these questions will help improve the Bank's forecasts of inflationary pressures. The authors examine the first question. A simple growth-accounting exercise suggests that, in contrast to the United States, Canada did not experience an acceleration in the contributions of ICT use to output and labour-productivity growth.

2002-8
Restructuring in the Canadian Economy: A Survey of Firms
Carolyn C. Kwan

The Bank's regional offices surveyed 140 Canadian companies to study the effects of restructuring (defined as a major change in the way firms do business). The survey showed that restructuring was greater in the 1990s than in the 1980s. Also, restructuring reduced employment more often in the 1990s than in the 1980s, usually because competition squeezed profit margins and made it necessary to reduce the cost of labour. Restructuring also shifted the skill mix in favour of more highly skilled workers and increased the use of contract workers to maintain flexibility. Companies were optimistic, however, regarding their future performance.

2002-9
The Microstructure of Multiple-Dealer Equity and Government Securities Markets: How They Differ
Toni Gravelle

Although dealership government and equity securities have, on the surface, similar market structures, the author demonstrates that some subtle differences exist between them that are likely to significantly affect the way market-makers trade, and as such have an impact on the liquidity that they provide. The author reviews some of the concepts recently introduced in the literature, examining multiple-dealer equity markets, and delineates gaps that exist in this literature in terms of its applicability to government securities markets.

2002-10
La fiabilité des estimations de l'écart de production au Canada
Jean-Philippe Cayen and Simon van Norden

The authors measure, with Canadian data, the scope of the revisions to real-time estimates of the output gap generated with several univariate and multivariate techniques. They empirically evaluate the usefulness of the output gap estimates for predicting inflation. Their findings suggest that, for all techniques, the standard deviation of the revisions is of the same order of magnitude as the output gap itself. The authors also find that, except for the Beveridge-Nelson technique, all revisions are persistent: there is a long lag before the scope of the output gap revisions is fully known. The results suggest that estimates of the output gap are not very reliable.

2002-11
Risk, Entropy, and the Transformation of Distributions
R. Mark Reesor and Don L. McLeish

The exponential family, relative entropy, and distortion are methods of transforming probability distributions. The authors establish a link between those methods, focusing on the relation between relative entropy and distortion. Relative entropy is commonly used to price risky financial assets in incomplete markets, while distortion is widely used to price insurance risks and in risk management. The link between relative entropy and distortion provides some intuition behind distorted risk measures such as value-at-risk. Furthermore, distorted risk measures that have desirable properties, such as coherence, are easily generated via relative entropy.

2002-12
Modelling Financial Instability: A Survey of the Literature
Alexandra Lai

The magnitude and frequency of recent financial crises underscore the importance of understanding financial instability for the purpose of crisis prevention and crisis management. This paper brings together and adds structure to the theoretical literature on financial instability and the implications they carry for policy-makers. In addition to clarifying the theoretical underpinnings for studying financial crises, it points to several directions for future theoretical research necessary to fill the gaps of our understanding of financial instability.

2002-13
Towards a More Complete Debt Strategy Simulation Framework
David Jamieson Bolder

To defensibly generate a debt charge distribution for a given financing strategy, one must have a good model to simulate the future dynamics of a set of key macroeconomic variables into the future. The author suggests a reduced-form approach to describe the key elements of the stochastic model used to analyze the Government of Canada's debt strategy problem. A simple algorithm is proposed for the simultaneous simulation of the business cycle, the government's financial position, and the term structure of interest rates. The approach uses a constant parameter hidden-Markov model in combination with the class of affine term-structure models.

2002-14
Entrepreneurship, Inequality, and Taxation
Césaire Assah Meh

The author confirms the conjecture that the evaluation of tax policy leads to very different conclusions once the role of entrepreneurs is considered. Contrary to previous literature, the author finds that switching from a progressive to a proportional income tax system has a negligible effect on wealth inequality in the United States. This surprising result arises because entrepreneurial activities moderate the effects of the policy change on the wealth distribution. The author shows that proportional income tax reform increases entrepreneurial investment and savings by reducing the marginal income tax rates paid by entrepreneurs.

2002-15

Corporate Bond Spreads and the Business Cycle

Zhiwei Zhang

The author examines the predictive power of credit spreads from the corporate bond market. The high-yield bond spread and investment-grade spread can explain 68 per cent and 42 per cent of output variations one year ahead, while the term spread based on government debts can explain only 12 per cent of them. For output forecasts up to one year ahead, the corporate bond spreads also outperform popular indicators such as the paper-bill spread, federal funds rate, consumer sentiment index, Conference Board leading indicator, and the Standard & Poor's index both in-sample and out-of-sample.

2002-16

A Market Microstructure Analysis of Foreign Exchange Intervention in Canada

Chris D'Souza

The author clarifies the role and the impact of foreign exchange dealers in the relationship between foreign exchange intervention and nominal exchange rates using a unique dataset that disaggregates trades by dealer and by type of trade. The author tests a number of market microstructure hypotheses. Results suggest that central bank orders and other customer orders are treated similarly by dealers who are engaged in short-run speculative and risk-sharing-motivated interdealer trading. While private payoff-relevant information is contained in trades, speculative interdealer trading is based only on transitory non-payoff-relevant information.

2002-17

Does Exchange Rate Policy Matter for Growth?

Jeannine Bailliu, Robert Lafrance, and Jean-François Perrault

Previous studies on whether the nature of the exchange rate regime influences a country's medium-term growth performance have distinguished between pegged, intermediate, and flexible exchange rate regimes. Two of the categories (intermediate and flexible) characterize solely the exchange rate regime, whereas the third (pegged) characterizes *both* the exchange rate regime and the monetary policy framework. The authors refine this classification scheme by accounting for different monetary policy frameworks. They estimate the impact of exchange rate arrangements on growth in a panel-data set of 60 countries over the period from 1973 to 1998 using a dynamic generalized method of moments estimation technique.

2002-18

Estimated DGE Models and Forecasting Accuracy: A Preliminary Investigation with Canadian Data

Kevin Moran and Veronika Dolar

The authors apply the hybrid dynamic general-equilibrium, vector autoregressive (DGE-VAR) model developed by Ireland (1999) to Canadian time series. They present the first Canadian evidence that a hybrid DGE-VAR model may have better out-of-sample forecasting accuracy than a simple, structure-free VAR model. The evidence suggests that estimated DGE models have the potential to add good forecasting ability to their natural strength of adding structure to an economic model.

2002-19

Estimates of the Sticky-Information Phillips Curve for the United States, Canada, and the United Kingdom

Hashmat Khan and Zhenhua Zhu

The authors present a methodology for the empirical implementation of Mankiw and Reis' "sticky-information"-based Phillips curve for closed and open economies. The benchmark results (with forecasting horizons of firms of seven to eight quarters) indicate that: (i) the average frequency of information updates is four quarters in the United States, between four and five quarters in Canada, and over seven quarters in the United Kingdom, and (ii) the open-economy estimates for Canada and the United Kingdom are similar to the closed-economy ones. The authors' structural estimates can be used to calibrate dynamic general-equilibrium models for monetary policy analysis that use informational inertia to match the stylized facts on inflation dynamics.

2002-20

Evaluating the Quarterly Projection Model: A Preliminary Investigation

Robert Amano, Kim McPhail, Hope Pioro, and Andrew Rennison

The Quarterly Projection Model (QPM) consists of a steady-state model and a dynamic model, and this paper focuses on those two parts. The results of the two evaluations reveal some strengths and weaknesses in QPM. For example, while most of the parameter calibrations in the steady-state model appear reasonable, there are some parameters for which other values may be more appropriate. Similarly, while the dynamic model can replicate most of the key historical moments, some work is required to develop the linkages between foreign and domestic variables.

2002-21

Entrepreneurial Risk, Credit Constraints, and the Corporate Income Tax: A Quantitative Exploration

Césaire Assah Meh

The author uses a dynamic general-equilibrium model in which individuals choose whether to become entrepreneurs or workers. Workers save by holding corporate equity and therefore are subject to double taxation, as the return on their savings is taxed at both the corporate and personal level. Entrepreneurs save by investing in their businesses and are taxed only at the personal level. This differential tax treatment increases capital accumulation because entrepreneurs must save in response to liquidity constraints and uninsurable risk. A calibrated version of the model is used to quantify the consequences of eliminating the corporate income tax.

2002-22

The Usefulness of Consumer Confidence Indexes in the United States

Brigitte Desroches and Marc-André Gosselin

The literature generally dismisses the relevance of consumer confidence indexes in forecasting aggregate consumer spending in the United States. Without formal modelling, however, some researchers suggest that, during major economic or political shocks, large swings in confidence could be useful indicators of consumption. The authors rigorously assess this possibility by estimating a consumption function in which only large variations of confidence can affect spending. Their results show that economists and forecasters should pay attention to consumer confidence, especially in times of elevated economic or political uncertainty.

2002-23

How to Improve Inflation Targeting at the Bank of Canada

Nicholas Rowe

Correlations between the target variable, the monetary policy instrument, and the indicators show that, over the past decade, the Bank of Canada has, on average, responded optimally to indicators of inflation, being neither too aggressive nor too timid in raising or cutting the overnight rate. While responding optimally on average, however, the Bank has not responded optimally to each individual indicator. The Bank systematically overreacted to some indicators and underreacted to others. Correcting these errors could improve inflation targeting in Canada.

2002-24

Financial Structure and Economic Growth: A Non-Technical Survey

Veronika Dolar and Césaire Meh

There is a large body of literature that studies the relationship between financial structure (that is, the degree to which the financial system is either market- or intermediary-based) and long-run economic growth. This paper gives a non-technical survey of that literature designed for a general audience. The literature suggests that financial structure does not explain differential growth rates across countries. What matters for growth is the overall level and quality of financial services. Therefore, the best way to examine the connection between financial structure and growth is not to study how markets and intermediaries can substitute for each other, but rather how markets and intermediaries complement one another.

2002-25

Nominal Rigidities and Monetary Policy in Canada Since 1981

Ali Dib

The author develops and estimates a dynamic, stochastic, general-equilibrium model with price and wage stickiness to analyze monetary policy in Canada. The structural parameters of the model are estimated econometrically using a maximum-likelihood procedure with a Kalman filter. The estimates reveal that either price or wage rigidities are key nominal frictions that generate real monetary effects. Furthermore, the simulation results show that the Bank has, since 1981, increased the short-term nominal interest rate in response to exogenous positive demand-side disturbances, and used modest but persistent reductions to accommodate positive technology shocks.

2002-26

Nominal Rigidity, Desired Markup Variations, and Real Exchange Rate Persistence

Hafedh Bouakez

The author develops and estimates a dynamic general-equilibrium sticky-price model that accounts for real exchange rate persistence. The model's key feature is the dependence of the firm's desired markup on its relative price. Desired markup variations exacerbate the nominal rigidity that results from the exogenously imposed frictions in the goods market. The model is estimated by the maximum-likelihood method using Canadian and U.S. data. It successfully replicates the behaviour of the Canada-U.S. bilateral real exchange rate. In particular, it closely matches the persistence found in the real exchange rate series. This is achieved with a plausible duration of price contracts and a moderate convexity of the demand function.

2002-27
Habit Formation and the Persistence of Monetary Shocks
Hafedh Bouakez, Emanuela Cardia, and Francisco J. Ruge-Murcia

The authors construct and estimate a general-equilibrium model with price rigidities, habit formation, and costly capital adjustment. The model is estimated by the maximum-likelihood method using U.S. data on output, the real money stock, and the nominal interest rate. Econometric results indicate that habit formation and adjustment costs to capital play an important role in explaining the output effects of monetary policy. In particular, impulse-response analysis indicates that the model generates persistent, hump-shaped output responses to monetary shocks.

2002-28
Filtering for Current Analysis
Simon van Norden

The author shows how existing band-pass filtering techniques and their extension can be applied to the common current-analysis problem of estimating current trends or cycles. These techniques give estimates that are "optimal" given the available data, so their standard errors represent a lower bound on what can be achieved with other univariate techniques. Applications to the problems of estimating current trend productivity growth, core inflation, and output gaps are considered.

2002-29
Exponentials, Polynomials, and Fourier Series: More Yield Curve Modelling at the Bank of Canada
David Jamieson Bolder and Scott Gusba

The authors consider two alternative classes of models for extracting zero-coupon and forward rates from a set of observed Government of Canada bond and treasury-bill prices. The first class of term-structure estimation methods, called spline-based models, employs a B-spline basis for the space of cubic splines to fit observed coupon-bond prices. The second class, called function-based, uses linear combinations of basis functions, defined over the entire term-to-maturity spectrum, to fit the discount function. In addition to a comprehensive discussion of these models, the authors perform an extensive comparison of these models' performance in the Canadian marketplace.

2002-30
Inflation Expectations and Learning about Monetary Policy
David Andolfatto, Scott Hendry, and Kevin Moran

The authors embed, within a standard monetary dynamic stochastic general-equilibrium model, an information friction and a learning mechanism regarding the interest-rate-targeting rule that monetary policy authorities follow. The learning mechanism enables optimizing economic agents to distinguish between transitory shocks to the policy rule and occasional shifts in the inflation target of monetary policy authorities. The model's simulated data are consistent with the empirical evidence. The results suggest that an important size distortion may occur when conventional tests of unbiasedness are applied to relatively small samples dominated by a few significant shifts in monetary policy and sluggish learning about those shifts.

2002-31
Supply Shocks and Real Exchange Rate Dynamics: Canadian Evidence
Céline Gauthier and David Tessier

The authors specify a structural vector-error-correction model that links the real exchange rate to different fundamentals. Two main results emerge from their analysis. First, a positive supply shock in favour of Canada leads to a real exchange rate appreciation. Second, commodity price shocks tend to dominate exchange rate movements over the short and medium run, but supply shocks have the largest impact over the long run. In particular, supply shocks explain most of the stochastic depreciation of the Canadian real exchange rate since the beginning of the 1990s.

2002-32
Labour Markets, Liquidity, and Monetary Policy Regimes
David Andolfatto, Scott Hendry, and Kevin Moran

The authors develop an equilibrium model of the monetary policy transmission mechanism that highlights information frictions in the market for money and search frictions in the market for labour. A change in monetary policy regime, modelled as an exogenous reduction in the long-run target for the money-growth rate, results in a large and persistent increase in the interest rate owing to a persistent shortfall in liquidity. The subsequent period of high interest rates curtails job-creation activities in the business sector, making it more difficult for the unemployed to find suitable job matches. In the long run, however, employment rises above its initial level, primarily because of the lower long-run interest rates associated with a tight-money regime.

2002-33
Alternative Trading Systems: Does One Shoe Fit All?
Nicolas Audet, Toni Gravelle, and Jing Yang

The authors examine the factors that lead liquidity-motivated investors to choose the type of market structure they prefer. The authors assume that investors can choose between a dealership and a limit-order-book market. They build a theoretical model for both the dealership and order-book markets and develop a numerical method to solve the Nash equilibrium strategies of heterogeneous market participants. The authors find that a dealership market would be preferred by investors in an environment where customer trading is relatively thin and correlated, and by investors who are subject to relatively large liquidity shocks.

2002-34
How Do Canadian Banks That Deal in Foreign Exchange Hedge Their Exposure to Risk?
Chris D'Souza

The author examines the daily hedging and risk-management practices of financial intermediaries in the Canadian foreign exchange (FX) market. Results suggest that financial institutions behave similarly when managing their market risk exposure. In particular, dealing banks do not fully hedge their spot market risk. The results support arguments by Stulz (1996) and Froot and Stein (1998) that the amount of hedging will depend on a firm's comparative advantage in bearing risk. Private information via customer order flow, guaranteed access to liquidity, and the capital-allocation structure of a dealer's financial institution are potential sources of comparative advantage to dealing banks in the FX market.

2002-35
The Impact of Common Currencies on Financial Markets: A Literature Review and Evidence from the Euro Area
Liliane Karlinger

The author reviews both the theoretical and empirical literature on the impact of common currencies on financial markets and evaluates the first three years of experience with Economic and Monetary Union (EMU). EMU has encouraged integration among the still fairly fragmented European financial markets directly and indirectly. When applying the European experience to a potential North American monetary union, one should consider that the U.S. and Canadian financial markets are already more integrated than the European ones, and thus the potential gains in terms of greater financial market integration from a common currency in North America may be more moderate than in Europe.

2002-36
Une approche éclectique d'estimation du PIB potentiel américain
Marc-André Gosselin and René Lalonde

The authors describe the principal results obtained from a new method applied to the estimation of potential U.S. gross domestic product (GDP). This method derives from the work of Rennison (2002), which suggests that the joint use of extended multivariate filters and structural vector autoregressions is optimal for estimating potential output. The authors use this approach to estimate the two components of potential GDP: the full-employment labour input and the labour-productivity trend. This decomposition is particularly useful for identifying sources of fluctuations in potential GDP.

2002-37
Alternative Public Spending Rules and Output Volatility
Jean-Paul Lam and William Scarth

One of the central lessons learned from the Great Depression was that adjusting government spending each year to balance the budget increases the volatility of output. The authors compare this policy with one that involves running temporary deficits and surpluses and an average budget balance of zero. Their analysis allows monetary policy to adjust to a change in fiscal regime, and the specifications for aggregate demand and supply are consistent with the "new neoclassical synthesis." The authors' results give only limited support to the conventional wisdom on fiscal rules and stability of output.

2002-38
Oil-Price Shocks and Retail Energy Prices in Canada
Marwan Chacra

The effects of global energy-price shocks on retail energy prices in Canada are examined. More specifically, the author looks at the response of the consumer price indexes for gasoline, heating oil, natural gas, and electricity in Canada to movements in world crude oil prices. Using an error-correction framework, a quarterly forecasting model is estimated for most of these price indexes. The forecasting ability of the error-correction models is found to outperform that of competing autoregressive and random-walk models.

2002-39
An Empirical Analysis of Dynamic Interrelationships Among Inflation, Inflation Uncertainty, Relative Price Dispersion, and Output Growth
Francis Vitek

Within a unified framework, the author conducts an empirical investigation of dynamic interrelationships among inflation, inflation uncertainty, relative price dispersion, and output growth. Focusing on the Canadian industrial sector, the author finds weak evidence that inflation uncertainty rises with the level of inflation, with short-run inflation uncertainty minimized at a trend inflation rate of approximately 3 per cent. With regard to the predictions of menu-cost and signal-extraction models, non-robust evidence that relative price dispersion rises with both trend inflation and inflation uncertainty is obtained. The primary result is that across a variety of different model specifications, inflation uncertainty significantly lowers output growth, an effect of considerable size and duration.

2002-40
Inflation Changes, Yield Spreads, and Threshold Effects
Greg Tkacz

Using interest rate yield spreads to explain changes in inflation, the author investigates whether such relationships can be modelled using two-regime threshold models. Implementing a robust test to detect evidence of a threshold, the author finds that the hypothesis of linearity is generally rejected. For the United States, he finds that the inflation-spread relationship at most horizons is more pronounced when the yield curve is inverted, which is usually associated with periods of tight monetary policy. This implies that monetary policy may have an asymmetric effect on inflation. Curiously, the pattern of asymmetry in Canada appears to operate in the opposite direction, with expansionary policies having a relatively greater impact on inflation than tighter policies.

2002-41
Estimating Settlement Risk and the Potential for Contagion in Canada's Automated Clearing Settlement System
Carol Ann Northcott

Because payments systems explicitly link financial institutions, they provide a way to transmit risk within, and between, financial systems. Ideally, payments systems should be designed and operated so as not to add risk in the event of a crisis. The author examines the potential for contagion through linkages arising from the interaction of financial institutions in a Canadian payments system, the Automated Clearing Settlement System (ACSS). A method of measuring risk in the system, given its unique design, is developed and used to estimate contagion over a wide range of conditions. The author finds that the ACSS has only a limited capacity, if any, to facilitate contagion in the current environment.

2002-42
Salaire réel, chocs technologiques et fluctuations économiques
Dominique Tremblay

The author presents empirical evidence that he has obtained from an analysis of the response of different economic variables, including the real wage rate, to a technology shock. He replicates Galí's (1999) bivariate model and compares dynamic impulse responses and conditional correlations with evidence provided by the vector-error-correction model that was identified using the King, Plosser, Stock, and Watson (1991) procedure. To calculate confidence intervals, the author uses Kilian's (1998) bootstrap-after-bootstrap method. The empirical evidence suggests that it is not possible to reject a procyclical real wage in response to a technology shock. Therefore, real-business-cycle models cannot be rejected based on their conditional predictions of the labour-market dynamics in favour of other types of models.

Technical Reports

No. 90
Dollarization in Canada: The Buck Stops There
John Murray and James Powell

There is an animated debate in Canada concerning the potential benefits of formally adopting the U.S. dollar as our national currency. Some observers suggest that the Canadian economy is already highly "dollarized." The authors examine the available data and draw some tentative conclusions about the extent to which Canada has become informally dollarized. The evidence that they present suggests that many of the concerns that have been expressed about the imminent dollarization of the Canadian economy are misplaced. The Canadian dollar continues to be used as the principal unit of account, medium of exchange, and store of value within our borders, and there is no indication that dollarization is likely to take hold in the foreseeable future.

No. 91
The Financial Services Sector: An Update on Recent Developments
Charles Freedman and Clyde Goodlet

The Canadian financial industry continues to experience significant changes. The authors provide an update on recent developments and re-examine a number of issues facing financial service providers that were identified in Technical Report No. 82. In particular, the authors highlight the role of economies of scale and scope as they relate to mergers and concentration, the strategies being followed by financial service providers, and how changes in information technology have affected service delivery. Developments in these areas continue to pose significant challenges for financial service providers as they attempt to develop strategies to maintain their profitability and long-run viability.

No. 92
The Performance and Robustness of Simple Monetary Policy Rules in Models of the Canadian Economy
Denise Côté, John Kuszczak, Jean-Paul Lam, Ying Liu, and Pierre St-Amant

The authors evaluate several simple monetary policy rules in twelve private and public sector models of the Canadian economy. Their results indicate that none of the simple policy rules they examined is robust to model uncertainty, in that no single rule performs well in all models. In fact, their results show that the performance of some of the simple rules, particularly interest-rate-smoothing rules and rules that have a high coefficient on the inflation gap, can substantially deviate from the optimal rule and can even be unstable in some models. They also find that open-economy rules do not perform well in many models. In fact, they find that adding an exchange rate term to a simple policy rule often increases the loss-function value.

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