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CONTENTS

INTRODUCTION

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A History of the Canadian Dollar
James Powell. Published in 2005. Available at Can$8 (plus GST and PST, where applicable).

About the Bank
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All Bank publications, except for the *Bank of Canada Banking and Financial Statistics,* and *The Bank of Canada: An Illustrated History*, are available on our website: **<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. The* Review *is available on the Bank's website (http://www.bankofcanada.ca/en/review/revlist.htm).

Winter 2004–2005

The Bank of Canada as Lender of Last Resort
Fred Daniel, Walter Engert, and Dinah Maclean

As the ultimate provider of Canadian-dollar liquidity to the financial system, the Bank of Canada has the unique capacity to create Canadian-dollar claims on the central bank and the power to make secured loans or advances to chartered banks and other members of the Canadian Payments Association. The Bank supplies overnight credit on a routine basis through the Standing Liquidity Facility (SLF) to direct participants in the Large Value Transfer System, and Emergency Lending Assistance (ELA) to solvent deposit-taking institutions that require more substantial and prolonged credit. The authors review the policy framework that guides the Bank's lender-of-last-resort function, including the key issues, terms and conditions, and eligibility criteria associated with its SLF and ELA activities. Also discussed are foreign currency ELA, the relationship between SLF and ELA, systemic risk and Bank of Canada intervention, and the potential provision of liquidity to major clearing and settlement systems.

Government of Canada Yield-Curve Dynamics, 1986–2003
Grahame Johnson

A database of historical Government of Canada zero-coupon yield curves developed at the Bank of Canada is introduced in this article, which also includes an initial statistical analysis of the behaviour and evolution of the zero-coupon interest (spot) rates over the full period and two distinct subperiods. Specific areas of interest include the evolution of the levels of key interest rates and yield-curve measures over the sample as well as daily changes in the key interest rates and the yield-curve measures; the identification of a relatively small number of factors that drove the evolution of the yield curve; and the total returns that would have been realized by holding bonds of different maturities for a given holding period.

A Survey of the Price-Setting Behaviour of Canadian Companies
David Amirault, Carolyn Kwan, and Gordon Wilkinson

To better understand price-setting behaviour in the Canadian economy, the Bank of Canada's regional offices surveyed a representative sample of 170 firms between July 2002 and March 2003. The authors discuss the reasons behind the survey, the methodology used to develop the questionnaire and conduct the interviews, and summarize the results. The study also assessed several explanations for holding prices steady despite market pressures for a change. The survey findings indicate that prices in Canada are relatively flexible and have become more flexible over the past decade. Price stickiness was generally found to originate in firms' fears of antagonizing customers or disturbing the goodwill or reputation developed with them. A detailed discussion of the results includes a consideration of their implications for monetary policy.

Spring 2005

Understanding China's Long-Run Growth Process and Its Implications for Canada
Michael Francis, François Painchaud, and Sylvie Morin

In the past 25 years, China has introduced numerous reforms, gradually moving from a centrally planned economy towards a socialist market economy capable of robust and sustainable economic growth. China's increasing integration into the global economy, which has been fuelled by this recent and rapid economic growth, has already begun to affect the economies of other countries and to present challenges for policy-makers, both in China and abroad. In addition to examining the determinants of China's past and current growth, the authors consider factors that are likely to support continued growth in the future and assess the implications for both the world and the Canadian economies.

Borders, Common Currencies, Trade, and Welfare: What Can We Learn from the Evidence?
John F. Helliwell and Lawrence L. Schembri

Recent evidence indicates that the intensity of economic exchange within and across borders is significantly different: linkages are much tighter within, than among, nation-states. These findings, however, do not necessarily imply that borders and separate national currencies represent significant barriers to trade that should be removed, since the evidence is also consistent with the alternative hypothesis, that domestic exchange is more efficient because domestic producers are better able to satisfy the requirements of local consumers, owing to common tastes and institutions and the existence of local information and social networks. Focusing primarily on trade linkages within and between Canada and the United States, the authors review the evidence on the extent to which national borders lessen the intensity of international economic linkages, primarily trade in goods and services, and the effects on domestic welfare. They also examine the evidence on the impact of common currencies on trade and welfare. They determine that, since the empirical models employed to date in this research cannot distinguish between alternative explanations of the evidence, it is not yet possible to draw firm conclusions for policy-making.

Conference Summary: Canada in the Global Economy

Lawrence L. Schembri

The Bank of Canada's 2004 research conference examined the real and financial linkages between the Canadian economy and the economies in the rest of the world. Although Canada has profited enormously from its openness to international trade in goods, services, and financial assets, many of the most significant shocks to the Canadian economy in recent years have come from abroad. For these reasons, understanding the extent and nature of the external linkages, their implications for the Canadian economy, and the process by which the Canadian economy adjusts to external shocks is of critical importance both for monetary policy and for monitoring the financial system. This article describes the purpose of the conference—to deepen economists' understanding of these important issues—and provides highlights of the papers presented in each of the five sessions, as well as summaries of the keynote lecture and the discussion of the policy panel.

Summer 2005

Changes in the Indicator Properties of Narrow Monetary Aggregates

Tracy Chan, Ramdane Djoudad, and Jackson Loi

Although many countries have abandoned monetary targeting in recent decades, monetary aggregates are still useful indicators of future economic activity. Past research has shown that, compared with other monetary aggregates and expressed in real terms, net M1 and gross M1 have traditionally provided superior leading information for output growth. Yet financial innovations and the elimination of reserve requirements over the past two decades have made it increasingly difficult for financial institutions to differentiate between demand and notice deposits, suggesting the need to re-examine the information content of narrow monetary aggregates that depend on such a distinction. Based on an analysis over a sample period from 1975Q1 to 2005Q1, the authors determine that the leading-indicator properties of the narrow monetary aggregates for output growth have shifted over time and that, since 1993, real M1+ has become a better indicator of future output growth than real gross and net M1.

Estimating the Impact of Monetary Policy Surprises on Fixed-Income Markets

Jason Andreou

In the interest of better understanding the impact of the Bank of Canada's policy actions on bond and bill yields, Andreou assesses the impact of policy-rate announcements on short and long bonds over the period 1996 to 2004. To aid the analysis, policy actions are decomposed into expected and surprise components. The author also examines whether the introduction of fixed announcement dates (FADs) has affected these results, including markets' perceptions. The main finding is that unexpected policy actions by the Bank have a significant effect on market rates at the shorter end of the yield curve, with the effect dissipating as the maturity increases. A second finding, that the impact on longer-term interest rates of a surprise action by the Bank has diminished since the introduction of the FADs, suggests that the Bank's long-term policy goals are well understood and credible.

Recent Trends in Canadian Defined-Benefit Pension Sector Investment and Risk Management

Eric Tuer and Elizabeth Woodman

Defined-benefit (DB) pension plans account for the majority of employer pension fund assets. In recent years, a number of DB plans have become underfunded, in sharp contrast to the 1990s, when many plans had large actuarial surpluses. The deterioration in the financial health of DB plans has underscored various longer-term structural issues that could make it increasingly difficult for plan sponsors to manage the financial risks of these plans. Tuer and Woodman examine how funding deficits, a greater focus on plan liabilities, a low-yield environment, and changing investment beliefs are influencing investment decisions in the Canadian DB pension sector. They review the funding of DB plans, changing views on the equity-risk premium, and the shift towards liability-centred approaches to investment and how these developments are affecting pension sector investment. They also consider additional influences on the pension sector, including the limited supply of long-term bonds, the elimination of the foreign-property rule, and the movement towards fair-value accounting and a financial-economics approach to actuarial valuation, as well as their implications for financial markets.

Autumn 2005

Exports, Imports, and the Appreciation of the Canadian Dollar

Richard Dion, Michel Laurence, and Yi Zheng

An objective assessment of the effects of the appreciation of the Canadian dollar in 2003 and 2004 on exports and imports requires a detailed review of the numerous other factors that may have been at play. Dion, Laurence, and Zheng discuss the influences that have affected Canada's international trade over the past two years, including exchange rate movements, global and sector-specific shocks, constraints on the domestic supply of a few products, and competition from emerging economies, most notably China. The analysis is complemented with econometric models developed at the Bank which provide statistically valid estimates of the contribution of the Canadian-dollar appreciation to the recent developments in exports and imports.

How the Appreciation of the Canadian Dollar Has Affected Canadian Firms: Evidence from the Bank of Canada Business Outlook Survey

Jean Mair

To track how firms were affected by the appreciation of the Canadian dollar in 2003 and 2004 and the steps they took in response, the Bank included supplementary questions in the quarterly Business Outlook Survey conducted by its regional offices. About half of the firms surveyed reported being adversely affected, one-quarter experienced a favourable impact, and the remainder reported no effect. Jean Mair classifies and summarizes the firms' responses, identifying the sectors that were most and least affected. Causes of the impacts are identified, as well as the actions firms took as a result of the appreciation. The article looks at these actions over time to see what they tell us about firms' adjustment process.

What Drives Movements in Exchange Rates?

Jeannine Bailliu and Michael R. King

Understanding what causes the exchange rate to move has been an ongoing challenge for economists. Despite extensive research, traditional macro models of exchange rate determination—with the exception of the Bank of Canada's exchange rate equation—have typically not fared well, motivating economists to explore new ways to model exchange rate movements that incorporate more complex and realistic settings. Within the context of the sharp appreciation of the Canadian dollar in 2003 and 2004, Bailliu and King review the macroeconomic models of exchange rates, as well as the microstructure studies that highlight the importance of trading mechanisms, information asymmetry, and investor heterogeneity for explaining short-term dynamics in exchange rates. In addition to summarizing the current state of knowledge, they highlight recent advances and identify promising alternative approaches.

The Exchange Rate and Canadian Inflation Targeting

Christopher Ragan

An essential element of the Bank of Canada's inflation-targeting framework is a floating exchange rate that is free to adjust in response to shocks that affect the Canadian and world economies. This floating rate plays an important role in the transmission mechanism for monetary policy. A practical question is how the Bank incorporates currency movements into the monetary policy decision-making process. Only after determining the cause and persistence of exchange rate change, and its likely net effect on aggregate demand, can the Bank decide on the appropriate policy response to keep inflation low, stable, and predictable. Ragan reviews the need to target inflation and the transmission mechanism for monetary policy, including the role of the exchange rate, before describing two types of exchange rate movements and their implications for monetary policy.

CONFERENCE PROCEEDINGS

Canada in the Global Economy

This conference, held at the Bank of Canada on 18 and 19 November 2004, examined the real and financial linkages between the Canadian economy and those in the rest of the world. It is well known that, by most standard measures of openness to trade and financial flows, Canada is among the most open of the industrialized countries. Because of Canada's close ties with the rest of the world, comprehending the extent and nature of external linkages, their implications for the Canadian economy, and the process by which the Canadian economy adjusts to external shocks is of critical importance in the formulation of monetary policy and in the Bank of Canada's monitoring of the Canadian financial system. The main purpose of this conference, therefore, was to deepen our understanding of these critical issues.

The Expected Marginal Rate of Substitution in the United States and Canada

Andrew K. Rose (Haas School of Business)

The author applies a new methodology to estimate the expected (intertemporal) marginal rate of substitution (EMRS), using only data on asset prices and returns. A novel feature of the technique is that it relies upon exploiting idiosyncratic risk, since theory dictates that idiosyncratic shocks earn the EMRS. The author applies the methodology to two data sets: monthly data from 1994 through 2003, and daily data for 2003. The two data sets include large stocks traded on the New York and Toronto stock exchanges. For both monthly and daily frequencies, the author finds plausible estimates of EMRS with considerable precision and time-series volatility. He then uses these estimates to test for asset integration, within and between stock markets. He finds that both markets seem to be internally integrated in the sense that different assets traded on a given market share the same EMRS. More interestingly, the technique is powerful enough to reject integration between the two stock markets, and between stock and bond markets.

Is There a Quantity Puzzle Within Countries? An Application Using U.S. and Canadian Data

Jean Imbs (London School of Business and University of Lausanne)

Fluctuations in disposable income (net of transfers) are more correlated across U.S. states or Canadian provinces than fluctuations in local production. Across countries, consumption plans are less correlated than business cycles, a theoretical anomaly famously labelled a "quantity puzzle" by Backus, Kehoe, and Kydland. In the aggregate, financially integrated regions tend to have highly synchronized GDP fluctuations, as previously documented. In contrast, within countries, financial integration is associated with less correlated business cycles, in a way consistent with the standard international real-business-cycle model. In other words, the quantity puzzle pertains to international data, and it stems from the specific impact of capital flows on international output correlations.

Multilateral Adjustment and the Canadian Dollar

Jeannine Bailliu (Bank of Canada), Ali Dib (Bank of Canada), and Lawrence Schembri (Bank of Canada)

Rapid and significant appreciations of floating exchange rates, such as that experienced by the Canadian dollar in 2003 and again in 2004, pose a number of challenges for central banks in formulating the optimal monetary policy response, if any. In particular, how the central bank should react depends critically on the underlying forces behind the appreciation. In 2003, the evidence, based on the experience of the exchange rates of other countries, indicated that some of the appreciation of the Canadian dollar reflected a multilateral adjustment to the large U.S. current account and fiscal imbalances.

To capture situations in which the Canadian dollar is being driven largely by the forces of multilateral adjustment to U.S. imbalances, it is necessary to go beyond the standard bilateral empirical exchange rate model. The authors extend the bilateral model used at the Bank of Canada by adopting a threshold methodology that will allow the specification of the empirical model to change when U.S. imbalances are significant. They also add the U.S. fiscal and current account deficits as explanatory variables and find that the augmented threshold model dominates the traditional model in terms of in-sample explanatory power and out-of-sample forecasting ability.

NEMO: An Equation for the Canadian Dollar

John F. Helliwell (University of British Columbia), Ramzi Issa (Bank of Canada), Robert Lafrance (Bank of Canada), and Qiao Zhang (Bank of Canada)

NEMO is a nominal bilateral exchange rate equation built around a long-run relationship between the real exchange rate, real non-energy commodity prices, and labour productivity differentials with the United States. This relationship is augmented by short-term dynamics that reflect movements in Canada-U.S. interest rate differentials, the evolution of the U.S. dollar relative to other currencies, and a measure of risk perception in international markets.

NEMO's postulated fundamentals are found to be significant and robust. NEMO tracks the data well, both in sample and out of sample, and a dynamic simulation of the equation can account for most of the movements of the exchange rate since 1975.

Terms of Trade and Current Account Fluctuations: Evidence from Canada

Hafedh Bouakez (HEC Montréal) and Takashi Kano (Bank of Canada)

The authors investigate whether extending the intertemporal model of the current account to allow for variations in the terms of trade improves its ability to fit the data. They derive a testable present-value representation of the current account that encompasses the Harberger-Laursen-Metzler effect, according to which a temporary rise in the terms of trade improves the current account. The present-value model is tested using Canadian data. The results show that the cross-equation restrictions implied by the model are rejected by the data, and that terms-of-trade movements have no significant effect on the Canadian current account.

The Current Account and the Interest Rate Differential in Canada

Martin Boileau (HEC Montréal) and Michel Normandin (HEC Montréal)

For post-1975 Canadian data, the authors document the joint behaviour of output, the current account, and the interest differential at the business cycle frequency. They also interpret this behaviour using a simple model of a small open economy. Their model assumes that agents have access to international financial markets, but face country-specific interest rates on their holdings of world assets. The interest differential depends negatively on the country's net foreign asset position. The authors find that their model matches the Canadian data remarkably well.

Growth and Integration: The Emergence of China and India and the Implications for Canada

Brigitte Desroches (Bank of Canada), Michael Francis (Bank of Canada), and François Painchaud (Bank of Canada)

The authors examine the growth and integration of the economies of China and India with the world economy and consider the implications for Canada. To do so, they set up a unified framework to address what they refer to as the "growth and integration" puzzle—the lack of empirical evidence to link trade and growth, despite the important role that trade seems to play in many economies. They use their framework to estimate the impact of trade on growth, conditional on the influence of variables that are likely to determine a country's long-run comparative advantage. With this information, they are then able to assess the impact of institutional reform and trade liberalization in countries such as China and India and the impact on countries such as Canada. Their results suggest that while trade liberalization may have had an ambiguous effect on growth in India and China, the positive economic impact of institutional reform was magnified by trade. For Canada, however, the authors find that the integration of China and India into the world economy has contributed positively to GDP.

Economic Integration in Europe: Its Effects on Canada

Richard Cameron (International Trade Canada), Denise Côté (Bank of Canada), and Christopher Graham (Bank of Canada)

For the past half century, European countries have undertaken a series of measures that have liberalized trade and factor flows among member states of the European Union (EU). They have also harmonized various government policies, including external commercial policy and monetary policy. This increased integration has greatly expanded economic transactions within Europe, possibly at the expense of trade and factor flows with non-member states, including Canada. In this paper, the authors examine how Europe's increasing economic integration has affected its trade with Canada.

Using a Canadian export share model that controls for relative price competitiveness and relative real income, the authors find evidence that increased European economic integration has reduced Canada's relative exports to the EU. This decline can be attributed almost completely to a dramatic fall in the relative importance of Canadian non-energy commodity exports to the United Kingdom. Moreover, when increased Canada-United States trade is accounted for, Canada's export share to the EU, excluding the United Kingdom, has been stable over the past fifty years, while that of the United Kingdom has trended downwards. This shift in U.K. imports was likely driven primarily by Britain's co-founding of the European Free Trade Association in 1960, as well as by that country's entry into the European Community in 1973, which left Canada and other Commonwealth countries, such as Australia and New Zealand, without their pre-existing preferential trade treatment.

John Kuszczak Memorial Lecture

Canada's Exchange Rate: New Evidence, a Simple Model, and Policy Implications

Charles Engel (University of Wisconsin)

The "border effect"—the measure of (lack of) integration of the Canadian and U.S. economies, using deviations from the law of one price—is found to have increased throughout the 1990s before falling sharply from between 2001 and 2004. This finding follows from a new data set of the Economist Intelligence Unit that uses prices of 97 consumer goods. What lies behind this finding? Apparently, the nominal exchange rate became increasingly misaligned until 2001, but the appreciation of the Canadian dollar since 2001 has reduced the wedge between U.S. and Canadian consumer prices.

The literature reveals that the real value of the Canadian dollar is related to the price of commodities, but posits that the link works through the price of non-traded relative to traded goods. The author presents evidence that tends to refute that link. He offers an alternative explanation in a simple model with local currency pricing for final goods. Optimal co-operative monetary policy in this model indicates that there is a role for stabilizing nominal exchange rate fluctuations.

Regional and Industrial Business Cycle Fluctuations in Canada: A North American Perspective

Marc-André Gosselin (Bank of Canada), René Lalonde (Bank of Canada), Jean-François Perrault (Bank of Canada), and Gerald Stuber (Bank of Canada)

The growing linkages between the Canadian and U.S. economies are often analyzed in the literature in one of two ways: by looking at trends in bilateral trade flows at the regional and sectoral levels, or by analyzing correlations or commonalities in aggregate business cycle fluctuations. In this paper, Gosselin et al. combine the two approaches. By formally examining Canadian and U.S. business cycles at the industry and region levels, they provide a rich analysis of the extent to which expansions and recessions in these two economies are linked.

Using a unique data set of sectoral output for U.S. and Canadian subnational regions, the authors investigate the extent to which disaggregate Canadian business cycle fluctuations are influenced by North American, Canadian, and region-specific variations in sectoral output. To do so, they identify factors that are common to each industry from North American, Canadian, and regional perspectives, using a state-space approach.

Over the period 1963–2001, the authors find that the common North American, common Canadian, and region-specific components were all important determinants of business cycle fluctuations in Canada's regions and industries. They also find that the share of the variance in Canadian cycles that is common with the United States increased over the sample. This increase was at the expense of region-specific shocks, indicating that economic integration could have led to a reduction in cyclical asymmetries across Canada's regions.

Aspects of Canadian and U.S. Business Cycles

Graham Voss (University of Victoria)

The author examines the interaction between the business cycles of the U.S. and Canadian economies in a non-structural fashion. His objective is to characterize various aspects of the relationship between the two economies. He sets out to determine whether there has been an increase in the synchronization of the two economies, as might be expected, given their increased integration in recent decades. He finds only weak evidence of increased synchronization. The author then examines correlations between U.S. and Canadian industry sectors and finds no evidence of a border effect. Viewed from an industry perspective, Canada and the United States appear to operate as a single economic region.

Economic Integration, the Business Cycle, and Productivity in North America

Roberto Cardarelli (International Monetary Fund) and M. Ayhan Kose (International Monetary Fund)

The authors examine the effect of the major Canada-U.S. trade agreements on the dynamics of business cycles and productivity in Canada. The North American Free Trade Agreement (NAFTA) and its predecessor, the Canada-U.S. Free Trade Agreement (CUSFTA) have led to a substantial expansion of trade flows. Although common factors have played a larger role in explaining business cycles in Canada and the United States since the early 1980s, country-specific and idiosyncratic factors remain important for Canada. At the same time, while increased trade integration seems to have positively contributed to total factor productivity of Canadian industries, the persistence of structural differences between the two countries has prevented convergence of aggregate labour productivity. While these findings seem to weigh against moving towards a monetary union, they also suggest that substantial benefits could be reaped from further reducing remaining barriers to trade.

Closing Policy Panel: Canada's Role in International Macroeconomic Policy

Discussion 1

Mark Carney (Bank of Canada) addresses the G-7 process after spending almost a year as Canada's G-7 Deputy at the Department of Finance. He makes a number of interesting observations about the G-7 process and Canada's role. He begins by discussing the G-7 priorities in recent years: he feels that at least half of the G-7's attention is being paid to development and debt issues in the poorest countries, and that oversight of the International Monetary Fund and the World Bank is also an important priority. Other international macroeconomic policy challenges often do not receive the attention one might expect. Carney feels that there are three international macroeconomic policy issues that are important for Canada, and that Canada has pushed, and should continue to push, these issues forward by its thoughtful and disinterested analysis and through the Bank of Canada's collaborative efforts with other central banks. In particular, he notes international architecture reform, structural resolution of global imbalances, and current concerns involving oil prices and exchange rates. Canada has an enviable record of recent macroeconomic performance and can draw from that experience to make meaningful interventions on these issues.

Discussion 2

John Helliwell (University of British Columbia) provides an insightful overview of a number of the conference papers. He stresses that, despite the rapid growth in international trade and capital flows over the postwar period, many of the papers find that national markets appear distinct. Helliwell notes that these findings of "border effects" have less to do with traditional barriers to trade than with the fact that it may be more efficient to organize economic activity along national lines, given common institutions, similar tastes, and shared values.

He also notes the importance of institutions, defined broadly to include social capital, for economic growth. He concludes by arguing that middle-level countries like Canada, which lack the pretense of being military or economic powers, but have made important contributions to the good governance of their own countries as well as to that of the international community, can play an important leadership role. In particular, they can build coalitions for reform within traditional international institutions or lead new policy experiments, such as the G-20, to bridge the policy gap between the G-3 and emerging-market countries.

Discussion 3

William R. White (Bank for International Settlements) carries on with Helliwell's theme of Canada as an "honest and thoughtful broker" in international macroeconomic policy deliberations. Drawing on his experience as a deputy governor at the Bank of Canada and then economic advisor at the Bank for International Settlements, White provides an insightful and engaging overview of the contribution that Canada (via the Bank of Canada) and individual Canadian economists have made to the intellectual framework for international macroeconomic policy-making, to international co-operation, and to the international institutions themselves. He pays particular attention to Canada's involvement in issues pertaining to financial stability.

WORKING PAPERS AND TECHNICAL REPORT

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 website contains working papers from 1994 on (http://www.bankofcanada.ca/en/wp(y).htm) and technical reports from 1982 on (http://www.bankofcanada.ca/en/trlist.htm).

Working Papers

2005-1
Self-Enforcing Labour Contracts and the Dynamics Puzzle
Christian Calmès

The author proposes a theoretical validation of a micro-founded internal-propagation mechanism: he builds a model that features a limited-commitment economy, and derives endogenous self-enforcing labour contracts that produce a different linkage between the real wage and the marginal product of labour. The risk-sharing between the entrepreneur and the worker, both faced with enforcement problems, provides an admissible explanation of the prolonged co-movements observed between consumption and labour. Since these co-movements are at the core of the persistence of the impulse response of output to exogenous technology shocks, this persistence can, in turn, be rationalized with the endogenous real rigidity emerging from the economy. The author shows that, in this framework, the persistence ultimately depends on the initial bargaining power and the magnitude of the risk-sharing.

2005-2

The Stochastic Discount Factor: Extending the Volatility Bound and a New Approach to Portfolio Selection with Higher-Order Moments

Fousseni Chabi-Yo, René Garcia, and Eric Renault

The authors extend the well-known Hansen and Jagannathan (HJ) volatility bound. HJ characterize the lower bound on the volatility of any admissible stochastic discount factor (SDF) that prices correctly a set of primitive asset returns. The authors characterize this lower bound for any admissible SDF that prices correctly both primitive asset returns and quadratic payoffs of the same primitive assets. In particular, they aim at pricing derivatives whose payoffs are defined as non-linear functions of the underlying asset payoffs. The authors construct a new volatility surface frontier in a three-dimensional space by considering not only the expected asset payoffs and variances, but also asset skewness. The intuition behind the authors' portfolio selection is motivated by the duality between the HJ mean-variance frontier and the Markowitz mean-variance portfolio frontier. The authors' approach consists of minimizing the portfolio risk subject not only to portfolio cost and expected return, as usual, but also subject to an additional constraint that depends on the portfolio skewness. In this sense, the authors shed light on portfolio selection when asset returns exhibit skewness.

2005-3

Pre-Bid Run-Ups Ahead of Canadian Takeovers: How Big Is the Problem?

Michael R. King and Maksym Padalko

The authors study the price–volume dynamics ahead of the first public announcement of a takeover for 420 Canadian firms from 1985 to 2002. Pre-bid price run-ups in a target firm's shares may be caused by some combination of information leakage due to illegal insider trading or market anticipation based on rumours in the press. The authors review empirical studies of illegal insider trading and trading ahead of unscheduled announcements to generate predictions for abnormal returns and abnormal volume ahead of the takeover announcement. They observe serially correlated volume and a pattern of return reversals in their sample. Pre-bid run-ups occur shortly before the actual announcement, accompanied by significantly positive abnormal returns and share volume. The stock prices of the target firm react significantly to the actual announcement, with both positive and negative reactions. These price–volume dynamics are more consistent with the predictions of the market anticipation hypothesis than the hypothesis of illegal insider trading.

2005-4

State-Dependent or Time-Dependent Pricing: Does It Matter for Recent U.S. Inflation?

Peter J. Klenow and Oleksiy Kryvtsov

Inflation equals the product of two terms: an extensive margin (the fraction of items with price changes) and an intensive margin (the average size of those changes). The variance of inflation over time can be decomposed into contributions from each margin. The extensive margin figures importantly in many state-dependent pricing models, whereas the intensive margin is the sole source of inflation changes in staggered time-dependent pricing models. The authors use micro data collected by the U.S. Bureau of Labor Statistics to decompose the variance of consumer price inflation from 1988 through 2003. They find that around 95 per cent of the variance of monthly inflation stems from fluctuations in the average size of price changes, i.e., the intensive margin. When the authors calibrate a prominent state-dependent pricing model to match this empirical variance decomposition, the model's shock responses are very close to those in time-dependent pricing models.

2005-5
Y a-t-il eu surinvestissement au Canada durant la seconde moitié des années 1990?
Sylvain Martel

This study on overinvestment differs from the existing literature in that investment in machinery and equipment is modelled as a structural vector autoregression with identification achieved by imposing long-run restrictions, as in Blanchard and Quah (1989). The transitory components obtained from the model suggest the existence of a minor overinvestment in machinery and equipment of less than 5 per cent in 2000, despite a significant overevaluation of the stock market.

2005-6
Monetary Policy under Model and Data-Parameter Uncertainty
Gino Cateau

Model uncertainty arises because a central bank finds three competing models of the economy to be plausible. Data uncertainty arises because real-time data are noisy estimates of the true data. The central bank explicitly models the measurement-error processes for both inflation and the output gap, and it acknowledges that it may not know the parameters of those processes precisely (which leads to data-parameter uncertainty). The central bank chooses policy according to a Taylor rule in a framework that allows an aversion to the distinct risk associated with multiple models and data-parameter configurations. The author finds that, if the central bank cares strongly enough about stabilizing the output gap, this aversion generates significant declines in the coefficients of the Taylor rule, even if the bank's loss function assigns little weight to reducing interest rate variability. He also finds that an aversion to model and data-parameter uncertainty can yield an optimal Taylor rule that matches the empirical Taylor rule. Under some conditions, a small degree of aversion is enough to match the historical rule.

2005-7
Determinants of Borrowing Limits on Credit Cards
Shubhasis Dey and Gene Mumy

The difference between actual borrowings and borrowing limits alone generates information asymmetry in the credit card market. This information asymmetry can make the market incomplete and create ex post misallocations. Households that are denied credit could well turn out to be ex post less risky than some credit card holders who borrow large portions of their borrowing limits. Using data from the U.S. Survey of Consumer Finances, the authors find a positive relationship between borrower quality and borrowing limits, controlling for banks' selection of credit card holders and the endogeneity of interest rates. Their estimation reveals how interest rates have a negative influence on the optimal borrowing limits offered by banks.

2005-8
Recent Developments in Self-Employment in Canada
Nadja Kamhi and Danny Leung

The authors document the recent evolution of the self-employment rate in Canada. Between 1987 and 1998, the self-employment rate rose 3.5 percentage points from 13.8 per cent to 17.3 per cent. In contrast, over the 1999 to 2002 period, the self-employment rate fell by 1.9 percentage points, returning the self-employment rate in 2002 to a level only 0.2 percentage points higher than in 1992. The authors explore the possible explanations for this reversal. They describe trends in self-employment by age, gender, and types of self-employment, and then decompose the changes in the self-employment rate into the fraction due to shifts in the industrial structure and the proportion due to changes within each industry. The authors also examine the role of the business cycle and other macroeconomic factors, such as tax rates.

2005-9
State Dependence in Fundamentals and Preferences Explains Risk-Aversion Puzzle
Fousseni Chabi-Yo, René Garcia, and Eric Renault

The authors examine the ability of economic models with regime shifts to rationalize and explain the risk-aversion and pricing-kernel puzzles put forward in Jackwerth. They build an economy where investors' preferences or economic fundamentals are state-dependent, and simulate prices for a market index and European options on that index. Based on the original non-parametric methodology, the risk-aversion and pricing-kernel functions obtained across wealth states with these artificial data exhibit the same puzzles found with the actual data, but within each regime the puzzles disappear. This suggests that state dependence potentially explains the puzzles.

2005-10
Educational Spillovers: Does One Size Fit All?
Robert Baumann and Raphael Solomon

In a search model of production, where agents accumulate heterogeneous amounts of human capital, an individual worker's wage depends on average human capital in the searching population. Following this model, the authors use a large American panel data set to estimate a Mincerian wage equation augmented with terms for average human capital. They find that there is a positive and significant spillover effect, but that the effect differs by gender and population group (whites, blacks, and Hispanics), as well as educational status. The differing spillover effects can only partially be explained by occupational choice.

2005-11
An Analysis of Closure Policy under Alternative Regulatory Structures
Greg Caldwell

The author develops a theoretical model of bank closure. The regulatory decision about bank failure consists of two parts: whether to close and how to close. Assuming that the closure decision is credible, the welfare implications of two resolution regimes are considered. In one case, a meta-regulator supervises, closes, and resolves failed banks using an ex post efficient criterion. In the other case, a supervisor closes the bank while a deposit insurer resolves the closure on the basis of least cost. The bank chooses the riskiness of its loan portfolio in response to the announced policy. The supervisor can limit risk-shifting incentives of banks ex ante by raising capital requirements. The cost of this decision is a misallocation of economic resources, since some welfare-enhancing projects are abandoned. Market discipline is determined both exogenously, by the level of uninsured depositors, and endogenously, by the regime and capital requirements chosen. Least costly resolution weakly dominates an ex post efficient resolution decision when market discipline is present. Neither mechanism outperforms when it is reliant on capital regulation in the absence of market discipline.

2005-12

Do Exchange Rates Affect the Capital-Labour Ratio? Panel Evidence from Canadian Manufacturing Industries

Danny Leung and Terence Yuen

Using industry-level data for Canadian manufacturing industries from 1981 to 1997, the authors find empirical evidence of a negative relationship between the capital-labour ratio and the user cost of capital relative to the price of labour. A 10 per cent increase in the user cost of the machinery and equipment (M&E) relative to the price of labour results in a 3.3 per cent decrease in the M&E-labour ratio in the long run. Assuming complete exchange rate pass-through into imported M&E prices, the maximum effect of a permanent 10 per cent depreciation in the exchange rate is a 5.2 per cent increase in the user cost of M&E, and a 1.7 per cent decline in the M&E-labour ratio. This result implies that the cumulative growth of the M&E-labour ratio during the 1991–97 period would have been 2.3 percentage points higher had the dollar not depreciated. This may appear to be significant, but, considering that M&E as a share of total capital and capital's share of nominal output are both approximately one-third, in terms of a simple growth accounting framework, the effect on labour productivity is small.

2005-13

Efficiency and Economies of Scale of Large Canadian Banks

Jason Allen and Ying Liu

The authors measure the economies of scale of Canada's six largest banks and their cost-efficiency over time. Using a unique panel data set from 1983 to 2003, they estimate pooled translog cost functions and derive measures of relative efficiency and economies of scale. The disaggregation of the data allows the authors to model Canadian banks as producing multiple outputs, including non-traditional activities. Given the long time span of the data set, they also incorporate technological and regulatory changes in the banks' cost functions, as well as time-varying bank-specific effects. The authors' model leads them to reject constant returns to scale. These findings suggest that there are potential scale benefits in the Canadian banking industry. The authors also find that technological and regulatory changes have had significant positive effects on the banks' cost structure.

2005-14

Labour Market Adjustments to Exchange Rate Fluctuations: Evidence from Canadian Manufacturing Industries

Danny Leung and Terence Yuen

The authors provide some of the first empirical evidence on labour market adjustments to exchange rate movements in Canadian manufacturing industries. Generalized method of moments estimates that control for endogeneity show that there are significant changes in labour input when a change in the exchange rate occurs. During the 1981–97 period, the cumulative effect of a 10 per cent depreciation (appreciation) of the Canadian dollar was a 10 to 12.5 per cent increase (decline) in labour input. The majority of this effect was due to the increase (decrease) in the demand for domestically produced goods both at home and abroad when a depreciation (appreciation) occurs. The authors find evidence that the responsiveness of labour input to exchange rate movements was greater in the 1990s than in the 1980s. They also find that industries with high and medium net trade exposures adjust their labour inputs more than industries with low trade exposures. The exchange rate effect on real wages is estimated to be virtually zero for all manufacturing industries.

2005-15

Learning-by-Doing or Habit Formation?

Hafedh Bouakez and Takashi Kano

In a recent paper, Chang, Gomes, and Schorfheide extend the standard real business cycle (RBC) model to allow for a learning-by-doing (LBD) mechanism whereby current labour supply affects future productivity. They show that this feature magnifies the propagation of shocks and improves the matching performance of the standard RBC model. In this paper, the authors show that the LBD model is nearly observationally equivalent to an RBC model with habit formation in labour (or, equivalently, in leisure). Under the same calibration of the parameters, the two models share the same equilibrium paths of output, consumption, and investment, but have different implications for hours worked. Using Bayesian techniques, the authors investigate whether the LBD or the habit model fits the U.S. data best. Their results suggest that the habit specification is more strongly supported by the data.

2005-16

Endogenous Central Bank Credibility in a Small Forward-Looking Model of the U.S. Economy

René Lalonde

The linkages between inflation and the economy's cyclical position are thought to be strongly affected by the credibility of monetary authorities. The author complements existing research by estimating a small forward-looking model of the U.S. economy with endogenous central bank credibility. His work differs from the existing literature in several ways. First, he endogenizes and estimates credibility parameters, allowing inflation expectations to be a mix of backward- and forward-looking agents. Second, his models include both outcome- and action-based credibility. Third, he estimates a non-linear relation between policy credibility and divergences of inflation from target, which is also assumed to change over history. Finally, the author's non-linear time-varying credibility indexes do not rely on a two-regime definition, but on a continuum of credibility regimes. The author finds strong, stable, and statistically significant outcome- and action-credibility effects that generate important inflation inertia. According to his results, the value of the endogenous credibility indexes has risen steadily across the different monetary policy regimes.

2005-17
Risk Perceptions and Attitudes
Miroslav Misina

Changes in risk perception have been used in various contexts to explain shorter-term developments in financial markets, as part of a mechanism that amplifies fluctuations in financial markets, as well as in accounts of "irrational exuberance." This approach holds that changes in risk perception affect actions undertaken in risky situations, and create a discrepancy between the risk attitude implied by those actions and the a priori description of risk attitude as summarized by the Arrow-Pratt coefficients of risk aversion. The author characterizes this discrepancy by introducing the notion of risk perception within the expected utility theory, and proposes the concept of implied risk aversion as a summary measure of risk attitudes implied by agents' actions. Properties of implied risk aversion are related to an individual's future outlook. Key ideas are illustrated using an asset-pricing model.

2005-18
Lines of Credit and Consumption Smoothing: The Choice between Credit Cards and Home Equity Lines of Credit
Shubhasis Dey

The author models the choice between credit cards and home equity lines of credit (HELOCs) within a framework where consumers hold lines of credit as instruments of consumption smoothing across state and time. Flexible repayment schemes for lines of credit induce risk-averse consumers with sufficiently high discount rates to underinsure and hold lines of credit instead as a buffer, even when they have access to full and fair insurance markets. Weighing the fixed upfront fees and higher default costs of HELOCs against the advantages of low and income-tax-deductible interest payments, the author finds a threshold level of potential borrowing below which consumers prefer to use credit cards exclusively. Above that threshold, consumers decide to use HELOCs and consolidate all outstanding credit card debt into them; however, a rising probability of default and the resulting loss of equity in the home will put an upper bound on the potential HELOC borrowing that will prevent full debt consolidation.

2005-19
Bank Failures and Bank Fundamentals: A Comparative Analysis of Latin America and East Asia during the Nineties using Bank-Level Data
Marco Arena

The author develops the first comparative empirical study of bank failures during the nineties between East Asia and Latin America using bank-level data, in order to address the following two questions: (i) To what extent did individual bank conditions explain bank failures? (ii) Did mainly the weakest banks, in terms of their fundamentals, fail in the crisis countries? The main results for East Asia and Latin America show that bank-level fundamentals not only significantly affect the likelihood of bank failure, but also account for a significant proportion of the likelihood of failure for failed banks. Systemic shocks (macroeconomic and liquidity shocks) that triggered the banking crises mainly destabilized the weakest banks ex ante, particularly in East Asia. This finding raises questions about regional asymmetries in the degree of banking sector resilience to systemic shocks.

2005-20

La fonction de production et les données canadiennes

Patrick Perrier

First, the author examines the theoretical properties of the constant elasticity of substitution (CES) production function and the implications of this formulation for the properties of a structural macroeconomic model. He then seeks to determine whether Canadian macroeconomic data correlate better with a CES production function with an elasticity of substitution between labour and capital equal to one, which would be the case with a Cobb-Douglas function, or with a CES function whose elasticity of substitution is different from one. In terms of empirical analysis, the estimation frameworks used in this study and applied to Canadian macroeconomic data yield an elasticity of substitution of capital for labour lying between 0.4 and 0.6, or well below one. Most of the tests reject use of the Cobb-Douglas formulation for representing Canadian data. These results suggest that capital and labour are much more complementary than is assumed by a Cobb-Douglas production function.

2005-21

The Effectiveness of Official Foreign Exchange Intervention in a Small Open Economy: The Case of the Canadian Dollar

Rasmus Fatum and Michael King

The Bank of Canada is one of very few central banks that has made records of the intraday timing of its intervention operations available to researchers. The authors investigate the effectiveness of sterilized intervention in the Canadian dollar exchange rate market over the period January 1995 to September 1998. They employ an event study methodology and different criteria for success, and use both daily data and high-frequency (intraday) intervention and exchange rate data. When they analyze the high-frequency data, the authors find evidence that intervention systematically affects movements in the Canadian dollar/U.S. dollar exchange rate and in the desired direction, along with some evidence that intervention is associated with a reduction of exchange rate volatility. When investigating exchange rate movements around intervention events using daily data, the authors find some evidence supportive of effectiveness. These effects, however, are weakened when adjusting for currency co-movements against the U.S. dollar.

2005-22

The Effects of the Exchange Rate on Investment: Evidence from Canadian Manufacturing Industries

Tarek Harchaoui, Faouzi Tarkhani, and Terence Yuen

Using industry-level data for 22 Canadian manufacturing industries, the authors examine the relationship between exchange rates and investment during the period 1981–97. Their empirical results show that the overall effect of exchange rates on total investment is statistically insignificant. Further investigation reveals the non-uniform investment response to exchange rate movements in three channels. First, it is important to distinguish between environments that have low and high exchange rate volatilities. Through changes in output demands, depreciations would have a positive effect on total investment when the exchange rate volatility is low. Yet, this stimulative effect becomes considerably smaller as the volatility increases. Second, these results for total investment are mainly due to movements in other machinery and equipment, and not to investment in information technology and structures. Third, investment in industries with low markup ratios is more likely to be affected by exchange rate movements.

2005-23

Pocket Banks and Out-of-Pocket Losses: Links between Corruption and Contagion

Raphael Solomon

The author describes a model with a corrupt banking system, in which bankers knowingly lend at market interest rates to back projects riskier than the market rate indicates. Faced with early withdrawals, bankers turn to an interbank market, which may be available in an unfettered way, available but subject to screening, or unavailable. The presence of corruption increases the probability of contagious bank failure significantly. This fact holds in a perfect information environment, as well as in some environments with imperfect information. The model suggests that financial stability can be imperilled by corrupt lending.

2005-24

A Search Model of Venture Capital, Entrepreneurship, and Unemployment

Robin Boadway, Oana Secrieru, and Marianne Vigneault

The authors develop a search model of venture capital in which the number of successful matches of entrepreneurs and venture capitalists (VCs) at any moment in time is a function of the number of entrepreneurs searching for funds, the number of VCs searching for entrepreneurs, and the number of vacancies posted by each VC. The authors extend the literature by incorporating search unemployment and they explicitly model the occupational choice of individuals to become workers or entrepreneurs. Their analysis shows that, in the market equilibrium, the level of advice VCs offer is inefficiently low compared with the social optimum. Furthermore, the number of vacancies, the level of employment, and the number of potential entrepreneurs are generally either too low or too high relative to their socially optimal level. Policy to achieve the social optimum consists of a capital gains subsidy, an employment tax or subsidy, and an investment tax or subsidy.

2005-25

The Impact of Unanticipated Defaults in Canada's Large Value Transfer System

Darcey McVanel

Canada's Large Value Transfer System (LVTS) is designed to meet international risk-proofing standards at a minimum cost to participants in terms of collateral requirements. It does so, in part, through collateralized risk-sharing arrangements whereby participants may incur losses if another participant defaults. The LVTS is designed to be robust to defaults. Its rules, however, do not ensure that individual participants are robust to defaults. The author studies participants' robustness to default empirically by creating unanticipated defaults in LVTS, and finds that all participants are able to withstand their loss allocations that result from the largest defaults she can create using actual LVTS data.

2005-26

Uninsured Idiosyncratic Production Risk with Borrowing Constraints

Francisco Covas

The author analyzes a general-equilibrium model of a heterogeneous agents economy in which the agents are subject to borrowing constraints and uninsurable idiosyncratic production risk. In particular, he addresses the impact of these frictions on entrepreneurial investment and illustrates the trade-off between production risk and precautionary savings faced by the entrepreneur. In contrast to other studies, the author's results suggest that, when entrepreneurs' earnings are poorly diversified and production risk mainly affects the total output produced, the underaccumulation of capital in the entrepreneurial sector of the model economy is less likely to hold, because of a strong precautionary savings motive. Furthermore, the presence of these frictions on entrepreneurial investment exacerbates the overaccumulation of capital in the corporate sector of the economy that is reported in Bewley models with uninsurable labour income risk.

2005-27

Inflation Dynamics and the New Keynesian Phillips Curve: An Identification-Robust Econometric Analysis

Jean-Marie Dufour, Lynda Khalaf, and Maral Kichian

The authors use identification-robust methods to assess the empirical adequacy of a New Keynesian Phillips curve (NKPC) equation. They focus on Galí and Gertler's specification, for both U.S. and Canadian data. Two variants of the model are studied: one based on a rational-expectations assumption, and a modification to the latter that uses survey data on inflation expectations. The results based on these two specifications exhibit sharp differences concerning: (i) identification difficulties, (ii) backward-looking behaviour, and (iii) the frequency of price adjustment. Overall, the authors find that there is some support for the hybrid NKPC for the United States, whereas the model is not suited to Canada. Their findings underscore the need for employing identification-robust inference methods in the estimation of expectations-based dynamic macroeconomic relations.

2005-28

Inflation and Relative Price Dispersion in Canada: An Empirical Assessment

André Binette and Sylvain Martel

The authors examine three theories that explain movements in relative price dispersion: the signal extraction model, the extension of the signal extraction model, and the menu cost model. They show that expected inflation, which is captured by the menu cost model, is the aspect of inflation that is most closely associated with relative price dispersion. Furthermore, this result seems robust to different specifications. The authors, however, cannot completely discard inflation uncertainty (the signal extraction model), especially when using core inflation. They also observe a strong asymmetry regarding the impact of positive and negative unexpected inflation on relative price dispersion using total inflation, but this asymmetry is not observed for core inflation. This suggests that the strong asymmetry arises mainly from the presence of components typically associated with supply shocks, and not from the presence of downward nominal rigidities.

2005-29

Has Exchange Rate Pass-Through Really Declined in Canada?

Hafedh Bouakez and Nooman Rebei

The authors use a structural, general-equilibrium approach to test the premise that exchange rate pass-through has decreased in Canada. Their approach consists in estimating a dynamic stochastic general-equilibrium model for Canada over two subsamples, which cover the periods before and after the Bank's adoption of inflation targeting. The authors then use impulse-response analysis to assess the stability of exchange rate pass-through across the two subsamples. Their results indicate that pass-through to Canadian import prices has been rather stable, while pass-through to Canadian consumer prices has declined in recent years. Counterfactual experiments reveal that the change in monetary policy regime is largely responsible for this decline.

2005-30

Intertemporal Substitution in Macroeconomics: Evidence from a Two-Dimensional Labour Supply Model with Money

Ali Dib and Louis Phaneuf

The hypothesis of intertemporal substitution in labour supply has a history of empirical failure when confronted with aggregate time-series data. The authors show that a two-dimensional labour supply model, adapted to an environment with money, performs very well. The overidentifying restrictions implied by the model are far from rejected. The estimated parameters of preferences are generally stable and meaningful. Furthermore, the estimated wage elasticities of labour supply are much higher than previously found in the literature.

2005-31

Forecasting Canadian GDP: Region-Specific versus Countrywide Information

Frédérick Demers and David Dupuis

The authors investigate whether the aggregation of region-specific forecasts improves upon the direct forecasting of Canadian GDP growth. They follow Marcellino, Stock, and Watson and use disaggregate information to predict aggregate GDP growth. An array of multivariate forecasting models are considered for five Canadian regions, and single-equation models are considered for direct forecasting of Canadian GDP. The authors focus on forecasts at 1-, 2-, 4-, and 8-quarter horizons, which best represent the monetary policy transmission framework of long and variable lags. Region-specific forecasts are aggregated to the country level and tested against aggregate country-level forecasts. The empirical results show that Canadian

GDP growth forecasts can be improved by indirectly forecasting the GDP growth of the Canadian economic regions using a multivariate approach, namely a vector autoregression and moving average with exogenous regressors (VARMAX) model.

2005-32
Degree of Internationalization and Performance: An Analysis of Canadian Banks
Walid Hejazi and Eric Santor

The international business literature measures the link between the degree of internationalization (DOI) of a firm's activities and its performance. The results of this literature are mixed. The authors extend the analysis to Canadian bank-level data, but they also take into account the riskiness of each bank's foreign-asset exposure. The results establish a positive, but weak, relationship between DOI and performance—one that is dependent on each bank's risk profile. The authors discuss the policy implications of their analysis.

2005-33
Does Financial Structure Matter for the Information Content of Financial Indicators?
Ramdane Djoudad, Jack Selody, and Carolyn Wilkins

The authors use standard methods to determine the predictive content of common financial asset prices and quantities for 29 countries. They find no systematic pattern between financial structure and whether financial asset prices or quantities are the best financial indicators for monetary policy. Importantly, financial quantities are sometimes the best financial indicator, even in economies with highly developed market-based financial systems. The authors conclude that it would be difficult to tell, a priori, whether a financial asset price or quantity would be the best indicator for monetary policy for a particular country at a particular point in time.

2005-34
The Exchange Rate and Canadian Inflation Targeting
Christopher Ragan

The author provides a non-technical explanation of the role played by the exchange rate in Canada's inflation-targeting monetary policy. He reviews the motivation for inflation targeting and describes the monetary transmission mechanism. Though the exchange rate is an integral component of the transmission mechanism, the author explains why it is not a target for monetary policy. He provides a simple taxonomy for exchange rate movements, distinguishing between movements associated with direct shocks to aggregate demand and those unrelated to such direct shocks. He explains the importance to monetary policy of determining the cause of any given movement in the exchange rate, and of determining the net effect on aggregate demand. The author also describes Canadian monetary policy during the 2003–04 period, a time when the Canadian dollar appreciated sharply against the U.S. dollar.

2005-35
Testing the Parametric Specification of the Diffusion Function in a Diffusion Process
Fuchun Li

A new consistent test is proposed for the parametric specification of the diffusion function in a diffusion process without any restrictions on the functional form of the drift function. The data are assumed to be sampled discretely in a time interval that can be fixed or lengthened to infinity. The test statistic is shown to follow an asymptotic normal distribution under the null hypothesis that the parametric diffusion function is correctly specified. Monte Carlo simulations are conducted to examine the finite-sample performance of the test, revealing that the test has good size and power.

2005-36

The Canadian Macroeconomy and the Yield Curve: An Equilibrium-Based Approach

René Garcia and Richard Luger

The authors develop and estimate an equilibrium-based model of the Canadian term structure of interest rates. The proposed model incorporates a vector-autoregression description of key macroeconomic dynamics and links them to those of the term structure, where identifying restrictions are based on the first-order conditions that describe the representative investor's optimal consumption and portfolio plan. A remarkable result is that the in-sample average pricing errors obtained with the equilibrium-based model are only slightly larger than those obtained with a far more flexible no-arbitrage model. The gains associated with parsimony become obvious out-of-sample, where the equilibrium model delivers much more accurate predictions, especially for yields with longer-term maturities. The preferred equilibrium model has impulse responses that are consistent with long-term inflation expectations being anchored, so a surprise increase in inflation does not necessarily raise expectations of higher future inflation.

2005-37

Quantity, Quality, and Relevance: Central Bank Research, 1990–2003

Pierre St-Amant, Greg Tkacz, Annie Guérard-Langlois, and Louis Morel

The authors document the research output of 34 central banks from 1990 to 2003, and use proxies of research inputs to measure the research productivity of central banks over this period. Results are obtained with and without controlling for quality and for policy relevance. The authors find that, overall, central banks have been hiring more researchers and publishing more research since 1990, with the United States accounting for more than half of all published central bank research output, although the European Central Bank is rapidly establishing itself as an important research centre. When controlling for research quality and relevance, the authors generally find that there is no clear relationship between the size of an institution and its productivity. They also find preliminary evidence of positive correlations between the policy relevance and the scientific quality of central bank research. There is only very weak evidence of a positive correlation between the quantity of external partnerships and the productivity of researchers in central banks.

2005-38

An Empirical Analysis of Foreign Exchange Reserves in Emerging Asia

Marc-André Gosselin and Nicolas Parent

Over the past few years, the ability of the United States to finance its current account deficit has been facilitated by massive purchases of U.S. Treasury bonds and agency securities by Asian central banks. In this process, Asian central banks have accumulated large stockpiles of U.S.-dollar foreign exchange reserves. How far is the current level of reserves from that predicted by the standard macroeconomic determinants? The authors answer this question by using Pedroni's panel cointegration tests as the basis for the estimation of a long-run reserve-demand function in a panel of eight Asian emerging-market economies. While the authors find evidence of a positive structural break in the demand for international reserves by Asian central banks in the aftermath of the financial crisis of 1997–98, their results indicate that the actual level of reserves accumulated in 2003–04 was still in excess relative to that predicted by the model. However, both the substantial capital losses that Asian central banks would incur if they were to drastically change their holding policy and the evidence that the currency composition of reserves evolves only gradually mitigate the risks of a rapid depreciation of the U.S. dollar triggered by Asian central banks.

2005-39

Measurement Bias in the Canadian Consumer Price Index

James Rossiter

The consumer price index (CPI) is the most commonly used measure of inflation in Canada. As an indicator of changes in the cost of living, however, the CPI is subject to various types of measurement bias. The author updates previous Bank of Canada estimates of the bias in the Canadian CPI by examining four different sources of potential bias. He finds that the total measurement bias has increased only slightly in recent years to 0.6 percentage points per year, and is low when compared with other countries.

2005-40

Subordinated Debt and Market Discipline in Canada

Greg Caldwell

The author documents the use by Canadian banks of subordinated debt (SD) as a capital instrument. He reviews the economic benefits of this asset as a mechanism for market discipline and highlights academic and policy research over the past 20 years. The author provides both qualitative and quantitative summaries of the current regulatory and market environment in Canada, and conducts a Tobit analysis of factors that affect a bank's decision to issue SD. He also constructs a cross-section time-series sample of banks, into which controls for fixed effects, along with other non-default risk factors, are incorporated. Results for domestic banks show that, whenever there exists a high degree of gross impaired non-mortgage loans and mortgage writeoffs relative to assets, banks are less likely to issue SD. In contrast, increases in past-due (but still unimpaired) non-mortgage loans have a positive effect on SD issuance. This suggests that domestic banks 'time' their issuance decisions to avoid market discipline.

2005-41

Modelling and Forecasting Housing Investment: The Case of Canada

Frédérick Demers

The author proposes and evaluates econometric models that try to explain and forecast real quarterly housing expenditures in Canada.

Structural and leading-indicator models of the Canadian housing sector are described. The long-run relationship between expenditure and its determinants is shown to have shifted during the late 1970s, which implies that important changes have occurred in how the housing market is driven. The author finds that the response of housing investment to interest rates has become more pronounced over time. He finds that simple leading-indicator models can provide relatively accurate near-term forecasts. The preferred structural model, which allows for a shift in the cointegrating vector, provides a rich analysis of the housing sector, with good forecast accuracy on the construction side but not on the resale side, which is more difficult to predict.

2005-42
Order Submission: The Choice between Limit and Market Orders
Ingrid Lo and Stephen G. Sapp

Most financial markets allow investors to submit both limit and market orders, but it is not always clear what affects the choice of order type. The authors empirically investigate how the time between order submissions, changes in the state of the order book, and price uncertainty influence the rate of submission of limit and market orders. The authors measure the expected time (duration) between the submissions of orders of each type using an asymmetric autoregressive conditional duration model. They find that the execution of market orders, as well as changes in the level of price uncertainty and market depth, impact the submissions of both best limit orders and market orders. After correcting for these factors, the authors also find differences in behaviour around market openings, closings, and unexpected events that may be related to changes in information flows at these times. In general, traders use more market (limit) orders at times when execution risk for limit orders is highest or the risk of unexpected price movements is highest.

2005-43
The 1975–78 Anti-Inflation Program in Retrospect
John Sargent

The author provides an overview of the 1975–78 Anti-Inflation Program (AIP), in a background document prepared for a seminar organized by the Bank of Canada to mark the AIP's 30th anniversary. After reviewing Canada's experience with, and policy response to, inflation in the decade preceding the introduction of the AIP, the author sets out the elements of the AIP's monetary and fiscal policy, and prices and incomes controls. He then compares the program's inflation objectives with the actual course of inflation and aggregate demand during, and immediately after, the AIP. Drawing on existing analyses of the program's monetary and fiscal policy and controls elements, the author discusses why the program's specific targets and general objectives were not met. He concludes, with the benefit of hindsight, that—while external factors contributed to the failure to meet objectives—monetary and fiscal policy were not such as to give the AIP a strong chance of fully succeeding.

2005-44

Forecasting Core Inflation in Canada: Should We Forecast the Aggregate or the Components?

Frédérick Demers and Annie De Champlain

The authors investigate the behaviour of core inflation in Canada to analyze three key issues: (i) homogeneity in the response of various price indexes to demand or real exchange rate shocks relative to the response of aggregate core inflation; (ii) whether using disaggregate data helps to improve the forecast of core inflation; and (iii) whether using monthly data helps to improve quarterly forecasts. The authors show that the response of inflation to output-gap or real exchange rate shocks varies considerably across the components, although the average response remains low; they also show that the average response has decreased over time. To forecast monthly inflation, the use of disaggregate data is a significant improvement over the use of aggregate data. However, the improvements in forecasts of quarterly rates of inflation are only minor. Overall, it remains difficult to properly model and forecast monthly core inflation in Canada.

2005-45

An Evaluation of MLE in a Model of the Nonlinear Continuous-Time Short-Term Interest Rate

Ingrid Lo

The author compares the performance of three Gaussian approximation methods—by Nowman; Shoji and Ozaki; and Yu and Phillips—in estimating a model of the nonlinear continuous-time short-term interest rate. She finds that the performance of Nowman's method is similar to that of Shoji and Ozaki's method, whereas the window width used in the Yu and Phillips method has a critical influence on parameter estimates. When a small window width is used, the Yu and Phillips method does not outperform the other two methods. Choosing a suitable window width can reduce estimation bias quite significantly, whereas too large a window width can worsen estimation bias and the fit of the model. An empirical study is implemented using Canadian and U.K. one-month interest rate data.

Technical Report

No. 96

MUSE: The Bank of Canada's New Projection Model of the U.S. Economy

Marc-André Gosselin and René Lalonde

MUSE (Model of the U.S. Economy) is a system of estimated equations that describe, in a stock-flow framework, the interactions among the principal macroeconomic variables, such as GDP, inflation, interest rates, and the exchange rate. In MUSE, most behavioural equations are governed by a polynomial adjustment cost (PAC) structure. This approach is widely used in the Federal Reserve Board's FRB/US model. By allowing for lags in the dynamic equations in the context of forward-looking rational expectations, the PAC approach strikes a balance between theoretical structure and forecasting accuracy. MUSE, therefore, makes an explicit distinction between dynamic movements caused by changes in expectations and those caused by adjustment costs. Moreover, GDP is decomposed into household expenditures, business investment, government spending, exports, and imports. Hence, MUSE can be used to predict the consequences of a wide variety of shocks to the U.S. economy.

OUTSIDE **PUBLICATIONS**

Bank economists publish the results of their research in a wide range of journals, conference proceedings, and books. The Bank does not supply copies of articles published by outside journals or organizations.

Published in 2005

P. Berry
"A History of Decimal Coinage in Canada." *Canadian Numismatic Correspondence Course* Part II.

J.-P. Cayen and S. van Norden
"The Reliability of Canadian Output-Gap Estimates." *North American Journal of Economics and Finance* 16(3): 373–93.

D. Coletti
"Addressing Uncertainty in Monetary Policy Decision Making at the Bank of Canada." In *Practical Experience with Inflation Targeting*, 95–99. Proceedings of a conference held at the Czech National Bank, 13–14 May 2004. Czech National Bank.

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