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Bus Transportation Tokens and Tickets

Canadians taking the bus use millions of tickets each day. These small, colourful bits of paper have a long history of use in Canada. In the early nineteenth century, metal tokens were issued to those who had prepaid a trip, whether it was across a bridge or to ride on a ferry or a train. With the rise of mass transit companies in urban centres, the natural outgrowth of this practice was to issue bus tokens. The tokens used by firms operating horse-drawn coaches, electric trams, and motor-driven buses were manufactured from an array of materials, including copper, brass, fibre, vulcanite, and paper. Plastic was later added to this list. In recent decades, paper has become the medium of choice because it is the most economical.

From the issuer's viewpoint, bus tickets have several advantages over cash payments. Tickets provide drivers with some security against robbery because there is no need to carry cash to make change. They enable the transportation company to secure payment for its services in advance without having to wait for the exact date of the fare. And as a non-reusable substitute for money, tickets reduce the firm's cost of sorting the various coins that people use to pay fares.

In the past, companies issued more than one type of token or ticket for different passengers. Fares were based on age (child vs. adult), frequency of use (student vs. worker), or the distance that a passenger had to travel (central business district vs. suburbs). The shapes and colours of tickets and tokens reflected these different fares, making it easy for the driver to verify that the correct amount had been paid. Today, one type of ticket is typically issued, and differences in fare are dealt with by increasing or decreasing the number required. Changes in colour usually coincide with rate hikes. Tickets are issued in perforated sheets to facilitate separation for use. Rates are rendered either as a numerical value or in terms of the service; for example, "Good for One Fare." Bus tickets are generally produced in the town or city where the transportation company operates. This accounts for the lack of a standardized design or form among the tickets of different municipalities.

The pieces illustrated on the cover range in size from 12 mm to 38 mm in diameter or width. They form part of the National Currency Collection, Bank of Canada.

Photography by Gord Carter, Ottawa.

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Asset Prices and Monetary Policy: A Canadian Perspective on the Issues

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The issue addressed in this article is the extent to which monetary policy in Canada should respond to asset-price bubbles. The article concludes that:

- *Maintaining low and stable consumer price inflation should remain the primary goal of monetary policy. Accordingly, monetary policy decisions currently take into account the effects of asset-price movements on aggregate demand and inflation, tightening when rising asset prices stimulate aggregate demand and easing when a crash in asset prices depresses aggregate demand.*
- *When asset prices rise rapidly, monetary policy might, in principle, better achieve its objectives of minimizing deviations of inflation from target and output from potential over time by allowing inflation to go temporarily below target in the short run. Such a step might reduce the risk that a crash in asset prices could lead to a recession and to inflation markedly below target in the longer run.*
- *This strategy requires, however, that asset-price bubbles and their effect on the economy be identified with some precision. Such identification is rarely possible, since economists are far from being able to determine consistently and reliably when leaning against a particular bubble is likely to do more harm than good to the real economy.*
- *Monetary policy should therefore aim for temporary deviations from its target only under rare and extreme circumstances.*
- *Housing-price bubbles should be a greater concern for Canadian monetary policy than equity-price bubbles, since rising housing prices are more likely to reflect excessively easy domestic credit conditions than are equity prices, which are largely determined in global markets.*

The issue of how monetary policy should respond to asset prices gained prominence during the 1990s, following an increasing number of booms and busts in markets for equity and housing in many countries.[1] For example, Japan is only now slowly recovering from the asset-price bubble in equity and property markets that burst in the early 1990s. And, although nowhere near as dramatic, the United States experienced a shallow recession following the collapse of equity prices in 2000. This collapse, as well as other factors, such as the fallout from the terrorist attack on 11 September 2001 and concerns about corporate governance, contributed to slow the recovery. Currently, some commentators are questioning whether rising housing prices in the United Kingdom and Australia are a threat to future economic activity in those countries.

Given the pervasive and important channels through which asset prices affect economic behaviour and the aggregate economy, it should come as no surprise that monetary policy takes into account the impact of changes in asset prices on spending and inflation. The specific issue addressed in this article is whether monetary policy should respond to a special characteristic of asset prices, namely, asset-price bubbles.[2] These asset-price misalignments warrant separate consideration because they may have different consequences for spending than asset-price movements driven by

1. There are many important asset prices in the economy, but this article will focus on equity and housing prices. These prices are worth special attention, given their large share in the balance sheets of households and businesses and their historical tendency to experience episodes of large swings and misalignments (i.e., bubbles).

2. We use the terms "misalignment" and "bubble" interchangeably in reference to any large and persistent boom in asset prices that is followed by a bust and that is likely to entail an asset price deviating from its fundamental value.

fundamentals, owing to their episodic nature and possible non-linearities in behaviour.

This special characteristic of asset prices has generated arguments that, in the presence of potentially costly asset-price bubbles, monetary policy might better contribute to stabilizing output and inflation by raising rates ("leaning against the bubble"). The idea that monetary policy might respond to asset-price booms at the expense of temporary deviations from the inflation target is controversial. Much has been written on the subject in recent years. For example, the Federal Reserve Bank of Chicago, the Reserve Bank of Australia, and the European Central Bank all recently hosted conferences on asset-price bubbles.

The idea that monetary policy might respond to asset-price booms at the expense of temporary deviations from the inflation target is controversial.

The remainder of this article is organized as follows. The following two sections draw lessons from theories of why asset-price misalignments might occur and discuss the potential role of monetary policy in fuelling asset-price misalignments. This is followed by a review of the reasons why asset-price bubbles might be costly and of the lessons to be learned from history. A discussion of the current role played by asset prices in Canadian monetary policy decisions follows. The discussion highlights the issues related to the identification of asset-price misalignments in real time, including some empirical examples for Canada. The article concludes with our views on how policy-makers might want to think about asset-price misalignments in the context of monetary policy discussions and suggests avenues for future research.

Asset-Price Bubbles: Causes and Effects

Equity and housing prices play an important role in the monetary policy transmission mechanism because they determine the value of wealth and because they are responsive to interest rate movements. Asset prices also determine the value of collateral posted by households and firms to obtain loans from banks. Finally, housing prices enter into the calculation of the consumer price index (CPI) and so affect inflation directly.[3] Given the importance of the indirect and direct channels through which asset prices affect economic behaviour and the aggregate economy, asset prices are one of the factors taken into account in the setting of monetary policy. The issue addressed in this article is whether monetary policy should respond to asset-price bubbles. To begin our exploration of this issue, we offer a brief review of the economic literature on the causes and consequences of asset-price bubbles.

In standard models of the economy, financial markets are assumed to be efficient and free of distortions. Economic agents are assumed to exhibit "rational" (optimizing) behaviour. Asset-price misalignments are not possible unless economic agents exogenously deviate from their optimal behaviours. Moreover, should misalignments somehow arise in these models, they would be quickly eliminated by well-informed arbitrageurs (Fama 1965).[4]

The real world appears to deviate from the standard economic model, since history is rife with examples of apparent misalignments in housing and equity markets. In reviews of the theoretical literature, bubbles are generally classified by the behaviour that contributes to their formation, as well as by the efficiency of the markets in which they occur. However, not all theories fall neatly into these categories.

One branch of theory posits that bubbles can be caused by investors acting on irrational or erroneous beliefs. These beliefs are owing to fads or overly optimistic agents. In this framework, an asset-price bubble could occur because of exaggerated confidence in the fundamentals underlying the asset (a new technology or organizational structure, for example) to generate

3. Housing prices are incorporated in the "owned accommodation" component of the CPI, which is itself a weighted average of indexes of price elements of homeowners' costs. For details, see Canada (1989).

4. In a small class of models, bubbles continue because of "rational" self-fulfilling expectations where an investor purchases an asset solely in anticipation of selling it at a higher price to someone willing to purchase the asset for the same reason (Blanchard and Watson 1982; Santos and Woodford 1997). These models do not explain the start or end of bubbles, nor are they supported by the data.

future earnings (Meltzer 2003).[5] Perhaps the most notorious real-world example of this is the "irrational exuberance" explanation for the rise in equity prices in the United States in the second half of the 1990s (Greenspan 1996). This explanation emphasizes the excessive optimism stemming from positive developments in the real side of the economy that contribute to the underestimation of risk and the overextension of credit. The resulting excessive rise in asset prices leads to overinvestment in physical capital and buoyant consumer expenditures that feed back into the real economy, amplifying the cycle. Collyns and Senhadji (2003) describe how this cycle might also develop in the real estate market.

In a second branch of theory, misalignments are explained by rational reactions to unexplained real-world constraints on economic behaviour. For instance, informational frictions may cause herding behaviour, in which a large number of individuals react the same way to new information, thereby creating an overreaction in aggregate. They might react in this way—in full knowledge that there is likely to be an aggregate overreaction to the news—because they would suffer reputational damage if they did not react like their competitors or because they are compensated relative to a benchmark based on aggregate behaviour and therefore find it too costly to "buck the trend."[6] Another example is given by Allen and Gale (2003), where banks have insufficient information about the investment intentions of borrowers and therefore underprice risk in loans to investors, thus providing excess credit that fuels the bubble.

In theory, there are many reasons why bubbles can persist despite the presence of rational arbitrageurs who are collectively both well informed and well financed. In virtually all of these theories, the force behind the persistence of the bubble is rational arbitrageurs who try to ride the bubble for as long as they can (even though they know it will eventually collapse) to generate high returns. What the different theories try to explain is why too few arbitrageurs "bet against the market," thereby bringing the bubble to an abrupt end. Abreu and Brunnermeier (2003) provide one such explanation. They posit that bubbles persist in a world of well-informed and well-financed arbitrageurs because different arbitrageurs use different methods for timing the market. This diffusion of exit strategies and the resulting lack of synchronization permit the bubble to persist until a sufficient mass of traders sells out.

It [is] difficult for policy-makers to know in which direction to react to an asset-price misalignment: whether to tighten in order to lean against the growing bubble or to ease, in anticipation of the aftermath of the bursting bubble.

In all economic models, asset-price misalignments are introduced into the model by some combination of exogenous element or exogenous modification to behaviour. The exogenous explanation for asset-price misalignments in these models has important implications for monetary policy. First, it means that the start, length, and end of an asset-price bubble, as well as how the bubble will react to a change in monetary policy, will all have an unpredictable element because the misalignment is not fully explained by the economic model. This unpredictability makes it difficult for policy-makers to know in which direction to react to an asset-price misalignment: whether to tighten in order to lean against the growing bubble or to ease, in anticipation of the aftermath of the bursting bubble. Second, changes in monetary policy may have unpredictable non-linear effects on the behaviours that are generating the bubble, since investors may be behaving in an economically "irrational" way that is not susceptible to the influence of the economic incentives generated by a small rise in the policy rate. This line of reasoning supports Bernanke's (2002) and Greenspan's (2004) view that the instruments of monetary policy are too blunt to be used effectively for controlling asset-price bubbles. Finally, actions to improve the efficiency of markets and reduce information asymmetries would be beneficial in reducing the probability of a bubble persisting.[7]

5. Meltzer refers to these irrational bubbles as "Kindleberger manias." See Kindleberger (1978).

6. See Bikhchandani and Sharma (2000) for an etxcellent review of this literature.

7. See Hendry and King (2004) for a discussion of market efficiency in Canada.

Actions to improve the efficiency of markets and reduce information asymmetries would be beneficial in reducing the probability of a bubble persisting.

How Monetary Policy Can Make a Bubble More Likely

Some economists have proposed that a monetary policy regime that targets low and stable inflation can increase the probability of asset-price bubbles forming because the stability associated with inflation targeting can fuel excessive optimism about the future profit potential of new technology. Other economists think that an inflation-targeting regime reduces the likelihood of asset-price bubbles, but that inappropriate implementation of monetary policy within that regime can contribute to the formation of a bubble. These suppositions have arisen in part because of evidence that asset-price swings have been greater in recent business cycles than in previous business cycles, despite the success of many countries in attaining a low-inflation environment (Borio and White 2004).

Eichengreen and Tong (2003) study a century's worth of data from 12 countries (including Canada) and show that asset-price volatility is highly correlated with volatility in the monetary policy regime. Asset prices are less volatile in stable monetary regimes, such as those that target inflation, and hence the probability of a bubble in those regimes is lower. The increase in asset-price misalignments in low-inflation countries in recent years may therefore be the result of positive technology (rather than monetary) shocks, which, because of their uneven and uncertain effect on production possibilities, have an effect on revenue streams that is difficult for investors to predict.

But bubbles can occur even in stable monetary policy regimes when credit is easily available. A long list of empirical studies have found a correlation between excessive credit growth and asset-price bubbles. For example, Bordo and Jeanne (2002) examined post-1970 data for stock and property prices from 15 countries that are members of the Organisation for Economic Co-operation and Development (OECD) and observed that credit growth was unusually strong during the 20 asset-price booms reflected in these data. In a similar study using aggregate asset-price data from 18 OECD countries since the 1970s, Detken and Smets (2003) found that, where real money and credit growth were particularly strong, high-cost asset-price busts have tended to follow asset-price booms. Borio and Lowe (2003), in a study of 34 countries from 1960–99, also found that excess credit and asset-price cycles often occur in tandem.

These correlations may reflect errors in monetary policy that arise because asset-price bubbles are typically excluded from the models used for monetary policy advice. It may be that, in some circumstances, monetary policy does not give sufficient weight to the consequences of excessive credit growth, and so policy remains easy for too long, thereby creating a credit cycle that contributes to a boom-bust cycle in asset prices. This may happen at a time when the inflation target is highly credible, such that excess demand pressures show up first in asset prices rather than in inflation expectations or in the prices of consumer goods and services, delaying the reaction of inflation to excess demand pressures. If monetary policy advisers are unaware that the boom in asset prices reflects building excess demand pressures, monetary policy may inadvertently remain easy, contributing to the credit growth that fuels an asset-price bubble.

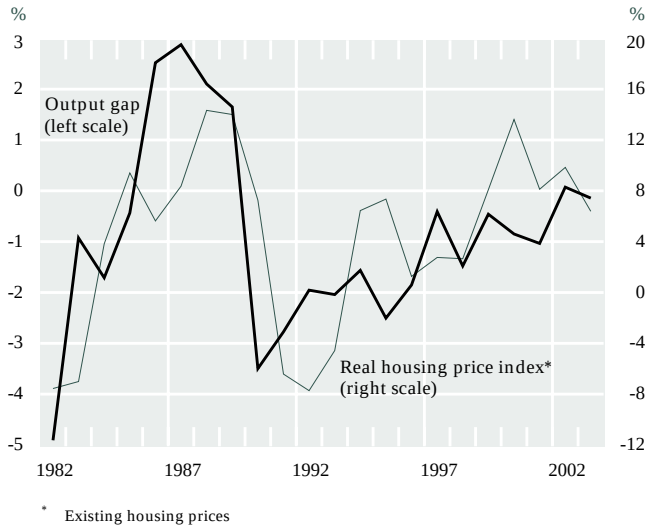
In our view, an inflation-targeting regime is the best monetary policy regime for reducing the probability that asset-price bubbles will develop in the first place. Inflation targeting provides a stable environment in which nominal profits are easier to predict, thus improving the ability of rational arbitrageurs to estimate the fundamental price of assets. In fact, changes in housing and equity prices in Canada have been historically highly and positively correlated with the output gap, which is a key indicator used by the Bank of Canada in setting monetary policy (Charts 1 and 2).

Why Some Asset-Price Bubbles Are Costly When They Burst

Asset-price bubbles are not always costly when they burst but, occasionally, a bursting bubble can be associated with events that are very disruptive to the real economy. The Great Depression and, more recently, the situations in Japan and the United States demonstrate just how large the costs associated with a burst-

Chart 1

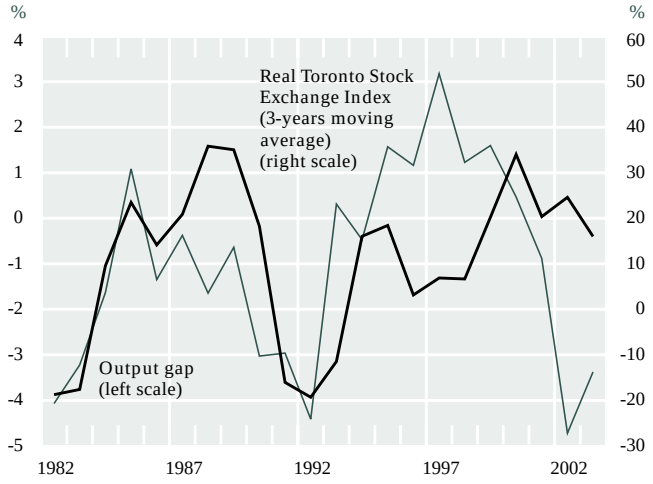
Change in Real Property Prices and the Output Gap for Canada



* Existing housing prices

Chart 2

Change in Real Equity Prices and the Output Gap for Canada



ing asset-price bubble can be. While Canada has few examples, the aftermath of its commercial and residential property boom and bust in the early 1990s involved long and painful adjustments on both the real and financial sides of the economy.

Asset-price booms can be costly for many reasons. Equity-price bubbles inappropriately reduce the cost of equity finance, which can cause overinvestment in real capital. Housing-price bubbles give home buyers a false sense of the real return they can expect on their investment, which can lead to speculative home buying and overinvestment in the real housing stock. This can lead to overinvestment in physical capital, overconsumption, and overextension of credit. And, although this overspending usually reverses when the bubble bursts, at a minimum, the timing of spending is affected, thereby increasing output volatility.

A decline in asset prices results in a deterioration in balance sheets that constrains spending and investment. Falling asset prices lower the value of collateral, which reduces the willingness of financial institutions to lend. This can cause decreased spending on investment and consumption goods and increased bankruptcies. Rapidly declining asset prices can undermine investor confidence by increasing uncertainty about the future—another reason for reduced spending and investment.

Although it is easy to describe the channels through which a bubble can impose costs on the economy, actually estimating these costs is not easy, because the endogeneity and forward-looking nature of asset prices make it difficult to determine how the economy would have been different had asset prices not behaved as they did. Moreover, each episode of boom-bust in asset prices is unique, making summary statistics and "stylized facts" of limited use in predicting the future. At the same time, we believe that a few lessons can be drawn from studies that use multi-country analyses of boom-bust cycles in housing and equity markets.

These lessons are:

1. *Not all asset-price booms result in busts* (Bordo and Jeanne 2002; Helbling and Terrones 2003). The results of these studies, among others with similar conclusions, mean that not all bubbles end with a crash or end in a costly manner. As a result, knowing that a bubble is forming, in and of itself, is not sufficient justification for a policy response to the bubble.

2. *Housing-price bubbles are more likely to end in busts and to be costly.* Helbling and Terrones (2003), for example, find that only 25 per cent of the equity-price booms in the past 30 years ended in busts, while around 50 per cent of the housing-price

booms ended in busts. Housing-price busts are correlated with larger output losses than are equity-price busts and are drawn out over a longer period (4 years vs. 1.5 years). The evidence for Canada, based on how different types of wealth affect consumption, suggests that housing-price bubbles are more likely to be costly than are equity-price bubbles.[8] Housing-price bubbles may also present a greater threat to the financial stability of the economy, given that the banking sector of an economy tends to be more exposed to loans secured by real estate. Eichengreen and Bordo (2002) found that virtually all episodes of banking stress in their data were accompanied by housing-price busts.

3. *Asset-price busts seem to be more costly when they occur in financial systems that are not well regulated* (Hunter, Kaufman, and Pomerleano 2003). Not surprisingly, economies with financial systems that have strong supervisory and regulatory institutions, as does Canada, tend to weather a bubble's collapse better than economies with fragile financial systems.

Overall, the stylized facts from a wide range of empirical studies suggest that policy analysts should not assume that all asset-price bubbles will be costly when they burst. The uncertainty about how policy should respond to an asset-price bubble is even greater because the timing of the end of a bubble is uncertain. Should policy-makers raise rates to lean against the bubble or lower rates to mitigate the costs associated with the bubble bursting? The fickle nature of bubbles suggests that there is much potential for an activist policy-maker to get the timing wrong, thereby making matters worse (Laidler 2004; Stockton 2003). The evidence suggests that policy-makers should monitor asset-price bubbles closely and react only when they are sufficiently certain that their reaction will do more good than harm to the economy. They should also be cognizant of the stylized fact that bubbles in housing prices are more worrisome than those in equity prices, in part because housing prices tend to reflect domestic credit conditions, whereas equity prices tend to reflect global forces.

8. See Pichette (2004) for a review of wealth effects in Canada. Recent estimates by Pichette and Tremblay (2003) find an average marginal propensity to consume (MPC) from housing wealth of 5.7 cents per dollar. This is much greater than their statistically insignificant estimate of the MPC from stock market wealth of less than one cent per dollar. This is consistent with Case, Shiller, and Quigley (2001), who find strong evidence across 14 countries (including Canada and the United States) that variations in housing wealth have an important effect on consumption, but only weak evidence that stock market wealth affects consumption.

The stylized facts from a wide range of empirical studies suggest that policy analysts should not assume that all asset-price bubbles will be costly when they burst.

How Asset Prices Currently Enter Policy Analysis

Policy analysts at the Bank of Canada incorporate movements in asset prices into their analysis in many ways. First, fundamental asset-price values are implicit in the calculations that determine the value of wealth in the main structural model used for policy advice and through their direct effect on the CPI.[9] Second, indicator and monitoring models that use market-determined asset prices are being developed for policy advice. [10] Third, descriptions and analysis of the evolution of market-determined asset prices are included in the regular briefings to policy-makers that precede policy decisions.[11]

In the Bank's main policy model, the Quarterly Projection Model (QPM), wealth is valued at what can be considered to represent fundamental prices (i.e., prices that reflect the underlying long-term value of an asset rather than the current price). Since wealth is a determinant of consumption in the model, the dynamics of consumption are tied to the fundamental value of assets (Coletti et al. 1996).[12] The QPM implicitly incorporates estimates of the long-run (fundamental) value of asset prices when calculating the steady-state value

9. For a review of these models, see Coletti and Murchison (2002). In particular, housing prices are incorporated into several components of Canadian core CPI, and therefore, direct effects are taken into account in structural policy models.

10. Current reduced-form models in use at the Bank do not incorporate asset-price misalignments. However, reduced-form models are being developed (Gauthier and Li 2004) that should result in asset-price misalignments being better understood.

11. See Macklem (2002) for details of the information used in monetary policy decisions.

12. The principal measure of wealth corresponds to Macklem's (1994) consolidated concept, where households are the ultimate owners of private sector wealth.

of capital (Black et al. 1994).[13] Since the steady-state value of capital is a determinant of investment in the model, shocks to these fundamentals (e.g., technology shocks) have implications for supply and demand in the economy, and hence, have implications for short-term growth and inflation (Coletti et al. 1996).

Missing from these models are the effects of changes in market-determined asset prices that do not reflect fundamentals—asset-price misalignments—and that may be perceived as persistent and important by economic agents. Also missing are the effects that asset-price misalignments may have on the ability of households and firms to obtain credit, since asset prices also determine the value of collateral posted by households and firms.[14] The importance of these effects is ultimately an empirical question and depends in large part on how economic agents perceive asset-price changes (persistent and to be incorporated into economic decisions or transitory and to be ignored) and on the ability of households and businesses to use their portfolios as collateral. It might also be expected that the magnitude of these effects would vary with the financial structure of the economy. While not much empirical work for Canada has focused on this question, recent evidence suggests that property prices are positively correlated with the availability of household credit across countries (including Canada), pointing to an active credit channel (Hofmann 2001). The importance of this channel in Canada and the United States may have grown in recent years with the advent of home-equity financing.[15] It might also be expected that the unique characteristics of the credit channel would be more prominent and therefore more relevant to monetary policy in the presence of large asset-price misalignments.

If fluctuations in asset prices contain reliable leading information about gross domestic product (GDP) and/or inflation, then they should be included in the information set considered by policy-makers.[16] Unfortunately, for Canada as for most countries, the empirical evidence suggests that the information content of asset prices in general, and of equity and housing prices in particular, is unreliable in that they do not systematically predict future economic activity. In particular, Stock and Watson (2003) find that just because a predictor worked well in one period does not mean that it will work well in the next. In other words, they found no subset of predictors, horizons, or variables in which the relationship between asset prices and real economic activity was stable enough to be used for policy analysis. This said, the analysis in Stock and Watson is restricted to simple linear relationships that do not pick up the potential non-linear effects of asset-price misalignments. Work on a financial conditions index (FCI) for Canada that allows more complex interactions between variables and includes housing and equity prices does provide some leading information for output at some time horizons, although not for inflation (Gauthier, Graham, and Liu 2004).[17]

The discouraging results obtained with indicator models led Gilchrist and Leahy (2002), among others, to suggest that movements in asset prices should be evaluated in structural-behavioural models that are explicit about their causal or structural relationship to economic activity.[18] Theory and evidence also suggest that asset-price misalignments are likely to have different empirical properties than asset-price fluctuations corresponding to changes in fundamentals and therefore should be treated differently by monetary policy-makers (Filardo 2001). This suggestion represents an interesting avenue for future research on the relationship between asset prices and real economic activity.

Identifying Bubbles: A Canadian Example

Probably the reason most frequently cited for not responding to asset-price bubbles is the difficulty of identifying bubbles ex ante (or even ex post). The

13. This follows from the neo-classical theory of investment, where the long-run desired capital stock is a function of the equilibrium level of real output and the real user cost of capital (derived from the solution of a multi-period profit-maximization problem of a representative firm).

14. Asymmetric information gives rise to adverse-selection and moral-hazard problems. In this case, banks require borrowers to offer collateral to back a loan (Bernanke, Gertler, and Gilchrist 1999).

15. The advent of home-equity loans has also offset the fact that housing wealth is less liquid than stock market wealth and subject to higher transactions costs.

16. This could be achieved through the use of indicator models, which systematically extract the leading information of variables.

17. Predictive instability is not inconsistent with the findings of some researchers that housing and equity prices contain useful information about future economic activity in some periods for some countries. For example, Goodhart and Hofmann (2000) find that housing prices have leading indicator properties for inflation in 12 countries, although Cecchetti et al. (2000) and Filardo (2001) show that the inclusion of housing prices does not improve inflation forecasts in an economically significant manner.

18. The authors refer to arguments made by Woodford (1994) that poor forecasting performance of an indicator may be expected if policy-makers use this information and respond to it.

difficulty arises in large part because, as Richards (2003) points out, any operational definition of an asset-price bubble is highly subjective. The subjectivity arises largely from two sources. First, an asset-price bubble is often defined as a major deviation of an asset price from its fundamental value, and there are many different yet legitimate ways to think about fundamental value. Second, how far and how long an asset price must move away from its fundamental value before it is considered a bubble is also highly subjective.

In practice, current techniques for identification do not identify misalignments precisely enough for policy purposes, as is demonstrated by the following example using Canadian stock market data from the Toronto Stock Exchange (TSX). In this example, two measures of the stock market gap (the difference between actual fundamental price and estimates of it) are compared. The measures shown here have both advantages and drawbacks, but are nonetheless illustrative.[19]

The first estimate is drawn from the standard-valuation approach, which is perhaps the approach most widely used by market analysts and economic researchers alike, largely because of its simplicity. The well-known Federal Reserve (FED) model is a forward-looking version of this type of model that compares the earnings yield to the bond yield. Using forward earnings is more relevant for stock valuation, especially around turning points in the business cycles. The model measures the fair value of a stock market index as expected earnings divided by the yield on 10-year Treasury bonds. The ratio of the current stock index to the fair-value price shows the degree of over- or undervaluation.[20]

The second estimate is based on an estimate of the fundamental value of equity prices from a macroeconomic model (BEAM) developed at the Bank of Canada that identifies the long-run determinants of the TSX (Gauthier and Li 2004). The resulting relationship is often referred to as a cointegrating vector because it identifies the common stochastic trend in the asset price and common macroeconomic variables such as output and inflation.[21] The key cointegrating vector in the empirical model is one that relates the log of the stock price index to the log of nominal GDP with a coefficient of one, which means that the fundamental value of stock prices grows at the same rate as nominal GDP in the long run. This approach to determining fundamental values has the appeal of being linked directly to macroeconomic theory. It also uses econometric estimates rather than arbitrary exogenous assumptions about the future path of revenue streams and discount rates to determine fundamental values.[22]

The estimates in Chart 3 show that measures of asset-price misalignments are highly variable, not very correlated, and often send conflicting signals. When specific episodes are examined, the measures send mixed signals about the degree of price misalignment at critical times for policy analysis. For example, during the period leading up to the stock market decline of October 1987, only the Fed model would have sent consistently worrisome signals (Chart 4). Moreover, by the time the signals emerged, tighter policy to lean against the bubble would have had contractionary effects following its collapse.

This is consistent with Japanese evidence using real-time data, which shows that Japan's asset bubble could not have been predicted with sufficient precision to allow monetary policy to respond pre-emptively (Okina and Shiratsuka 2003). It also supports Bean's (2003) view that by the time enough data were available for policy-makers to be confident that an asset-price bubble had indeed emerged, it would likely be too late for policy to react pre-emptively to the bubble in order to avoid economic disruption.

19. Since all existing measures of equity-price misalignments have important drawbacks, one should not rely on a single measure. See Bank of Canada (2004) and Hannah (2000) for applications of other stock market valuation techniques to Canadian data.

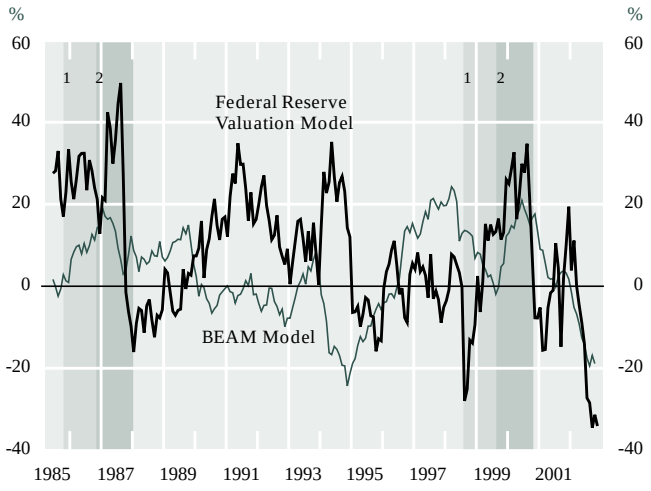
20. The Fed model is based on the strong correlation between the forward-earnings yield of the S&P500 SX and the Treasury yield. Our use of a Canadian version of the Fed model presumes the same empirical regularity in the Canadian data as in the U.S. data. The Fed model also uses nominal rather than real rates of return, even though theory posits that the earnings yield should equal the real bond yield plus a risk premium. And the Fed model takes the bond yield as exogenous, even though it must adjust to the expected rate of return on capital in the long run. These drawbacks reduce, but do not eliminate, the usefulness of this approach.

21. In this model, the fundamental value is defined as the accumulation of permanent shocks to asset prices. The permanent component of every variable is estimated in the vector-error-correction model (including stock prices) using the identification methodology suggested in King et al. (1991). This allows the construction of a stock market gap that is defined as the difference between stock prices and their permanent component. The gap is therefore the transitory component of the stock market which, by definition, should not last.

22. The weakness of the approach is that there is no guarantee that the macroeconomic variables identified in the cointegrating vector are, in fact, linked to the future revenue stream of the asset or to future discount rates. Another weakness relates to the technical point that cointegrating vectors are often non-unique.

Chart 3

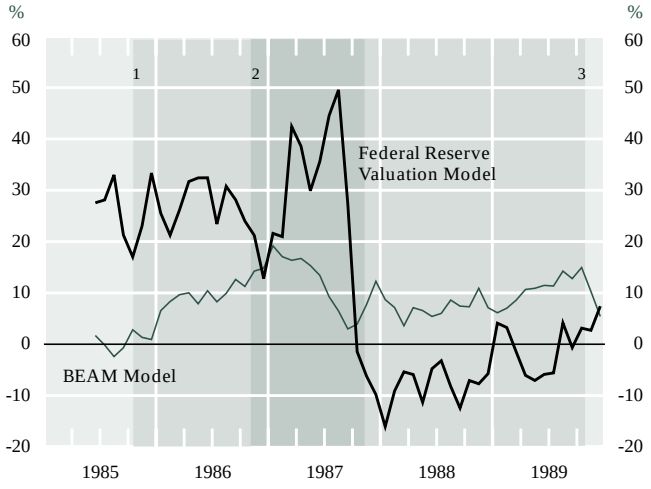
Alternative Measures of Asset-Price Misalignments (TSX)



1 24 months before bust
2 12 months before bust

Chart 4

Alternative Measures of Asset-Price Misalignments (TSX), October 1987



1 24 months before bust
2 12 months before bust
3 24 months after bust

What Might Monetary Policy Do?

Our view of the evidence and the literature is that asset-price misalignments can pose important risks to the economy, particularly if they are accompanied by financial fragility and occur in the housing market. In and of itself this is a compelling reason for monetary policy to pay special attention to asset-price misalignments. As discussed earlier, the Bank of Canada currently incorporates movements in asset prices into policy analysis in many ways, so that monetary policy reacts to these movements to the extent that they have an impact on the projected path of the output gap and inflation over the target horizon of two years.

In the case of a large misalignment in asset prices, however, monetary policy objectives may be better achieved, at least in principle, if monetary policy were to lean against the misalignment at the expense of inflation returning to target over a slightly longer horizon.[23] In this regard, housing-price misalignments are more of a concern than equity-price misalignments, since housing prices are more sensitive to domestic credit conditions than are equity prices, which are largely priced in global markets.[24]

In practice, the case made to take such extraordinary action should have a high burden of proof, for two reasons. First, the analysis is partial, and the full consequences of any policy reaction will be unknown, given that asset-price misalignments are excluded from policy models. Second, the burden of proof should be high because of the uncertainty surrounding estimates of the size, timing, and costs of asset-price bubbles. The analysis should therefore strongly indicate that a bubble does indeed exist, that it will probably be costly when it bursts, and that the bursting is likely to be far enough into the future that policy does not run the risk of making matters worse by effecting a tightening on the economy simultaneously with the bubble bursting. The high burden of proof is

23. This would be the case if leaning against an asset-price bubble were successful in either restraining its size and/or limiting the overspending and financial imbalances in balance sheets and credit markets that tend to accompany asset-price booms. In this case, the costs of the unwinding of the asset-price boom in terms of output losses and undershooting of inflation from its target would be lower.

24. This view implies a symmetrical monetary policy response in which monetary policy leans against asset-price bubbles and leans into asset-price bursts. Some commentators have suggested that monetary policy should respond asymmetrically by ignoring asset-price bubbles while easing in response to asset-price bursts. The disadvantage of the asymmetrical approach is that asset buyers are less likely to show restraint during a bubble if they believe that monetary policy will be asymmetrical.

also essential to maintain clear communication of policy actions and policy credibility.

It is our view that this burden of proof would rarely be met. First, bubbles are difficult—though not impossible—to identify in real time. Second, it is very difficult to predict when a bubble will burst, given that economic theory has difficulty explaining why bubbles start, persist, or end. Third, it is very difficult to determine whether a bubble will be costly on bursting, given how little we know about bubbles. Thus, economists are far from being able to determine consistently and reliably when leaning against a particular bubble is likely to do more harm than good to the real economy. For these reasons, inflation targeting remains the best contribution that monetary policy can make to promoting economic and financial stability.

The main thrust of the Bank's research in this area will be to learn more about the relationship between fluctuations in housing and equity prices and economic activity in Canada, as well as how monetary policy interacts with these fluctuations. This will require the development of theoretical and empirical tools that model structural relationships. This is consistent with Friedman's (2003) view that monetary policy should react to asset-price bubbles only if there is a role for them in a fully thought-out model of the transmission mechanism.

Inflation targeting remains the best contribution that monetary policy can make to promoting economic and financial stability.

Work should also be done to improve the identification of asset-price misalignments ex ante in order to help identify the sources of misalignments, in particular, the contribution of monetary policy to fuelling the misalignment. We find the evidence compelling that a buildup in credit can contribute to the formation of asset-price misalignments as suggested by Borio and White (2004). Ultimately, housing and equity prices should be part of the models that the Bank regularly uses for policy analysis.

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Real Return Bonds: Monetary Policy Credibility and Short-Term Inflation Forecasting

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- *By comparing the yields on conventional and Real Return Bonds, it is possible to calculate the break-even inflation rate, or BEIR, which is the average rate of inflation that equates the expected returns on these two bonds. The question then becomes, does the BEIR contain useful information about long-run inflation expectations?*
- *The BEIR has been higher, on average, and more variable than survey measures of expected inflation over the past 12 years. The difference between survey measures and the BEIR measure of inflation expectations may be explained by a number of market-based premiums and distortions that affect the BEIR.*
- *As a result of the potential distortions and the difficulties in accounting for them, the BEIR should not be given a large weight as a measure of inflation expectations at this time.*
- *The continued development of the Real Return Bond market should eventually result in the BEIR becoming a more useful indicator.*
- *The BEIR demonstrates no clear advantage in forecasting near-term inflation. Over all horizons examined, survey measures and even past inflation rates yield smaller forecasting errors than the BEIR.*

The difference between the yields on long-term Government of Canada conventional bonds and Real Return Bonds (RRBs), which is commonly referred to as the break-even inflation rate (BEIR), has long held out the potential of providing a unique, real-time, market-based measure of inflation expectations. Since Canada issues RRBs with 30-year maturities, the BEIR is constructed from yields on long-term bonds and indicates the expected average inflation over a 25- to 30-year horizon. In a study on the BEIR, Côté et al. (1996) concluded that this measure needs to be interpreted with caution, owing to the presence of a premium for inflation uncertainty and other distortions resulting from the small size of the RRB market. The authors maintained that "the differential over time may nonetheless be a good indicator of movements in long-run inflation expectations." With the BEIR breaching three per cent in 2004, the top of the inflation target band, there has been renewed interest in the importance of such premiums and distortions. Furthermore, since RRBs were first issued in Canada in December 1991, almost 13 years of data are now available to reassess the usefulness of this measure of inflation expectations.

The worth of the BEIR as a measure of inflation expectations can be examined from two perspectives: its usefulness as a measure of monetary policy credibility and as an aid to forecasting inflation.

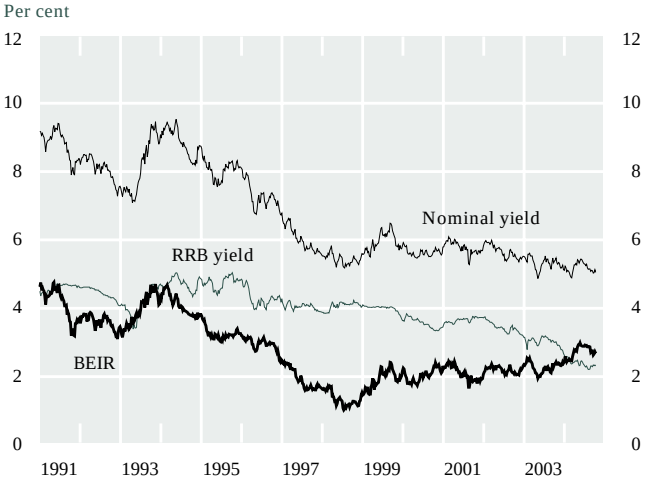
The worth of the BEIR as a measure of inflation expectations can be examined from two perspectives: its usefulness as a measure of monetary policy credibility and as an aid to forecasting inflation. It follows that if the BEIR captures inflation expectations accurately, its position relative to the midpoint of the inflation target band should be a good measure of credibility. To ascertain the BEIR's accuracy, the historical experience of this measure was examined in relation to alternative measures of the behaviour of long-run inflation expectations. While the broad trends in the BEIR conform with those of other measures of inflation expectations, the BEIR is more volatile and at times deviates significantly from other measures. The purpose of this article is to consider whether these movements can be attributed to changes in risk premiums and other distortions affecting the BEIR rather than to changes in inflation expectations. In addition, the BEIR's forecasting performance at short horizons is compared with that of survey measures of expectations and other simple models.

The Interest Rate Differential and Inflation Expectations

For conventional bonds, the nominal value of the cash flow is set in advance, while the real purchasing power of these cash flows deteriorates with inflation over the term to maturity. Therefore, to preserve the real purchasing power of these cash flows, the price of the conventional bonds must reflect the required compensation for expected inflation over the term of the bond as well as a real rate of return. In contrast, as the name implies, RRBs guarantee their holder a real return, protecting them from lower returns resulting from inflation. To do so, the coupon payment and the principal repaid at maturity of RRBs are adjusted to include compensation for inflation that has occurred since the issuance of the bond.[1] Assuming that the quoted real yield on the RRBs is equivalent to the expected real return on a conventional bond, and that both markets are efficient, the Fisher relationship[2] says that, in the absence of premiums and distortions, the difference between nominal and real yields should be equivalent to the average expected rate of inflation over the term of the bonds.

Chart 1

The BEIR, Nominal and Real Yields



The Historical Experience (1991 to 2003Q4)

The Government of Canada first issued RRBs in December 1991. Chart 1 shows the RRB yield, the yield from a 30-year nominal Government of Canada bond, and the BEIR calculated from these two yields.

Table 1 shows the means and measures of the variability of the nominal and real yields as well as the BEIR.[3] The drop in the mean and variability of the BEIR in the latter half of the sample coincides with a drop in the mean and variability of the nominal yield. This is consistent with inflation expectations and inflation uncertainty falling over the sample. The real yield also dropped

Table 1

Full and Subsample Statistics

	Mean			Standard deviation		
	1992–2003	1992–1997	1998–2003	1992–2003	1992–1997	1998–2003
Nominal	6.83	8.02	5.64	1.35	0.86	0.26
RRB	4.06	4.45	3.66	0.53	0.33	0.37
BEIR	2.74	3.52	1.96	0.95	0.66	0.36

1. See "Canada—Real Return Bonds" on the Bank of Canada's Web site (http://www.bankofcanada.ca/en/notices_fmd/market_consult03.htm).

2. Fisher relationship: $(1+i) = (1+r)(1+\pi^{\varepsilon}) \Rightarrow \pi^{\varepsilon} = \frac{1+i}{1+r} - 1$

3. The sample includes quarterly data from 1991 to 2003Q4

Chart 2

Four Measures of Inflation Expectations

on average in the latter half of the sample, but its variability was relatively unchanged. Formal inflation targets were adopted in Canada in February 1991, and since December 1995 have been set to the current target of 2 per cent. Chart 2 shows that the BEIR was above the inflation target in the early- to mid-1990s, temporarily below it from late 1997 to mid-1999, and very close to target to the end of 2003. Longworth (2002) and others cite the falling level of the BEIR between 1992 and 1997 as evidence of monetary policy becoming more credible.

Also shown in Chart 2 are the three survey measures of expected inflation: the median expected inflation rate 4 to 14 years ahead from an annual survey of forecasters conducted by Watson Wyatt; the semi-annual survey by Consensus Economics of forecasters' inflation expectations 6 to 10 years ahead; and expectations 2 years ahead from the Conference Board of Canada's quarterly *Survey of Forecasters*.[4] The BEIR is higher than the other measures of expectations for the first half of the sample—at times by more than 150 basis points. It registers both the highest reading (4.9 per cent in March 1992) and the lowest (about 1.0 per cent in late 1998). It also took longer to move to the target range for inflation. However, over the past four years, until the beginning of 2004, the BEIR was very close to 2 per cent, the Bank of Canada's target for inflation, along with the other measures of inflation expectations. From 2000 to 2003, taking surveys as the appropriate benchmark, any distortions in the level of the BEIR were, on average, either small or offsetting.

Even if all of these series were perfect measures of inflation expectations, their levels would be expected to differ because they capture expectations over different horizons. The measures of inflation expectations are in fact quite different. The mean level of the BEIR over the 1992 to 2002 sample is 2.8 per cent, above that of the 4- to 14-year expectations (2.5 per cent), the 6- to 10-year (2.1 per cent), and the 2-year (2.0 per cent). Thus, over this period, the longer the horizon over which the expectation applies, the higher the average expectation of inflation. This is consistent with a slow increase in the long-term credibility of monetary policy, which led expectations over longer horizons to fall gradually.

While it is too early to judge, the recent movement of the BEIR in 2004 may represent the beginning of a third significant deviation between this measure and survey measures of inflation expectations.

The BEIR is the most variable measure of longer-term inflation expectations, showing an average annual absolute change of 0.56 percentage points, at least double that of the survey measures over any horizon. The first differences in the latter measures, taken at the frequencies of the respective surveys, show little correlation with changes in the BEIR, suggesting that changes in one (or both) of these measures reflect some phenomenon other than changes in inflation expectations (Table 2). Historically, the higher peaks and lower troughs of the BEIR are mainly linked to two episodes: 1993–95, when the BEIR increased rapidly as other measures stabilized or fell; and 1997–99, when the BEIR dropped sharply while other measures fell only modestly or flattened. As of October 2004, the BEIR was approximately 2.8 per cent, well above its range over the preceding four years. While it is too early to judge, the recent movement of the BEIR in 2004 may represent the beginning of a third significant deviation between this measure and survey measures of inflation expectations.

4. Inflation two years ahead is the expected inflation rate for the following calendar year rather than over the next 12 months. The other survey measures are similarly defined.

Table 2

Correlations between Changes in the BEIR and Other Measures of Inflation Expectations

Survey measures	1992–2003	1992–1997	1998–2003
2 years ahead (quarterly)	0.17	0.11	0.20
6-10 years ahead (semi-annual)	0.08	0.08	-0.36
4-14 years ahead (annual)	0.31	-	-

Differences between survey measures and the BEIR may reflect flaws in either measure. In this article, we focus on the potential distortions affecting the BEIR, including cash-flow mismatches, term-varying inflation expectations, inflation- and liquidity-risk premiums, and market segmentation.

Embedded Premiums and Distortions: How Important Are They?

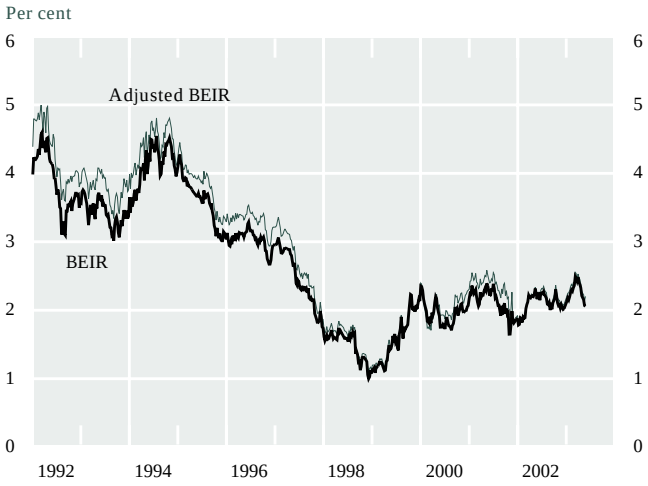
The use of the BEIR to capture inflation expectations depends on a number of fairly strong assumptions. Investors are assumed to demand the same real return from RRBs as from conventional Government of Canada bonds. In addition, the BEIR calculation is premised on well-functioning, efficient markets with cross-market arbitrage. Traditional bonds are also assumed to strictly adhere to the Fisher relationship, which stipulates that the only difference between a nominal interest rate and the real interest rate is in fact expected inflation. However, several factors may cause these assumptions to be violated and bias or distort the BEIR as a measure of inflation expectations. Furthermore, the calculation of the BEIR may introduce a bias, owing to the different structures of the component bonds.

Cash-flow mismatch

The RRB and the nominal bond that are used to construct the BEIR have approximately the same maturity. However, because the RRB's coupon payments rise with inflation while those of the nominal bond are constant, an investor will receive different cash flows for the two products. A greater portion of the cash flow for RRBs will tend to occur later in the maturity structure than for conventional bonds. Since the price of a bond is simply the sum of discounted future cash flows, the two bonds will have different sensitivities to the expected path of real interest rates and real interest rate risk. These differences will influence the yield spread between the securities for reasons unrelated to expected future inflation.

Chart 3

The Cash-Flow Adjusted and Unadjusted BEIR



Therefore, to adjust for the differences in cash flow in calculating the BEIR, the yield to maturity of the RRB should be compared not with that of a nominal bond, but with that of a synthetic nominal bond (created from a zero-coupon curve[5]) with exactly the same stream of cash flows as the RRB. Expressed differently, by discounting the inflation-adjusted cash flows with a zero-coupon curve, it is possible to solve iteratively for the constant inflation expectations that are consistent with the observed price (see Box).

Chart 3 illustrates both the BEIR and the cash-flow-adjusted BEIR. The two measures are reasonably close, but differ significantly on occasion (Chart 4), with an average bias of 20 basis points. The largest source of week-to-week volatility in this bias calculation is the issuance of a new benchmark bond, since the change in length of maturity will alter the sensitivity to interest rates of either component bond in the BEIR. Therefore, the level and variations of the BEIR reflect not only inflation expectations, but also the discrepancy in the interest exposure of each bond.

5. Results are based on the Merrill-Lynch-Spline exponential methodology to extract the yield curve (Brenner et al. 2001) as calculated by Bolder, Johnson, and Meltzer (forthcoming).

Box

"Adjusting" for Cash-Flow Mismatches

Discounting Using a Zero-Coupon Curve

The price of a bond is the present value of its cash flows. The price (P) therefore reflects how much money must be invested today, given a certain rate of return (yield to maturity), for n periods, to produce a specific flow of nominal payments. The specific future nominal cash flows of a conventional bond are known in advance. For example, a $100 par value semi-annual pay bond with a 5 per cent coupon and a maturity of 30 years will make 60 payments of $2.50 and $100 at maturity. To determine the present value of this bond, the cash flows (CF) are discounted using this formula:

$$P = \sum_{t-1}^{N} \frac{CF_t}{(1+i)^t} = \sum_{t=1}^{N} C/(1+i)^t + PL/(1+i)^n, \quad (1)$$

where C= coupon and PL = principal. This formula for calculating P assumes that the interest rate (i) or yield to maturity used to discount each cash flow is constant. However, it is more appropriate to discount each cash flow at the interest rate relevant to when it is received. Therefore, each cash flow should be considered separately; or, more technically, one should value a bond as a package of zero-coupon bonds, with each payment considered its own bond. To determine the present value of each zero-coupon bond, the future cash flow is discounted using the yield on a zero-coupon Government bond with the same maturity (m).

$$P = \sum_{m=1}^{N} CF_{t+m}/(1+i_m)^m. \quad (2)$$

However, such bonds do not exist for every maturity, and therefore theoretical foundations are used to derive a zero-coupon curve. This article relies on the Merrill-Lynch-Spline methodology to extract the yield curve as calculated by Bolder, Johnson, and Meltzer (forthcoming).

The Cash-Flow Adjustment

From equation (1) above, it follows that, for a given interest rate, the further out the cash flow, the lower the present value. Since a greater portion of the cash flows of RRBs typically occurs later in the maturity cycle than with conventional bonds, an adjustment for this difference in structure should be made.

There are several equivalent ways to approach the cash-flow adjustment. If expected future inflation is known and constant over the term of the RRB, then the stream of nominal payments from an RRB is also known (the fixed coupon and principal are adjusted for inflation). The necessary portfolio of zero-coupon bonds to replicate those cash flows exactly can then be constructed. The present value of this portfolio is determined by summing each cash flow that has been discounted using the zero-coupon curve.

$$P = \sum_{m=1}^{N} \frac{RCF_{t+m}(1+\pi)^m}{(1+i_m)^m} =$$

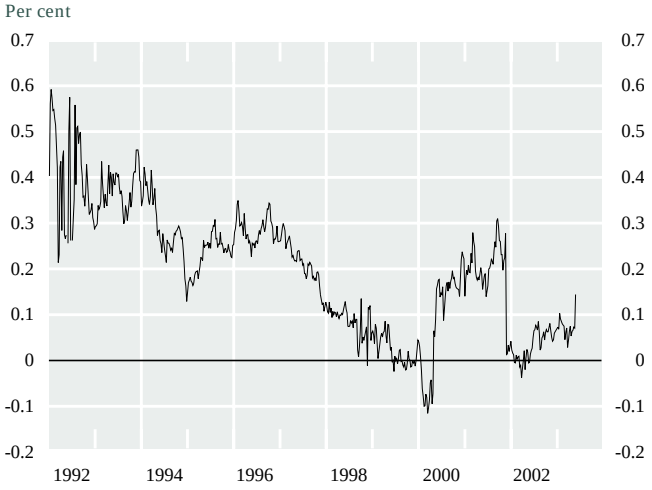
$$\sum_{m=1}^{N} \frac{RC_{t+m}(1+\pi)^m}{(1+i_m)^m} + \frac{RP(1+\pi)^n}{(1+i_n)^n}, \quad (3)$$

where RCF = real cash flow, RC = real coupon, and RP = real principal. Of course, expected inflation is not known, but since the current market price of the RRB contains an implicit valuation of expected inflation (the BEIR), this measure can now be calculated by solving iteratively for the constant inflation rate that equates the market value of the RRB with the calculated value of the synthetic portfolio of zero-coupon bonds. By matching the cash flows of the RRB with a portfolio of zero-coupon bonds, the differences in the timing of the cash flows are accounted for. A slightly different but equivalent approach consists of maintaining the constant inflation assumption but altering the level of inflation until the resulting present value of the inflation-adjusted cash flows (discounted by the zero-coupon curve) is equivalent to the observed market price of the RRB.

Chart 4

Bias Resulting from Differences in Cash Flow

(BEIR – adjusted BEIR)



The bias will also be a function of the slope of the yield curve, and accounting for it will further improve the measure of inflation expectations from RRBs. In October 1996, for example, the yield curve was particularly steep, which caused the BEIR to understate inflation expectations by 31 basis points. Conversely, in March 2000, the yield curve was flat to inverted,[6] and inflation expectations would have been overstated by 10 basis points.

Term structure of inflation expectations

The BEIR is not a forward rate,[7] in the sense that it doesn't refer to a future rate of inflation, but rather, is more closely aligned with the average of inflation over the maturity of the bonds. For example, if inflation is expected to be high for some period of time and then to return to 2 per cent, the BEIR will be above 2 per cent, even though it is a long-term measure. Thus, in order for the BEIR to be a good measure of average inflation expectations, the term structure of inflation expectations must be relatively constant. When this assumption fails, a bias is introduced into the BEIR measurement. As a result, term-varying inflation expectations will alter the level of the BEIR, adding to its variability even when long-run expected inflation is unchanged. In this section, we explore the extent to which the current reading of the consumer price index (CPI) and short-term inflation expectations can affect the BEIR.

In order for the BEIR to be a good measure of average inflation expectations, the term structure of inflation expectations must be relatively constant.

Table 3 shows the results of a sensitivity test of the BEIR obtained under different levels of short-term inflation expectations that last for varying lengths of time before reverting to the inflation target of 2 per cent. For example, if inflation is expected to be 3 per cent for the next six months and 2 per cent for the remainder of the 30 years to maturity, we should observe a BEIR of 2.03 per cent (while average inflation is 2.02 per cent).[8] Clearly, a large and persistent deviation of inflation expectations is required to create a significant bias. The bias owing to the term structure of inflation expectations is typically no larger than 3 to 4 basis points (Christensen, Dion, and Reid 2004). However, the bias will most likely be at its maximum (approximately 10 basis points, based on our sample) at criti-

Table 3

BEIR under Different Structures for Inflation

Period of high expected inflation before returning to the target (2%)	3% expected inflation		4% expected inflation		5% expected inflation	
	BEIR (%)	Average inflation (%)	BEIR (%)	Average inflation (%)	BEIR (%)	Average inflation (%)
6 months	2.03	2.02	2.05	2.03	-	-
1 year	2.05	2.03	2.11	2.07	2.16	2.10
2 years	2.10	2.07	2.21	2.13	2.31	2.20
5 years	2.25	2.17	2.50	2.33	2.76	2.49
10 years	2.47	2.33	2.94	2.66	3.42	2.99
15 years	2.65	2.50	3.30	3.00	3.97	3.49
30 years	3.00	3.00	4.00	4.00	5.00	5.00

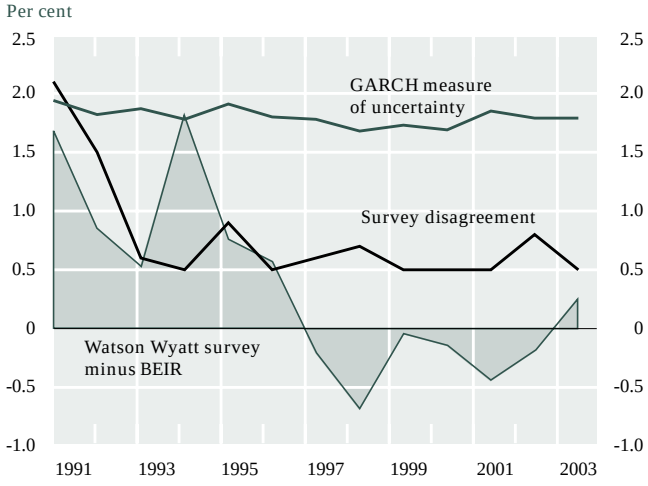
6. The yield to maturity on a 30-year conventional Government of Canada bond was significantly lower than that of a similar bond with 20 years to maturity.

7. A forward rate is an interest rate that is set today but has future start and stop dates.

8. The difference between the BEIR and average inflation is driven by the coupon structures of RRBs and nominal bonds.

Chart 5

Survey/BEIR Difference and Inflation Uncertainty



cal times, perhaps following a large relative price shock when monetary authorities will be looking for evidence that this shock is feeding into inflation expectations.

Inflation-risk premium

Inflation risk reflects the probability that the actual inflation rate will not match the expected rate. If inflation is significantly higher over the term of a conventional bond than was anticipated at the time of purchase, the realized real rate of return will be lower than the anticipated real rate of return. Investors in conventional bonds require compensation for this risk, resulting, other things being equal, in higher nominal yields. In contrast, RRB investors do not face inflation risk because RRBs compensate for realized inflation.[9] For this reason, the BEIR contains a positive inflation-risk premium, the magnitude of which is in turn dependent on the degree of uncertainty about future inflation and the degree of risk aversion.

Chart 5 shows two proxies of long-run inflation uncertainty. The first is a measure of the disagreement among forecasters who responded to the Watson Wyatt survey, calculated as the difference between the upper and lower quartiles of reported inflation expectations at the 4- to 14-year horizon. The second measure is inflation uncertainty over a 5-year forecast horizon derived from a GARCH model developed by Crawford and Kasumovich (1996).[10]

Côté et al. (1996) suggest that the increase in the BEIR in 1994, which was not accompanied by a similar move in survey measures, may reflect an increase in the inflation-risk premium. If changes in the premium for inflation uncertainty are an important factor in explaining movements in the BEIR, then sharp movements in these proxies should be associated with similar movements in the BEIR. Yet both measures fail to indicate a rise in inflation uncertainty in 1994 or a significant decline in 1997. Crawford and Kasumovich's measure of inflation uncertainty fell dramatically during the 1980s but has been relatively stable since 1992. Similarly, survey disagreement fell between 1991 and 1994 but was relatively stable afterwards. The simplest explanation is that deviations of the BEIR from survey measures of inflation expectations are the result of some phenomenon other than changes in uncertainty regarding inflation.

Liquidity-risk premium

Owing to the relatively small number of RRBs outstanding, investors may demand a higher yield on RRBs to compensate them for the risk that they will not be able to sell RRBs quickly or will have to sell at unfavourable prices. Other things being equal, this will result in a higher real yield and a lower BEIR. If this liquidity-risk premium is present, it should fall over time as more RRBs are issued and traded. In fact, there has been an improvement in liquidity since the beginning of the RRB program. The stock of RRBs outstanding increased from $4.1 billion at the end of 1994 to $17.3 billion at the end of 2003, rising from 9 per cent to 26 per cent of federal government marketable debt with a maturity of 10 years or greater.

However, even with a much greater stock outstanding, the liquidity premium may rise during periods when investors demonstrate a heightened preference for highly liquid assets. A dramatic deterioration in liquidity, if there were one, could explain the declining differential between the BEIR and survey measures of expected inflation between 1997 and 1999. During that period, global financial markets were heavily influenced by a series of shocks, chiefly the Asian crisis and the

9. In practice, there is some inflation risk, owing to the indexation lag and taxation.

10. Similar analyses were undertaken using implied volatility from long-term swaptions as a proxy for long-term inflation uncertainties in the sample 1997 to 2003. No positive relationship was identified. A swaption gives the holder the right (but not the obligation) to enter into an interest rate swap having a predetermined fixed rate at some later date.

Russian bond default. It is conceivable that, under these conditions of financial instability, the value investors placed on liquidity increased substantially. Shen and Corning (2001) find evidence of an increase in the liquidity-risk premium in the U.S. bond market from 1997 to 1999, using the yield spread between on-the-run and off-the-run conventional 10-year Treasury bonds as a proxy for the lower bound of the liquidity-risk premium in Treasury Inflation Protected Securities (TIPS), which are U.S. inflation-linked bonds. On-the-run bonds are the most recently issued bonds and are considered to be highly liquid. Conversely, off-the-run bonds are older securities that trade less often and are relatively less liquid. Therefore, by comparing the yield spread between the liquid on-the-run and the less liquid off-the-run bonds with similar maturities, the value of liquidity can be approximated.[11]

The relative lack of liquidity of RRBs compared with conventional bonds also discourages arbitrage, contributing to a less-efficient market. The resulting lack of efficiency in the RRB market could in turn lead to persistent mispricing. Lack of liquidity in the secondary market, for example, may make it difficult for market participants to complete a short RRB transaction (borrow and sell now, with the hope of purchasing the bonds more cheaply in the future). Participants' difficulty in borrowing RRBs to execute a short sale has been greatly alleviated by the evolution of security lending, as pension funds and other large accounts now regularly lend securities from their portfolios in return for a fee. However, the current strong demand for RRBs and the lack of depth in the secondary market could make it more difficult to purchase RRBs in order to return the borrowed securities (i.e., unwinding the short sale). A difficulty in covering a short RRB position limits participants' ability to take advantage of possible market mispricing. Specifically, if the BEIR were significantly higher than expected inflation, participants would normally buy conventional bonds and sell RRBs until this mispricing was eliminated. However, a difficulty with purchasing RRBs (once the price has fallen closer to fundamentals) in order to exit from a short RRB position would imply that RRBs can remain mispriced[12] over the short term. An increase in supply or the anticipation of greater supply should act to moderate this effect over time.

Market segmentation and supply constraints

Côté et al. (1996) and Mayer (1998) argue that the BEIR may reflect not the overall market view of inflation expectations, but the view of a non-representative subset of investors. The argument that the RRB market is segmented among investors with different degrees of risk aversion in regards to inflation requires the supply of RRBs to be relatively inelastic. In other words, if only a small amount of inflation-linked debt exists, it is likely to be owned by those with the highest inflation expectations or the biggest need for inflation protection, or by investors who have some tax advantage that allows them to accept a lower yield. As the amount of debt grows, however, inflation-linked debt should increasingly be held by investors who more accurately reflect the average expectation of, and sensitivity to, inflation. In the short run, it is reasonable to consider supply as being constrained (e.g., by rigid government funding policies or the high fixed costs faced by corporations implementing an inflation-linked borrowing program). To date, the supply of these types of securities has been relatively unresponsive to changes in price. In the long run, however, supply should also adjust eventually to take advantage of lower funding costs.

Using expectations survey data from Watson Wyatt, the maximum and upper quartile cutoff of responses, along with the BEIR, are plotted in Chart 6. Until 1996, the BEIR is usually inside the upper quartile of inflation expectations, consistent with RRB investors not representing the average investor.[13] Subsequently, the BEIR falls below this range. The break in this relationship in 1996 coincides with the announcement of the launch of the TIPS program. Not only did this mean more global supply and expected future supply through government issuance, it may have raised expectations regarding the development of the corporate inflation-linked securities market and led to more interest in, or acceptance of, Canadian RRBs. As a

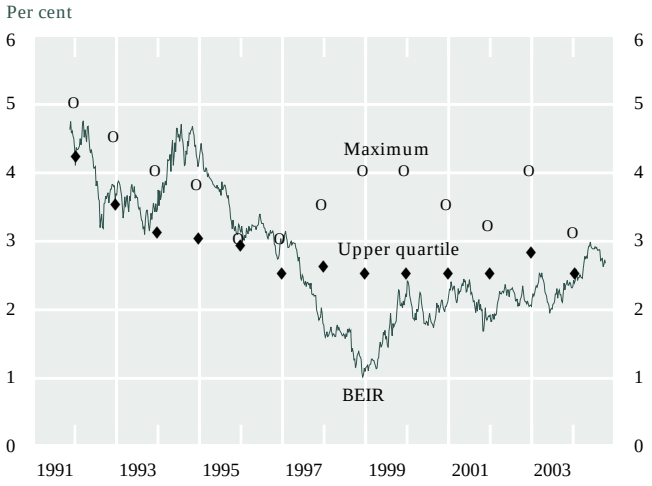
11. The high value of on-the-run U.S. Treasury bonds in the repurchase market may result in an upward bias in this measure of liquidity in the United States. Christensen, Dion, and Reid (2004) find little evidence of a liquidity-risk premium in Canada using a similar methodology. However, it is possible that this method of measuring liquidity is not particularly suited to the Canadian experience, since there is little difference in on-the-run and off-the-run securities.

12. The price distortion is in theory symmetrical and is dependent on demand conditions.

13. Note that the survey used for comparison may be subject to the same criticism, since respondents are drawn only from financial institutions and not from the whole population.

Chart 6

Upper Bound of Inflation Expectations



result, the degree of market segmentation may have diminished.

The Importance of Distortions Today: An Open Question

The correct interpretation of the high level of the BEIR in October 2004 and in particular of its movement towards the upper band of the inflation target remains an open question. A rise in long-term inflation expectations reflected in the BEIR would suggest that market participants do not expect the Bank of Canada to conduct monetary policy so as to contain inflation (an erosion of credibility). The most recent survey data (as of October 2004), however, do not show a similar increase in expectations, suggesting that perhaps the recent value of the BEIR reflects temporary market distortions rather than increasing inflation expectations or heightened inflation uncertainty. Supporting this argument, some market participants argue that a re-evaluation of equity risk by investors after the sharp declines in equity markets between 2000 and 2002 is driving strong demand for alternative means to hedge inflation and increase portfolio diversification (Canada 2003). This strong demand and the relatively fixed short-run supply of index-linked debt may have driven the real yields on RRBs temporarily below the long-run expected real interest rate, resulting in a higher measure of the BEIR even if expected inflation were unchanged. Consistent with this argument, the real yield declined from approximately 3 per cent in November 2003 to about 2.3 per cent in October 2004 (Chart 1). The elevated level of the BEIR might therefore be the result of a portfolio shift and could indicate that the RRB market is still highly segmented.

The correct interpretation of the high level of the BEIR in October 2004 and in particular of its movement towards the upper band of the inflation target remains an open question.

The high level of the BEIR is the result not only of an earlier decline in the real rate, but also of an increase in the yields of conventional Government of Canada bonds. In addition, the relatively stimulative stance of monetary policy, a strengthening in the global economy, and rising oil prices could all be contributing to higher inflation expectations or inflation uncertainty. However, while an increase in expectations or uncertainty cannot be dismissed, it is highly probable that the recent increase in the BEIR significantly exaggerates any change in expectations and/or uncertainty.[14] It remains to be seen whether alternative measures of inflation expectations (such as surveys) will fail to confirm an increase in inflation expectations or heightened uncertainty, as has occurred in the past.

The BEIR as a Measure of Credibility

If the BEIR's movements reflect inflation expectations or an inflation-risk premium, they should be a good indicator of monetary policy credibility. When the BEIR is evaluated as a measure of the credibility of monetary policy, the existence of an inflation-risk premium is not a drawback, since uncertainty about future inflation must reflect investors' views about the central bank's willingness and ability to take action to control future inflation. Since inflation uncertainty is positively correlated with the level of inflation or inflation expectations, the BEIR will tend to move

14. For example, to get a BEIR near 2.7 per cent, according to Table 3, inflation expectations would have to be 3 per cent for the next 15 years before returning to 2 per cent.

more than one for one with an increase in expected inflation. Either a lower, or a less variable, inflation-risk premium would be a sign of increased credibility.

If the premiums and distortions discussed in this article are unable to account for the movements in the BEIR over history, there is a higher probability that the BEIR was reflecting long-term expected inflation. However, over the 1990s, it is likely that most of these premiums and distortions were present in some form. Given these findings, there is reason to doubt that the BEIR was a good measure of credibility over this time period. However, over the period 2000Q1 to 2003Q4, both the BEIR and survey measures of inflation expectations were relatively stable, near 2 per cent. More precisely, the mean of the BEIR was 2.2 per cent, and it was between 1.8 and 2.6 per cent 95 per cent of the time (although week to week it is not uncommon to see changes of up to 17 basis points in either direction). If surveys are an appropriate benchmark, this suggests that the premiums over this period were small relative to the past, and that the BEIR has improved as a measure of the expected average rate of inflation. However, more recent signs of distortion make it more difficult to draw inferences about credibility. The continued development of the RRB market should eventually result in the BEIR becoming a more reliable indicator of the credibility of monetary policy.

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Forecasting Power

A good gauge of credibility is not necessarily a good forecast of inflation outcomes, especially if monetary policy reacts to measures of inflation expectations. However, there is some evidence from the United Kingdom in favour of using interest rate measures for forecasting inflation. Scholtes (2002) finds that the forecast accuracy of the BEIR, constructed using index-linked gilts (U.K. inflation-linked bonds) with a 2-year maturity, outperforms survey measures of expected inflation at a 2-year horizon. Other measures of inflation expectations derived using index-linked gilts in the United Kingdom have also been shown to possess predictive power for inflation at the 1- to 4-year horizon (Breedon 1995; Barr and Campbell 1997).

In Canada, RRBs are issued only with long maturities, and thus, the relatively short span of RRB history does not permit a comparison of the BEIR with the realized average rate of inflation over a 30-year horizon. Yet the BEIR should be influenced by expected inflation over many different horizons and, as a result, may contain useful information about inflation (CPI excluding taxes and core inflation) over a short to medium horizon. The results of the BEIR's forecasting performance over a policy-relevant horizon are shown in Table 4 . Over the entire sample, the BEIR has the worst forecast performance for CPI excluding taxes in terms of root mean-squared errors (RMSEs). Survey measures and even past average inflation rates yield lower RMSEs than the BEIR at all horizons examined. The volatility in the BEIR caused by premiums and distortions in the first part of the sample is one potential explanation for

Table 4

Root Mean-Squared Forecast Errors of the BEIR and Other Measures of Inflation Expectations for Total CPI Inflation, Excluding Taxes

	Forecast Horizon					
	Sample starting 1992			Sample starting 1998		
	1 year	2 years	3 years	1 year	2 years	3 years
BEIR	1.67	1.82	1.80	1.02	1.15	0.97
Naïve measures						
Inflation over the past 12 months	1.16	1.07	1.06	1.46	1.40	1.27
Inflation over the past 24 months	1.01	1.00	1.02	1.24	1.23	1.23
Inflation over the past 36 months	0.97	0.98	1.08	1.12	1.17	1.28
Inflation target	0.89	0.85	0.81	0.89	0.94	1.00
Survey measures						
6 months ahead[a]	0.85	0.84	0.79	1.02	1.10	0.94
2 years ahead[b]	0.86	0.92	0.90	0.93	1.10	0.94
6-10 years ahead[c]	0.85	0.86	0.95	0.79	0.79	0.89[d]

a. Quarterly Business Confidence Survey: Conference Board
b. Quarterly *Survey of Forecasters*: Conference Board
c. Semi-annual: Consensus Economics
d. Limited number of observations (10 or less)

its poor near-term forecast performance. The 6- to 10-year survey expectations have RMSEs that are roughly half as large as the BEIR and were much closer to the inflation target for the whole sample. The best forecast performance is dependent on the horizon, but comes from either surveys of expectations or simply using the inflation target as a forecast for future inflation. These results are actually reassuring, in the sense that the BEIR does not simply reflect changes in short-term expected inflation.

Conclusions

The merit of the BEIR as a measure of long-term inflation expectations is dependent on the importance of risk premiums and distortions and our ability to account for these factors. Having set out to consider whether the differences between survey measures and the BEIR can be explained by these various premiums and distortions, we argue that neither cash-flow mismatches nor term-varying inflation expectations can account for the difference. In addition, proxies of inflation uncertainty suggest that, while this premium did change over the sample, the timing did not coincide with movements in the BEIR. Futhermore, the liquidity-risk premium may explain part of the decline in the BEIR over the 1997 to 1999 period. Finally, supply constraints in the RRB market appear to be a significant part of the explanation of why the BEIR tends to deviate from survey measures on occasion. Evidence suggests that these premiums and distortions were less prevalent in the period 2000 to the end of 2003, but may again be present so far in 2004. The variability of the BEIR also declined during this period, but week-to-week movements can still be substantial, making the BEIR difficult to interpret on a high-frequency basis.

Because of the potential distortions and the difficulty accounting for them, it is premature to consider the BEIR a reliable measure of long-run inflation expectations. Despite these findings, the BEIR should not be completely dismissed. If distortions and premiums can be ruled out, or better accounted for, the BEIR would be a useful measure of monetary policy credibility. It represents a more timely and market-based alternative to survey measures and should, along with the continued development of the RRB market, eventually become a more reliable indicator of long-term inflation expectations.

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The Evolving Financial System and Public Policy: Conference Highlights and Lessons

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The Bank of Canada hosted its 12th annual economic conference in Ottawa on 4 and 5 December 2003. The subject of this conference was "The Evolving Financial System and Public Policy." Representatives from various public and private organizations joined Bank of Canada staff to discuss three key issues affecting the financial system: financial contagion, implications of bank diversification, and financial sector regulation. In this article, we report the highlights of the papers presented at the conference and the discussions around the presentations. The views of the conference panelists, who closed the conference with their perspective on the papers and the discussions, are also summarized. We conclude with key lessons for policy and directions for future research.[1]

Financial Contagion

The Bank of Canada works to promote a sound and stable financial system, one in which problems in one part do not trigger instability elsewhere. Financial markets and financial infrastructure arrangements are becoming increasingly interrelated and globalized. It is therefore important to understand the channels through which financial crises spread across institutions, sectors, and countries so that policy-makers can understand how to safeguard systems against contagion.

Three conference papers attempted to gain insight into the nature of contagion. **Santor** (2004) studies the extent to which Canadian banks have become globalized and how Canadian foreign-asset exposures have adjusted to crisis events. Using firm-level panel data from 1984 to 2003, the author finds that Canadian banks are very active globally, and that the composition of exposures has changed over the past two decades. In particular, Canadian banks now have lower foreign exposures in terms of deposits and loans but higher exposures in terms of foreign securities. The author finds that banks do not adjust their portfolios of foreign securities immediately in the presence of a crisis. Nor does a banking crisis in one country appear to influence whether banks continue to do business with countries that have similar characteristics.

Gobert, González, Lai, and Poitevin (2004) study the lending market under centralized and decentralized systems. The authors develop a general-equilibrium model of a competitive interfirm lending market in which firms can borrow or lend. They identify a source of inefficiency in this market that may lead to financial fragility. For instance, a liquidity shock can have a persistent component and can lead to firm failures that are inefficient. In this model, the authorities can help to eliminate this inefficient equilibrium by ensuring that there is sufficient liquidity in the system.

The discussant, Douglas Gale (New York University), was of the view that this paper represents a good step towards the goal of building models that can be used to analyze the welfare implications of financial system policies. More real-world institutional features must be included in such models, however, before that goal is achieved.

Gropp and Vesala (2004) take this field of study a step further by using market-based indicators to determine the probability that a European bank faces financial difficulty, given that other European banks are also

1. Conference papers and discussions are available on the Bank of Canada Web site at: <www.bankofcanada.ca/en/economic_conference2003/index.htm>. Proceedings of this conference will be published in 2004.

facing difficulty. They find significant evidence of contagion both domestically and across borders. This contagion appears to be typically generated by particularly concentrated interbank exposures. They also find that larger banks are the main sources and the main victims of cross-border contagion. The discussant of this paper, Maral Kichian (Bank of Canada), underscored various caveats to these conclusions, including the possibility that regressors in the estimated models might be endogenous. Nonetheless, their study provides a useful starting point for future research on this topic.

Bank Diversification

Central banks rely on the financial system to transmit the effects of monetary policy actions to the real economy. For this reason, it is very important to understand the implications of new business lines and changing strategies for pricing and diversifying risk. Two conference papers contributed to our understanding of the links between the changing behaviour of financial institutions and risk-return trade-offs. These papers suggest that diversification, encouraged to some extent by regulatory changes, has not always had beneficial implications for the risk-return trade-off.

Stiroh (2004) studies the implications for risk-adjusted profits of the shift in the activities of U.S. bank holding companies (BHCs) towards a wider range of financial services. This shift was encouraged by many factors, including regulatory changes, such as the Gramm-Leach-Bliley Act of 1999. This Act explicitly allowed bank holding companies and their subsidiaries to engage in a host of new activities, such as brokerage, portfolio advice, and underwriting. The author finds evidence of diversification benefits in terms of higher measures of risk-adjusted profitability for BHCs that earn most of their revenue from net interest income. However, these gains are usually offset by the increased exposure to volatile non-interest activities. These results are based on a sample of over 1,800 BHCs over the 1997Q1–2002Q2 period.

In a related paper, **D'Souza and Lai** (2004) study the effects of regional and industrial diversification in portfolios, and of diversification in business lines and financing sources, on the efficiency of Canadian banks. They construct a measure of efficiency using a portfolio-allocation approach. The authors find that bank efficiency is increased by diversification of business lines and financing sources; reduced by regional diversification; and unaffected by industrial diversification. These results are based on a sample of five major Canadian banks over the 1997Q1–2003Q3 period. The discussant, Varouj Aivazian (University of Toronto), found this approach an improvement over the existing literature because it explicitly takes into account the risk-return trade-off facing banks and, hence, the overall welfare of banks and depositors. The discussant also noted that, in future work, it may be useful to look at some of the model's assumptions that appear to be overly simplistic. For example, the model does not explicitly account for informational frictions or for non-pecuniary elements in bank returns that are not captured in price and market return data (e.g., credit rationing and the use of collateral).

These papers highlight the importance of studying diversification using measures that explicitly account for the risk-return trade-off. Discussant Christian Calmès (Bank of Canada) made the point that, if it is true that diversification does not always raise the risk-adjusted returns to banks, future work should concentrate on determining the reasons why banks are not making more profitable portfolio choices. At the same time, discussion by conference participants revealed many deficiencies in the data used (e.g., short sample periods, combining book and market value data, omitting some practices such as off-balance-sheet activities), pointing to a major challenge for this type of analysis.

Financial Sector Regulation

The Bank of Canada is very interested in how the regulatory environment, including the regulations themselves, supervision, or regulatory governance (the governance arrangements of the regulatory agencies themselves), can best promote macrofinancial stability. The regulatory environment is defined by the rules and incentives that influence the decisions of regulators, financial institutions, and non-financial actors. Getting the incentives right is important for sound economic performance, and these incentives must adapt to a changing financial landscape. Several aspects of this issue were addressed at the conference, including the relationship between governance and financial sector soundness, the theoretical basis of bank regulations for capital requirements, and the implications of bank capital requirements for the transmission of monetary policy.

Das, Quintyn, and Chenard (2004) study the relationship between regulatory governance and the soundness of the banking sector. They construct indexes of banking sector soundness, regulatory governance, and public sector governance for approximately 50 countries. They then test whether these indexes are related to the capacity of the banking sector to withstand shocks. Their regression results indicate that good regulatory governance has a statistically significant, positive influence on banking sector soundness. The results further indicate that macroeconomic conditions, as well as the quality of political institutions and public sector governance, also contribute to the soundness of the banking system. The main lesson from this paper for policy-makers is that good regulatory governance will pay off in the soundness of the domestic financial system. The authors suggest that future work could extend these tests beyond the banking sector to the entire financial system.

Although he agreed with the main conclusions of the paper, the discussant, Claudio Borio (Bank for International Settlements), mentioned various limitations in the study's empirical exercise, most of which were related to a lack of adequate data. Developing better multi-country data will be key for making further progress with this type of analysis.

Dionne's (2004) analysis of the optimal design of regulation for the banking sector is based on an extensive review of the literature. He argues that bank regulation can be justified in principle by the possibility that bank runs could prevent banks from playing their crucial role as the main provider of liquidity to the economy. The author views deposit insurance as one type of regulation capable of mitigating that risk. That said, Dionne thinks that national authorities should continue to improve deposit insurance by better aligning its pricing with the risks faced by individual banks. Authorities should also explore the possibility of using other regulatory tools, such as subordinated debt, and should work to improve bank governance. With respect to minimum capital-adequacy requirements, Dionne argues that there is little evidence that this approach reduces bank risk and some evidence that it may be the source of costly distortions.

The discussant, Paul Beaudry (University of British Columbia), argued that Dionne's paper, and the literature in general, put too much emphasis on bank runs as the primary source of problems in the banking industry. He considers the main difficulty with the banking system to be one of delegated monitoring (e.g., investors delegating to banks the authority to monitor business loans).

Gale (2004) voices concerns similar to Dionne'sregarding capital-adequacy requirements. The author built a simple model of an economy with a financial sector in which banks play a pivotal role owing to incomplete markets. The chief conclusion to be drawn from this model is that imposing constraints on capital adequacy does not improve overall welfare because market forces ensure that banks choose the right capital structure in equilibrium. Extensions of the basic model generate cases where the allocation of resources determined by the market is not necessarily optimal, but minimum capital requirements still do not seem to improve welfare (and, in fact, may actually reduce it). While this work raises important questions, the applicability of its findings for policy may be limited by the simplicity of the model. In particular, the discussant, Vincenzo Quadrini (New York University), noted that this model may not capture all the relevant externalities associated with the functioning of financial markets.

Changes in capital requirements can, in principle, affect how banks price risk and change the cyclical properties of bank capital. **Van den Heuvel** (2004) examines how capital-adequacy requirements alter the role of bank lending in the transmission of monetary policy. He constructs a dynamic partial-equilibrium model of bank asset and liability management that incorporates risk-based capital requirements. This model shows that the effects of monetary policy on bank lending depend on the capital adequacy of the banking sector and that shocks to bank profits can have a persistent effect on lending. Bank capital affects bank lending even when the regulatory constraints on bank capital are not binding. Given new capital requirements under Basel II and their potential to change the dynamics of bank capital, more research in the area of the interaction between bank capital standards and monetary policy is very important. The discussant, Césaire Meh (Bank of Canada), argued for the importance of future research using general-equilibrium models.

Chant (2004) focuses on the governance of Canadian banks, investigating whether linkages between bank boards and the boards of non-financial corporations influence the pattern and performance of bank lending. Based on a preliminary exploration of Canadian data on bank loans, board linkages, and credit ratings

over the 1996 to 1998 period, he reaches four main conclusions: i) Canadian banks are more likely to lend to corporations with which they share board linkages than to corporations linked with other banks; ii) the tendency to lend to linked corporations is stronger where the link involves a corporate officer than where it consists of shared directors; iii) there is weak evidence that corporations that receive loans from banks linked by officers have a higher probability of experiencing a downgraded credit rating than corporate borrowers in general; and iv) there is no evidence that the credit-rating experience of borrowers who are linked to the lending bank through directors differs from that of other borrowers. The author points out that more work is needed to test the robustness of these results, particularly given the short sample period used in the analysis. Future research could also focus on the factors that may be driving these results, including the possibility that there may be informational advantages to banks from corporate links.

Panel Discussion

The panel discussion, featuring Angela Redish (University of British Columbia), Charles Freedman (Carleton University), and Claudio Borio (Bank for International Settlements), provided an excellent forum for a general discussion of the conference papers. Aside from the specific comments on papers noted above, the discussion included such issues as the notion of systemic risk implicit in the conference papers, the state of the models used to address this notion, and the role of the central bank in pursuing this line of research.

Freedman linked the conference papers to the two main reasons why the Bank of Canada has, since its inception in 1935, been interested in research on issues affecting the financial system, even though it does not have regulatory or supervisory responsibilities for individual financial institutions. Such research helps the Bank, first, to gain a better understanding of how monetary policy is transmitted through the financial system to the real economy; and, second, to fulfill its role as an adviser to the government on the periodic revisions of legislation governing financial institutions. Freedman and Borio agreed that central banks have tended to emphasize the asset side of balance sheets in their recent research on the transmission mechanism, as in the Van den Heuvel paper, but should also remain concerned with the liability side in work on issues of financial stability.

Borio commented on the notion of systemic risk implicit in the conference papers. Systemic risk results when the failure of an individual institution leads to broader financial instability. The failure occurs because of an exogenous shock to liquidity or asset values within a fragile financial structure. Borio points out that this notion of risk is problematic, in part because it is static in nature and because it treats risk as exogenous. In his view, this notion does not correspond well with the reality that financial instability tends to build up over time and is endogenous to the state of the economy, with its origin not so much in contagion, but in the shared exposures of financial firms to common risk factors. These common risk factors are intimately linked to the business cycle, leading to a financial system that is excessively procyclical. The implication of this alternative view of risk is that policy-makers should promote the prudential operation of the entire regulatory and supervisory framework, rather than focusing on the risk profiles of individual institutions.

Redish noted that the answers to the questions addressed in some of the conference papers were rather inconclusive, which was perhaps a reflection of the early stages of development found among theoretical and empirical models. She pointed, for example, to the lack of support in theoretical models for key elements in the financial sector, such as bank capital requirements and deposit insurance. She urged the development of a framework to organize future research in this area, suggesting as a possible starting point an understanding of why the financial system differs from other sectors in the economy.

The panelists underscored how important it is for both central banks and academics to research issues relevant to the financial system. The topic of bank diversification and consolidation, for instance, was viewed as raising important issues that merited future research. Borio concluded from the work on diversification that benefits may exist, but that they are not as great as business people would have us believe. Freedman drew the same conclusion, adding that the banking sector might be experiencing "pendulum swings" between consolidation and divestiture similar to those seen in the non-financial corporate sector. The outstanding question is, why have the recent trends towards conglomeration continued in recent years if there are no benefits to such a strategy?

Generally, the panelists saw a role for central banks in assessing and commenting on developments in the financial system, even though the issues are not their

direct responsibility. Borio and Freedman advocated a role for central banks in commenting on such developments because of their ability to take the long-run view. That said, Freedman added the caveat that such comments are often misinterpreted or ignored by the markets.

Conclusions

The conference papers highlight the important interaction between financial governance and financial and economic activity. For example, there is compelling evidence that good regulatory governance is key to the sound functioning of the financial system. Also, there is evidence that the regulation of bank capital can have important implications for the portfolio choices of banks and for the monetary policy transmission mechanism.

As the conference panelists noted, however, the conference yielded more questions for future research than clear policy recommendations. For instance, the papers presented by Dionne and Gale underscore the need for further research on the appropriate design and effects of bank-capital requirements. More work in the area of contagion is also needed to understand how shocks are propagated through the financial system.

In pursuing this work, it will be important to emphasize the development of theoretical and empirical models that include key real-world characteristics and that could be used to guide policy-makers.

List of Conference Papers

The papers cited in this article will be published in 2004 in the conference volume, titled, *The Evolving Financial System and Public Policy.* Proceedings of a conference held by the Bank of Canada, December 2003. Ottawa: Bank of Canada.

Chant, J. "Corporate Linkages and Bank Lending in Canada: Some First Results."

Das, U., M. Quintyn, and K. Chenard. "Does Regulatory Governance Matter for Financial System Stability? An Empirical Analysis."

Dionne, G. "The Foundations of Risk Regulation for Banks: A Review of the Literature."

D'Souza, C. and A. Lai. "Does Diversification Improve Bank Efficiency?"

Gale, D. "Notes on Optimal Capital Regulation."

Gobert, K., P. González, A. Lai, and M. Poitevin. "Endogenous Value and Financial Fragility."

Gropp, R. and J. Vesala. "Measuring Bank Contagion Using Market Data."

Santor, E. "Banking Crises, Contagion, and Foreign-Asset Exposures of Canadian Banks."

Stiroh, K. "Revenue Shifts and Performance of U.S. Bank Holding Companies."

Van den Heuvel, S. "Does Bank Capital Matter for the Transmission of Monetary Policy?"

Summary of the G–20 Workshop on Developing Strong Domestic Financial Markets, 26–27 April 2004

Joerg Stephan, Deutsche Bundesbank, and James Powell, Robert Lafrance, and James Haley, Bank of Canada

The Group of 20 (commonly known as the G–20) brings together representatives from the finance ministries and central banks of 19 member countries from every region of the world as well as the European Union (EU). Officials from the International Monetary Fund (IMF) and the World Bank also participate in the G–20. Established in 1999, the G–20 is an informal forum that seeks to promote an open and constructive dialogue among major industrial and emerging-market economies on key issues related to the international monetary and financial system. Since 2002, the chair of the G–20 has rotated on an annual basis. Germany holds the 2004 chair.[1] In 2005, the chair will pass to China.

In April 2004, the Deutsche Bundesbank and the Bank of Canada co-hosted a G–20 workshop in Ottawa titled, "Developing Strong Domestic Financial Markets." The workshop broadened and deepened earlier work by deputies of finance ministers and central bank governors, launched in 2003 under the Mexican chair, on the importance of building institutions in the financial sector that will foster economic development and growth. At the Ottawa workshop, G–20 representatives, prominent academics, market participants, and members of international financial institutions met to share experiences and explore the role that robust domestic financial markets can play in economic growth and development and, where possible, to develop policy recommendations.

General Summary

Participants agreed that strong domestic financial markets are a key factor in economic growth and development, and that appropriate policies, institutions, and incentives are at the heart of market development. There was also a consensus that strong local banking systems and securities markets reduce countries' external vulnerability through enhanced collection and better allocation of domestic savings and by attracting foreign investment in instruments denominated in domestic currency as an alternative source of external funding. It was agreed that currency mismatches (i.e., foreign currency liabilities and domestic currency assets) were a common element in recent financial crises in emerging-market economies. It was also agreed that such mismatches should be assessed by examining the discounted present value of a country's future income and expenditure flows under alternative exchange rate assumptions. Participants broadly supported the sequence of market reforms: first, establish sound macroeconomic policies; then liberalize domestic financial markets while maintaining prudential supervision and regulation; next, open the current account; and, finally, eliminate restrictions on capital movements, starting with the liberalization of long-term flows. Questions were raised, however,

1. For more information on the G–20, please consult the G–20 Web site at http://www.g20.org. Member countries include Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, the United Kingdom, and the United States. Canada chaired the G–20 from its inaugural meeting in December 1999 to the end of 2001. In 2002, the group was chaired by India, and in 2003 by Mexico.

concerning the speed of liberalization. Participants broadly endorsed the concept of exchange rate flexibility for countries with widely opened capital accounts, agreeing that a high degree of exchange rate flexibility provides an incentive to monitor and control currency mismatches.

It was also recognized that, over the past decade, many emerging-market economies have made substantial progress in strengthening their domestic financial markets. Local bond markets are now the dominant source of funding for governments. There has been a surge in domestic corporate bond issues as well, although progress has been slower in this segment of the market. A driving force behind the development of local securities markets has been the rapid growth of non-bank institutional investors, in particular, pension funds in Latin America and insurance companies in Asia, which have a strong appetite for long-term investments, given the long-term nature of their liabilities.

Despite the significant progress that has been made in improving domestic financial markets in recent years, G–20 members recognized that currency mismatches will remain an important source of vulnerability for the foreseeable future and that further policy efforts are necessary to contain risks. Co-operation in the development of regional financial markets could also be fruitful, especially for smaller markets.

Participants agreed that further work is necessary to strengthen domestic financial markets. There was also broad agreement that the continued sharing of experiences among the G–20 countries is an important avenue for advancing this work. Areas deemed critical for fostering strong domestic financial markets included the following:

i) Sustained sound macroeconomic policies were identified as an essential precondition for the development of domestic banking systems and bond markets, especially the ability of domestic borrowers to issue long-term debt denominated in domestic currency. Appropriate incentives were also viewed as key, with most participants endorsing a substantial degree of exchange rate flexibility for countries with liberalized capital movements as a means of encouraging better management of currency mismatches.

ii) Further work is required to strengthen the financial infrastructure, focusing in particular on implementing and enforcing internationally recognized codes and standards, including those related to corporate governance and transparency. As well, robust payments and settlement systems should be established. Accounting rules should not discriminate against borrowing in domestic currency relative to foreign currency borrowing. Strong contract law and property rights are also essential for market development.

iii) Work must continue on strengthening banking systems because strong banking systems and strong securities markets complement each other. Many participants also agreed that foreign bank entry would help to increase local funding of domestic business and to reduce currency mismatches.

iv) Other practical steps to reduce currency mismatches and to strengthen domestic bond markets include more efforts by governments to reduce the proportion of foreign-currency-denominated or exchange-rate-linked debt in their total debt, and the establishment of a domestic benchmark yield curve.

v) Prudential oversight must take currency mismatches into account from both a micro and a macro perspective.

Session 1: Challenges in the Absence of Strong Domestic Financial Markets

Presenter: Mr. Philip Turner, Bank for International Settlements

Mr. Turner focused his remarks on currency mismatches, an important factor in triggering or aggravating financial crises in emerging-market economies.[2] Currency mismatches arise when borrowers incur foreign currency liabilities to finance domestic activities. In the aftermath of large exchange rate depreciations, economies with currency mismatches can experience serious adverse effects. Financial intermediaries can come under pressure, owing to mismatches in their own balance sheets or to corporate insolvency. This, in turn, can lead to a decline in economic activity.

Mr. Turner took issue with the concept of "original sin," an hypothesis which traces currency mismatches to a fundamental inability of emerging markets to borrow abroad in their own currency (Eichengreen and

2. Mr. Turner drew from a recent book that he co-authored with Morris Goldstein, *Controlling Currency Mismatches in Emerging Markets* (2004).

Hausmann 1999; Eichengreen, Hausmann, and Panizza 2003). While he agreed that very few emerging-market economies are able to issue debt abroad in their own currency, he argued that it was important to take a broader view of currency mismatching and its implications. It is important to look at the currency of denomination of all debts, including local bank lending and debt contracts, and to evaluate the impact of a change in the exchange rate on the discounted present value of all future income and expenditure flows.

Mr. Turner developed a measure of the aggregate effective currency mismatch (AECM) as a stress test for an economy in the event of a large currency depreciation. The AECM consists of three elements: net foreign currency assets, exports of goods and services, and the foreign currency share of total debt. Using this indicator for important emerging-market economies, he noted that China and India had avoided aggregate mismatches, while other Asian economies that had been vulnerable in 1997 had now virtually eliminated their aggregate mismatch. However, Argentina, Brazil, and Turkey continued to have mismatches in 2002 and thus remained vulnerable to a large depreciation of their currencies. He also noted that Brazil had made substantial progress in limiting the issuance by the government of dollar-linked paper.

Finally, Mr. Turner outlined an agenda for a six-step domestic policy that would reduce the vulnerability of emerging-market economies with open capital markets to exchange rate depreciation. This included a high degree of exchange rate flexibility (combined with a monetary policy that targets inflation) to remind players of exchange rate risk; greater transparency and better data in order to facilitate the monitoring of currency mismatches; government borrowing only in local currency to reduce currency mismatches in the economy as a whole and to improve macroeconomic discipline; foreign bank entry to increase the share of local currency lending and to encourage better banking skills; elimination of impediments to bond-market development; and increased "mismatch awareness" as part of prudential oversight.

Discussants: Dr. Alexandre Schwartsman, Central Bank of Brazil, and Dr. Erdem Basci, Central Bank of Turkey

Mr. Schwartsman agreed with Mr. Turner's thesis, endorsed his policy recommendations, and argued that a country's future lies in the hands of policy-makers. Good domestic economic policy will permit emerging-market economies to reduce their vulnerability to currency mismatches. He contended that the development of Brazil's local-currency bond markets was undermined by several factors, including uncertainty over property and savers' rights as well as macro policy. He noted that Brazil has taken steps to reduce its vulnerability by allowing its exchange rate to float and by decreasing the amount of dollar-linked bonds issued by the government. Foreign banks are also welcome in Brazil.

Mr. Basci echoed many of Mr. Schwartsman's comments, noting that the real origin of Turkey's vulnerability has been government deficits. Like Brazil, Turkey adopted a flexible exchange rate, which has led to improved risk management. He also noted that while maturities on Turkish debt instruments were short, they have been lengthening. He updated Mr. Turner's AECM analysis for Turkey, noting that Turkey had eliminated its currency mismatch in 2003, owing to a decline in foreign currency government debt. A decrease in domestic real interest rates in recent years caused by a fall in domestic inflation has encouraged a shift away from foreign currency borrowing to local currency borrowing.

General discussion

Participants debated whether currency mismatches can be significantly reduced by appropriate economic policies and institution building in emerging-market economies or whether they are beyond the control of policy-makers. There was a broad consensus that the original-sin explanation for currency mismatches was too narrow, or even unfounded. While small industrialized countries, with few exceptions, are unable to issue international bonds in their own currency, they have been able to develop strong banking systems and deep local bond markets that attract significant foreign interest. It was further noted that countries with large trade surpluses or high reserve holdings are perceived as more capable of sustaining currency mismatches than those with weak payments and reserves positions.

Most participants appeared to endorse the policy recommendations outlined in Mr. Turner's presentation, although it was evident that the call for a high degree of exchange rate flexibility is most relevant for countries that have already widely liberalized their capital account.

Session 2: Financial Intermediation and Economic Growth

Presenters: Professor Gerard Caprio, World Bank; and Professor Martin Hellwig, Max Planck Institute for Research on Collective Goods

Professor Caprio surveyed the evidence on the contribution of financial sector development to economic growth. Studies indicate that sound financial institutions and markets can make an important contribution to growth, mainly by improving productivity through a more efficient allocation of savings. Having said this, neither the financial structure per se (i.e., reliance on financial intermediaries vs. capital markets) nor the nationality of financial services providers matters for growth. Thus, it is better to build a solid financial infrastructure than to aim for a particular model.

The key is to recognize that well-functioning markets need both accurate and timely information and strong legal and regulatory underpinnings. To get the basics right, the authorities have to be aware of the incentives that an institutional structure can create, for good or bad. In practical terms, this means that supervisors of the financial system must be both publicly accountable and independent of the institutions that they regulate. While technical expertise and technology to reduce informational and transactions costs in the financial sector can be bought, the legal framework must be developed within the country. Experience shows that legal frameworks that protect outside creditors/investors favour financial development and investment.

In a complementary presentation, Professor Hellwig focused on long-term sustainable growth. He made three major points. First, the chief impetus today for long-term growth is innovation, financed in large part by risk capital (venture capitalists and stock markets, notably in the United States). In contrast, the second industrial revolution, which was geared to exploiting scale economies (mass production), was fuelled by internal finance. Consequently, the best financial structure had to take into account the characteristics of the main drivers of economic growth. Second, the availability of information and the nature of contractual arrangements affect the efficiency of the financial system. Asymmetric information leads to agency problems, favouring debt finance and monitoring of borrowers by financial intermediaries. When information is more widely available, capital markets function more efficiently. Incentives, rewards, and controls (via regulation) condition risk taking, as well as inclinations for misreporting, and even fraud. Third, while financial innovations such as securitization and derivative markets have allowed a greater diversification of risk, the extent to which risks have been shifted to contractual savings that are managed by pension funds and insurance companies needs to be examined. If they are bearing too much risk now, moving from public to private sector pension schemes will be less attractive.

Discussants: Mr. Glenn Stevens, Reserve Bank of Australia; Mr. Edward Gramlich, Board of Governors of the Federal Reserve System; and Dr. Akira Ariyoshi, Japanese Ministry of Finance

Mr. Stevens concurred with both presentations. He noted that Australia had benefited from financial reforms by promoting competition and by accepting flexibility in financial prices. He encouraged emerging-market countries to move faster on reforms, acknowledging that training and retaining qualified personnel for prudential supervision is a challenge. Mr. Gramlich also agreed with the presenters' comments. He added that countries with both banking and capital market systems were more resilient to shocks. He also stressed the importance of the legal system and the continuing need to adapt it to financial innovation. Mr. Ariyoshi spoke of the difficulty of moving the Japanese banking culture from a relationship basis to an arm's-length basis. Despite substantial reforms, including financial deregulation and improved disclosure and accounting rules, the actual shift in market structure has been slow to date. Japan's experience has been that building a new financial system is resource-intensive and that the benefits are slow to emerge. Perseverance is required; otherwise, a crisis may be needed before significant reforms are considered.

General discussion

Several points were raised in the general discussion. It was noted that, since the financial resources of emerging-market economies are limited, increasing domestic savings ratios in poorer countries is important, and greater official development assistance would be welcomed. For many developing countries, there is also the challenge of identifying viable projects that might interest domestic or foreign investors. With respect to institution building, it is important to get things right the first time. The development of domestic markets was also viewed as most relevant for countries with high savings rates, such as those in East Asia.

Session 3: The Sequence of Financial Liberalization and Supervisory Reforms

Presenter: Professor Ronald McKinnon, Stanford University

Professor McKinnon placed financial crises in an historical perspective. Before the Great Depression, economic and financial policies were dictated by the exigencies of the gold standard. Large-scale capital flows prevailed, and financial crises were common. For the most part, however, these crises were resolved relatively quickly, through a combination of fiscal consolidation, a reaffirmation of sound monetary policy, and lending by international banking houses acting as crisis managers.

The Great Depression discredited the gold standard, which led to the Bretton Woods system of pegged, but adjustable, exchange rates following World War II. Most countries resorted to restrictions on capital accounts and domestic financial repression to maintain the pegged rates and finance domestic development.

These policies had undesirable effects. Capital controls led to the growth of unregulated markets as banks sought to evade them, while the widespread adoption of explicit or implicit deposit insurance encouraged banks to reduce their capital/asset ratios. And, as capital controls and domestic regulations were progressively eased or evaded through the 1980s, these factors combined to lead to overborrowing. Financial repression was replaced by financial crashes.

These weaknesses underscored the importance of following the appropriate order of financial liberalization. According to Professor McKinnon, the starting point is fiscal balance, followed by domestic financial liberalization and the development of prudential bank regulations. Current account liberalization should proceed in tandem with domestic financial liberalization. Capital account liberalization should be the final element of the sequence, with long-term capital flows, especially foreign direct investment, liberalized before short-term flows (McKinnon 1993).

To minimize the risk of financial crises, Professor McKinnon favoured a new monetary order to stabilize exchange rates, using the U.S. dollar as the key currency. He recommended that debtor emerging-market economies encourage illiquid forms of capital inflows, such as direct foreign investment; develop their domestic financial markets; lengthen the maturity of obligations linked to the exchange rate; limit the net foreign exchange positions of banks; and use capital controls if bank regulations are weak. Creditor emerging-market economies, which, he argued, suffer from "conflicted virtue" should do much the same thing.[3] However, they should encourage less liquid capital outflows. He also recommended that these economies "nationalize" capital outflows through national savings programs (citing as an example Singapore's Provident Investment Fund) or reserve accumulation. To make the system function, obligations would also be imposed on the United States, whose currency would anchor the system. The United States would be required to maintain open capital markets, focus policy on stabilizing the U.S. price level rather than the exchange rate (and refrain from pressuring others to change their rates), and reduce its trade deficit through higher domestic savings.

Discussants: Mr. Ruogu Li, People's Bank of China; and Mr. Pierre Jaillet, Banque de France

Mr. Li noted that, before 1978, the People's Bank was the only bank in the country. Today, the Chinese financial system includes not only several domestic commercial banks, but 178 foreign bank branches or subsidiaries and 120 other foreign financial institutions. Capital markets have also grown rapidly, with more than 1,400 companies now listed on various exchanges. While many capital restrictions remain, Mr. Li noted that important steps have been taken to liberalize the system, including the introduction of a single, unified exchange rate in 1994. Moreover, of 43 capital account transactions monitored by the IMF, eight have been liberalized, while 11 other restrictions have been eased. The others will be gradually relaxed, depending in part on the strength of the banking system. In this respect, Mr. Li stressed the importance the Chinese authorities attach to financial stability and the sequencing of reforms.

Mr. Jaillet also acknowledged the degree to which the liberalization of the French financial sector followed the McKinnon "order." The starting point, he said, was the creation of deep, liquid markets for public debt instruments. Consistent with the McKinnon paradigm, however, a commitment to long-run fiscal discipline was necessary to reduce the risk premium on long-term bonds. At the same time, wide-ranging

3. Creditor countries are virtuous because they are large savers, but have conflicted feelings about their virtue because the implications of their virtue—continuous upward pressure on their exchange rate—is undesired.

reform of the legal environment, as well as strengthening the prudential regulatory and supervisory framework, contributed to the development of domestic capital markets. These, in turn, necessitated the adoption of a new market-led framework for monetary policy. Mr. Jaillet also noted that restrictions on current account transactions had been liberalized before the 1980s, when gradual capital account liberalization began as part of the elimination of controls that was entailed in the integration of European economic and monetary systems. Drawing on the French experience, Mr. Jaillet concluded that trade liberalization should go hand in hand with domestic financial liberalization. Moreover, financial liberalization should be carried out cautiously and gradually, with the sequencing of reforms tailored to the specific nature of the economy.

General discussion

There was broad agreement with Professor McKinnon's proposed sequence of reforms, especially the proposition that sound macroeconomic policies are a prerequisite for successful financial liberalization. There was less agreement, however, on his recommendation of a system of fixed exchange rates based on the U.S. dollar. Some participants questioned the claim that creditor emerging-market economies that are subject to "conflicted virtue" would face continuous pressure to appreciate their currencies, resulting in deflation. While extrapolative expectations might pose a potential risk if the proposed revaluation failed to eliminate the gap between the actual exchange rate and the perceived equilibrium rate, it was not clear why there would be expectations of further appreciation once the perceived equilibrium rate was reached.

With respect to China, there was a broad consensus that bank balance sheets would have to be strengthened before the authorities proceeded with further capital account liberalization. Yet some participants expressed concerns that too little attention had been paid to exchange rate issues: a more flexible exchange rate regime would reduce the risks associated with capital account liberalization in China. It was also noted that it is difficult to foster the use of hedging instruments under fixed exchange rates. Mr. Li responded by noting that the goal of the Chinese authorities is to liberalize long-term capital flows before short-term flows. Moreover, the exchange rate should reflect overall competitiveness, not just the competitiveness within the traded-goods sector. He opined that the current exchange rate is broadly appropriate. Professor McKinnon also observed that, in the current Asian context, which is characterized by a *de facto* currency zone, it might be disruptive if only one country moved to a floating rate.

Keynote Address

Professor Barry Eichengreen, University of California, Berkeley

In the keynote address to workshop participants, Professor Eichengreen noted that there are two views on the extent to which local financial markets have developed in emerging-market economies in Asia. An optimist would highlight the growth in the size of local markets, the growing diversity of issuers since the 1997–98 Asian crisis, and the expectation that rapid growth would continue in light of strong demand for investment instruments, given high domestic savings ratios. A pessimist, however, would stress the limited number of high-grade borrowers and the lack of liquidity, as well as the fragmented nature of local markets and regulatory obstacles. Professor Eichengreen suggested that the truth probably lies somewhere between these two extremes.

He also noted that Asian governments have done much to build the necessary infrastructure to develop their bond markets. At the national level, among other initiatives, calendars for government bond issues have been established. Effort has been made to address the supply / demand mismatch by encouraging issues of corporate bonds. At the regional level, co-operation among various groups has led to the launch of the Asian Bond Fund, which is helping to address the problem of small markets.

Professor Eichengreen argued strongly from a number of perspectives in favour of greater exchange rate flexibility in Asia. He noted that the 1997–98 Asian crisis demonstrated that growing capital account convertibility, while a necessary requirement for deep local and regional markets, is risky in the absence of exchange rate flexibility. Exchange rate flexibility would encourage the development of financial instruments for hedging purposes. Finally, by severing the link with the U.S. dollar, the present high correlation between Asian and U.S. yields would diminish, increasing the attractiveness of Asian securities for those seeking to diversify their portfolios.

Session 4: Infrastructure Building and Governance

*Presenters: Dr. Amar Bhattacharya, World Bank; and Ms. Sabine Miltner, Institute of International Finance (*IIF*)*

Dr. Bhattacharya focused his remarks on policies and institutions. He underscored the importance of supervisory principles relating to banks, securities markets, insurance, and the payments systems that have been established by the international standard-setting bodies. He also noted the importance of principles dealing with corporate governance, audit and accounting standards, insolvency, and creditor rights, as well as money laundering and the financing of terrorism. While G–20 countries have largely adopted internationally accepted standards, Dr. Bhattacharya thought that attention now needs to be directed towards enforcement. More broadly, he believed that reforms are just beginning to penetrate business culture in many emerging-market economies.

Dr. Bhattacharya also contended that financial markets in many emerging-market economies suffer from a lack of transparency. Progress is required at all levels: non-financial corporations, financial institutions, and the supervisory and regulatory authorities. Opaque markets are also reinforced by entry barriers, a lack of contestable markets, and government ownership. Opaque ownership structures and non-arm's-length transactions also contribute to deficient private sector monitoring.

Dr. Bhattacharya concluded with an examination of the legal issues pertaining to emerging markets. He noted that G–20 countries have different legal systems (e.g., common law vs. civil code) that gave rise to different practices. While some traditions provide stronger legal protections than others, markets have often developed compensatory devices.

In a complementary presentation, Ms. Miltner examined corporate governance in emerging-market economies from the viewpoint of the investor community. Most broadly, she noted that countries that protect their shareholders tend to have larger capital markets because investors are willing to pay a premium for companies with good corporate governance. Drawing on principles established by an IIF working group on corporate governance and transparency, Ms. Miltner stressed five key elements of good governance: minority shareholder protection; the structure and responsibility of boards of directors; accounting and auditing; transparency of ownership and control; and the regulatory environment. She also noted that corporate governance is a process (IIF 2002, 2003). Investors are aware that it takes time to implement good corporate governance practices. What is important is that there be ongoing progress.

Finally, Ms. Miltner turned her attention to the state of corporate governance in major emerging-market economies, noting that they share some common features. First, ownership and control structures are often opaque, contributing to a lack of accountability. As examples, she cited the oligarchs in Russia, the *chaebols* in Korea, and family-based conglomerates in Indonesia. China, too, poses challenges, given its mix of private- and state-controlled firms. Second, boards of directors frequently lack independence. Third, disclosure is often inadequate. Finally, enforcement is often weak, reflecting, for example, a lack of suitably trained judges and well-equipped regulators.

Discussants: Ms. Shyamala Gopinath, Reserve Bank of India; and Dr. Mikhail Senatorov, Bank of Russia

Ms. Gopinath provided a comprehensive overview of India's regulatory framework, underscoring the importance of a sound framework for market development. She noted the sequence of planned market reforms that has occurred since the early 1990s. These have included the liberalization of foreign exchange markets, the deregulation of interest rates, the development of a government securities market, and the introduction of an over-the-counter (OTC) market in derivatives. Interest rate futures were introduced in 2003. A gross real-time settlement system was also recently introduced to provide real-time payment finality. Thus, over the past decade, Indian financial markets have been transformed, moving from fixed exchange rates and administered interest rates to market-determined rates with efficient price discovery and a well-developed payments and settlement system. Some remaining issues, such as permitting the short-selling of government securities, will be addressed at the appropriate time. Discussion is currently underway concerning the elimination of the legal ambiguities associated with OTC derivatives and netting legislation. Work is also underway to move to screen-based trading of government securities.

In his overview of the Russian payments system, Dr. Senatorov noted that there are two major players in Russia, the Bank of Russia and a private payments system. Payments processed through the central bank account for slightly less than 50 per cent of payments by volume and 60 per cent by value. While almost all of these payments are electronic, they have not been centralized. Instead, most transactions were processed regionally. The majority of payments are in the form of payment orders: payment by cheque is almost unheard of. Since 2001, payment cards have grown rapidly in popularity in Russia. Virtually all are debit cards and are used mostly for cash withdrawals. The Russian authorities envisage moving towards a two-tiered payments system, including a "mass payments" system and a gross real-time settlement system.

General discussion

In the ensuing general discussion, participants generally concentrated on issues related to corporate boards and disclosure. Many participants commented on the importance of a corporate culture that supports appropriate risk management. Concern was also expressed regarding the ability of firms to find competent, independent board members. One participant observed that this is a problem even in major industrialized countries. Dr. Bhattacharya concurred, noting that, in many emerging-market economies, a shortage of qualified people in an environment of interconnected businesses makes it very difficult to find qualified individuals who are truly independent.

There was also considerable discussion on the appropriate degree of transparency. While participants broadly agreed that greater disclosure is important, some wondered whether there could be too much disclosure. In certain industrialized countries, rising disclosure requirements have acted as an incentive for publicly held companies to go private. Ms. Miltner responded that greater disclosure is something investors wanted. While a case for too much disclosure could be made in theory, the issue was irrelevant in emerging-market economies.

Session 5: Building Strong Local Securities Markets

Presenter: Dr. Donald Mathieson, International Monetary Fund

Dr. Mathieson outlined the results of an IMF study, *Emerging Local Securities and Derivatives Markets* (Mathieson et al. 2004). He reviewed the experience with capital-flow volatility in the 1990s, noting that crises in emerging-market economies resulted both from problems in these economies and problems in mature markets that spilled over to them. In response, emerging-market economies have adopted numerous complementary strategies to protect themselves. Among them are : i) better external asset and liability management, including a buildup of international reserves; ii) continued use of capital controls; iii) adapting policies and reinforcing supervision to the degree of capital account openness; and iv) developing local securities markets. Several emerging-market economies had been successful with number (iv), since domestic bonds had become the major source of public sector funding.

He observed that several principles had been broadly accepted by the international community as a means of strengthening local securities and derivative markets, such as improving market infrastructure and establishing benchmarks, raising the level of corporate governance and transparency, and creating an institutional investor base. With respect to the latter, he underscored the growing importance of private pension funds in Latin America, as well as to a lesser extent in central Europe, and life insurance companies in Asia.

Many issues, however, were still being debated. Dr. Mathieson noted, for example, that observers were divided over the merits of issuing indexed bonds. He argued that there is a difference between bonds linked to the exchange rate and bonds linked to inflation, favouring the latter. While understanding the reasons for bonds linked to the exchange rate, he recommended their elimination as quickly as possible, since the exchange rate can move sharply, leading to a dramatic increase in debt-servicing costs. Other issues in the "grey zone" included the extent to which local rating agencies should be encouraged, the role of government in developing local equity markets, the extent to which foreign investors should be encouraged, the challenges posed by derivatives markets, and the interaction between the development of national markets and their regional integration.

Finally, Dr. Mathieson made a plea to the G–20 to increase the availability of data on local securities markets through the development of user-friendly Web sites that would supply information on bonds such as issuance, yields, and their currency composition.

Discussants: Dr. Alberto Ades, Goldman Sachs and Company; Mr. Wolfgang Fritsch, Deutsche Bundesbank; and Mr. Alonso García Tamés, Ministry of Finance, Mexico

Mr. Ades added a few complementary points. He stressed the need for macroeconomic stability and a low-inflation environment to improve the attractiveness of local securities markets. Funded social security systems were also important to create a demand for domestic securities. Foreign investors could help in developing more liquid markets, though he noted a dilemma: local markets may become deeper but at the risk of exposure to greater volatility. On the question of indexed bonds, he thought that inflation indexing was valuable. However, bonds that index debt servicing to gross domestic product (GDP) have many problems (notably data revisions) and are of little interest to fixed-income investors.

Mr. Fritsch talked about the German *Pfandbrief* as a possible avenue for developing local bond markets in emerging-market economies. The *Pfandbrief* is a special form of "covered" bank bond that was instrumental in developing long-term bank lending and domestic securities markets in Germany after World War II. It is used for two specific purposes: to finance residential or commercial property and to fund local authorities, thereby granting borrowers indirect access to securities markets. Compared with other private sector bonds, its main attraction is that it offers strong guarantees to bond investors. First, the bonds are backed by either property mortgages or access to the tax income of local authorities. Second, the issuing banks are committed to backing their bonds with their own capital. There has never been a default of a *Pfandbrief*. He also noted that the *Pfandbrief* represents the biggest segment of the German bond market, with important holdings by foreign institutional investors, and that similar instruments closely modelled on the tried and tested German system are available in many other European countries (including transition economies).

Mr. García spoke of Mexico's successful experience in developing local securities markets and outlined two key preconditions for success. First, there is a need for macroeconomic stability. In Mexico, this involved four mutually reinforcing components: fiscal discipline, prudent autonomous monetary policy, a flexible exchange rate, and sound debt management. The second vital precondition is a strong legal and institutional framework. In Mexico, reforms were implemented to improve accounting standards and transparency in the public sector and in the banking industry. Complementary measures included efforts to develop an institutional investor base, a derivative market (MEXDER) to hedge risks, as well as issuance of public debt at various maturities to complete the yield curve and to provide benchmarks to improve market liquidity.

General discussion

Participants agreed that foreign investors could improve the liquidity and competitiveness of local financial markets. Concern was expressed, however, that they might increase asset-price volatility. Many participants also noted that, while there has been considerable success in developing local markets for public debt instruments, progress had been more limited with respect to corporate bonds. Other issues explored included whether countries should favour local or regional market strategies; how to regulate different institutions; how to avoid distortionary incentives for risk taking; the extent to which securitization should be encouraged; and the extent to which capital markets (which might draw off higher-quality borrowers) would increase the riskiness of bank-loan portfolios.

Session 6: Concluding Observations

Presenter: Dr. Morris Goldstein, Institute for International Economics

Noting the diverse membership of the G–20 and the utility of the forum for sharing experiences, Dr. Goldstein identified seven key policy themes. The first theme was that domestic financial markets are increasing in importance in many emerging-market economies, in both size and function. He noted two caveats in particular that countries would do well to heed. First, while it is better to have a larger share of debt owed to domestic creditors for a given ratio of debt to GDP, the level of debt is also important. In this respect, he cited recent IMF work which indicated that defaults in emerging-market economies have occurred at relatively modest levels of debt to GDP. The second caveat was that governments need to continue to improve bank soundness, especially given the potential fiscal liabilities associated with bank failures.

The second theme was the importance of diversification. If the golden rule of real estate is "location, location, location," Dr. Goldstein argued, then the key message from the workshop was "diversification, diversification, diversification." He noted that the development of multiple sources of finance (e.g., banks and securi-

ties markets) would be helpful in the event of a loss of access to any particular source.

Dr. Goldstein's third theme was that policy incentives are at the heart of building capital markets. The challenge is to create the right incentives for both private sector participants and the authorities to foster market development and prudential supervision.

The fourth theme was the need for appropriate sequencing of liberalization. Dr. Goldstein noted that there was broad support for Professor McKinnon's ordering: fiscal balance followed by domestic financial sector reforms and the opening of the current account before the liberalization of capital flows (beginning with foreign direct investment).

The fifth theme was the importance of implementing and enforcing standards and codes, such as those relating to transparency and corporate governance. Dr. Goldstein noted that the most powerful incentive for complying with standards and codes would be in the lower market borrowing costs that resulted from compliance; more evidence on this link would be most useful.

The sixth theme was that market liquidity matters. Governments could promote market liquidity through, for example, greater transparency in the scheduling of borrowing programs, the promotion of effective settlement and clearing systems, and the introduction of new financial instruments to help complete financial markets. Macroeconomic policy frameworks were considered equally important, since high and volatile inflation deters the development of local bond markets.

Finally, Dr. Goldstein argued that it is important to control currency mismatches, which were an element common to every financial crisis over the past decade. In assessing the extent of a mismatch, he contended that a broad definition of assets and liabilities is important.

He concluded by noting that there was wide support for a broad agenda of domestic reform, which would emphasize the importance of putting into place policy regimes that are robust to a range of shocks. This policy agenda would include greater exchange rate flexibility combined with inflation targeting; prudent debt-management practices; and fostering domestic capital markets both to reduce emerging-market economies' reliance on foreign currency borrowing and to develop financial instruments that can help hedge and better manage financial risks.

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Speeches

Introduction

In a speech to the Canadian Chamber of Commerce in Calgary, Alberta, on 20 September, Governor David Dodge spoke about the implications for Canada of world economic trends, particularly the rise to prominence of China and India. On 7 October, Governor Dodge noted for the attendees of the Ontario Economic Summit the challenges and opportunities Ontario will encounter in the near and mid-term from global economic trends.

Deputy Governor David Longworth, in a 23 August speech to the Canadian Association for Business Economics, talked about the types of uncertainty that affect monetary policy.

All three speeches are reproduced in this issue of the *Review*.

The full text of other speeches given by the Governor can be found on the Bank's Web site at: http://www.bankofcanada.ca, including:

26 October 2004	Opening statement to the House of Commons Finance Committee
21 October 2004	Opening statement following the release of the *Monetary Policy Report*
13 October 2004	Remarks to the Nation Builders Dinner, Famous 5 Foundation, Calgary, Alberta
22 July 2004	Opening statement following the release of the *Monetary Policy Report Update*
24 June 2004	Remarks to the European Economics and Financial Centre, Paris, France
16 June 2004	Remarks to the Hamilton Chamber of Commerce, Hamilton, Ontario
18 May 2004	Remarks to Bank staff at a Town Hall, Ottawa, Ontario
22 April 2004	Remarks to the Conference on Financial Services and Public Policy, Schulich School of Business at York University, Toronto, Ontario
21 April 2004	Opening statement to the House of Commons Finance Committee
20 April 2004	Opening statement to the Senate Banking, Trade and Commerce Committee
19 April 2004	Remarks by David Dodge to the Council of the Americas, New York City, NY
15 April 2004	Opening statement following the release of the *Monetary Policy Report*
16 March 2004	Remarks to an event hosted by the Center for Financial Stability and the Canadian Embassy, Buenos Aires, Argentina
10 March 2004	Remarks to the Brazil-Canada Chamber of Commerce, São Paulo, Brazil
17 February 2004	Remarks to the Mexican Business Coordinating Council, Mexico City, Mexico
22 January 2004	Opening statement following the release of the *Monetary Policy Report Update*

Global Economic Developments and the Implications for Ontario

Remarks by David Dodge
Governor of the Bank of Canada
to the Ontario Economic Summit
Niagara-on-the-Lake, Ontario
7 October 2004

Good afternoon. I am glad to be here, and to participate in this very important summit.

It's not easy to come up with something fresh to say this late in the conference agenda. My topic is "Ontario's Place in the World," but, of course, you've already spent a day and a half listening to the opinions of smart people who spend a great deal of their time studying this very subject. You've discussed at length the forces at play in the world economy and how they are influencing Canada's economy and, of course, the economy of Ontario.

Unfortunately, I have not been able to attend the entire event, so I have missed hearing many of the interesting speakers and presentations that have gone before. So, to contribute to this discussion about Ontario and its place in the world, I thought that I would begin by giving you a brief synopsis of what I heard this past weekend at the meetings of the G–7 and the International Monetary Fund in Washington. I'll recap what was said about the challenges facing the global economy, both over the next year and further out over the medium term. Then, I will talk about how those themes and their implications relate to the Ontario economy.

The Global Economy in the Near Term

One theme that I heard repeatedly in Washington is that 2004 is turning out to be a better year than many had thought, particularly the first half of the year. Indeed, the IMF is now projecting global economic growth of 5 per cent in 2004, which would be a marked improvement from the 3.9 per cent rate seen in 2003. Globally, while the United States continues to be an important source of growth, it is encouraging to note the very strong growth in Asia and the improved momentum in Europe.

There have been a few factors underpinning this growth, including a still-favourable financing environment and a general improvement in the banking sector and in private sector balance sheets and profitability. The outlook for consumption and investment in most countries continues to be good.

This outlook bodes well for the rest of this year and for 2005, even though there was a sense at the meetings that growth over this period will not be quite as strong as we saw in the first half of 2004. The IMF's own forecast, for example, pegs global growth for 2005 at 4.3 per cent—still above the trend rate, but off a bit from 2004.

However, this optimistic outlook came with a clear caveat. The balance of risks for the global economy in 2005 has shifted slightly to the downside. Let me briefly mention some of the risks that were talked about. There was a general sense that the sharp rise in oil prices could become a more significant drag on

growth next year, particularly if prices were to stay at current levels. Higher oil prices have cut into the rate of economic growth, but the consensus is that, so far, the overall effects appear to be manageable.

Geopolitical events remain a risk to the world economy. As well, we are beginning to see the potential for inflationary pressures in some countries, as economies approach the limits of their production capacity. The challenge for monetary authorities will be to manage the transition from a very low interest-rate environment to one where policy rates are somewhat higher.

Higher oil prices have cut into the rate of economic growth, but the consensus is that, so far, the overall effects appear to be manageable.

Medium-Term Prospects for the Global Economy

Looking beyond 2005, there was a general consensus that economic policy-makers around the world need to move ahead with addressing the problems that the global economy will face. So let me now take a few minutes to discuss what was said about the medium-term challenges for the global economy.

In 2006 and beyond, a key concern will be how economies will adjust to the current global economic imbalances. A large U.S. current account deficit has its counterpart in the large current account surpluses in almost every other region of the world, most notably in Asia. At the same time, we have seen a sharp rise in the net foreign liability position of the United States and a massive accumulation of foreign exchange reserves by the Asian countries.

Looking forward, the U.S. current account deficit is likely to continue to deteriorate, and current account surpluses in emerging Asia may remain larger than desired for longer than desired. For now, there is no reason to believe that world capital markets cannot manage these imbalances. But, over the longer haul, the magnitude of these current account imbalances cannot continue, and no country can pile up foreign exchange reserves indefinitely. Global adjustment will be needed to restore balance.

This global adjustment could take place in several ways and through several channels. Hopefully, these will allow the adjustment to take place in an orderly way. The first channel is through changes in the global pattern of savings and consumption. Domestic savings in the United States could rise—both government and household savings rates can be expected to head up. And foreign consumption could increase, as economies and markets continue to expand.

It is worth noting that, in North America, household consumption is running well over 60 per cent of GDP. As we look ahead, and take into account the aging population, it is important that savings rates increase in North America. At the same time, household consumption in emerging Asia is only about 40 per cent of that region's GDP. As Asian incomes rise, there is great potential for household consumption in that region to increase. So these are natural forces that will be working towards the adjustment of these imbalances.

Global adjustment will be needed to restore balance.

The second channel for adjustment will undoubtedly involve changes in real exchange rates; that is, the relative value of currencies, taking into account the effects of inflation. Changes in real exchange rates could come about either through movements in relative inflation rates, or movements in nominal exchange rates, or some combination of the two. With respect to nominal exchange rates, the big issue is the need for some effective depreciation of the U.S. dollar against the currencies of emerging Asia. A key element here is China's fixed exchange rate, and how successful the Chinese authorities will be in meeting their stated goal of moving to a floating currency.

In all likelihood, both of these channels of adjustment will play some part in facilitating the correction of global imbalances. As these adjustments take place, two things will be critical to ensuring that real incomes continue to rise worldwide. First, global trade flows must continue unimpeded. That is why we must push for continued progress at the Doha Round of trade negotiations under the World Trade Organization.

It is also why we must fight against any outbreak of protectionism.

Second, all economies must take steps to enhance their flexibility so that the adjustment doesn't have to take place through loss of real incomes. Here in Canada, we have to continue to increase the flexibility of our markets for goods and services, for capital, and crucially, for labour. At the same time, all of us leaders of corporations and public sector institutions must work to enhance the productivity of our workplaces. That leads me to the issues that we have to consider here in Ontario. The remainder of my remarks today will deal with these issues.

Adjustments in Ontario

Now, as I mentioned, I was not able to participate in your earlier discussions about the structure of Ontario's economy. But, having outlined the forces that the international experts believe will be at work in the years ahead, let me now spend a few minutes talking about the competitive and structural issues that we face here at home in light of these global forces.

Experience has taught me that we have to be very careful in trying to predict exactly how structures in an economy are going to evolve. But I think that we can safely predict that the first and most obvious adjustment will be a transformation of manufacturing processes around the world, as low-cost, highly efficient capacity is built in Asia. This means tremendous and continuing competitive pressure on industries that have traditionally been mainstays of the Ontario economy—automobiles and parts, other transportation equipment, and some areas of light manufacturing. Over time, those pressures will increasingly be felt by industries such as steel and heavy manufacturing. There are no signs that these pressures will abate in the years ahead.

A second adjustment will be to higher energy costs in the years ahead. This is a major issue for all countries, and poses a problem for Canada and Ontario, which are energy-intensive by world standards. But energy-cost increases and supply concerns are not limited to oil and natural gas. The blackout of August 2003 was a spectacular example of the need to have adequate and failsafe electricity supplies. We know that our electricity supplies are often stretched to the limit. And we know that demand in Ontario will continue to grow in the future, and that there is no clear plan to replace the capacity that has been slated for closure.

A third adjustment relates to non-energy commodities. Strong demand from the booming economies of Asia is behind the rise in non-energy commodity prices such as nickel and iron ore. In response, we are seeing significant efforts in countries around the world to find new sources for these commodities and to improve their efficiency in extracting them. This province's commodity producers must take advantage of this healthy environment to boost their own productivity to meet new competitive challenges.

Strong demand from the booming economies of Asia is behind the rise in non-energy commodity prices such as nickel and iron ore.

Fourth, we are in the process of adjusting to the fact that services, once thought to be non-tradable, are increasingly open to worldwide competition because of changes in technology. Ontario's service-producing industries are also facing increased competitive pressure from new suppliers, such as India's burgeoning information technology and business services industries. All indications are that this pattern will continue, and will be repeated in other service industries.

Perhaps the biggest challenge for Ontario's service sector will be from the continued consolidation within financial services industries around the world. This poses a real competitive challenge to the financial services industry that is so important to the Greater Toronto Area. Indeed, while financial services companies may be concentrated around Toronto, they are important to the whole province—the finance, insurance, and leasing sector represents almost 15 per cent of Ontario's GDP.

All of these competitive challenges are compelling Ontario's businesses, politicians, and policy-makers to find ways to increase industrial productivity and market efficiency.

Let me stop just for a second, because what I've said so far about Ontario's economic prospects may sound

overly negative. We need to keep in mind that changes in the global economy are also creating income and wealth in China and India, thus increasing their demand for goods and services from abroad. These emerging markets are just that—markets. This source of growing demand can provide a boost to the global economy in general, and the Ontario economy in particular.

Now, in the past two days, you have heard from people who are far more expert than I am about how individual sectors can meet this competition and take advantage of these opportunities. So I'm not going to try to add my own specific policy prescriptions to the debate. But I would like to point out some issues that I believe must receive considerable focus in order to position Ontario to meet the global challenges facing us over the medium term.

The first is the need to improve the efficiency of labour markets and the quality of Ontario's human resources. This is a critical element of Ontario's ability to meet future competitive challenges. To develop the skilled workers that this province will require to meet its labour demands, Ontario must ensure that its education and training systems are second to none. This applies to early childhood education and development, the provincial school system, and post-secondary education and skills training. And all employers, both public and private, have a responsibility to provide their workers with opportunities to upgrade their skills. Appropriate investment by individuals, by employers, and by governments will be needed.

But even the best-educated and trained workforce will still face inevitable economic adjustment that will lead to displacement and additional burdens on some groups in society. This does not mean that we should shy away from the task. But it does mean that a second area of focus should be to have policies in place that help to smooth the adjustment. These include providing access to training, or helping workers relocate or shift into expanding areas of the economy.

The third area would be to improve the efficiency of capital markets and the financial system in Ontario and Canada. We all know that an economy works better when its financial services sector is sound and efficient. A robust and well-functioning financial system is key, so that growing firms have access to credit, and savings can be efficiently recycled to help businesses expand.

With global standards evolving rapidly, Canada and Ontario must be at the forefront in terms of efficiency and competitiveness.

Now, I am not here with a prescription for what needs to be done in this area. But we must not lose sight of the fact that the financial sector is an important contributor to economic growth in Ontario. An efficient financial sector will continue to be a competitive advantage for this province, both in maintaining efficiency in our own market, and in providing an opportunity to export expertise around the world. So policymakers have an interest in providing a framework that will allow our financial institutions and markets to compete in an increasingly globalized world. With global standards evolving rapidly, Canada and Ontario must be at the forefront in terms of efficiency and competitiveness.

A fourth area of focus is the province's infrastructure—it needs to be a contributor to industrial efficiency, not an impediment. An important part of this is transportation infrastructure. And this applies not only within the province, but also to the links with our trading partners in other provinces, other parts of North America, and overseas. But it is not just physical infrastructure that is important. We also need the right policy infrastructure in areas such as security, inter-provincial trade, and regulation. For example, as industries increasingly rely on just-in-time delivery, border delays can cause real damage to businesses. That is why it is critical to develop and maintain border crossings that are as safe as these times require, yet open enough to allow the rapid flow of goods and people.

The fifth issue would be securing reliable sources of cost-effective energy for the future. Ways must be found to foster the development of new sources of energy and to provide the right incentives for the efficient use of that energy. Clearly, there is a need for an appropriate framework to encourage investment in electricity transmission and generation, including renewable energy and alternative technologies.

So those are five critical elements that I see as part of Ontario's efforts to meet the challenges that lie ahead**,** and to take advantage of the opportunities presented by growing world markets. It is by no means a comprehensive list. There are many other important issues that I have not discussed. But I have tried to point out five areas that, in my opinion, policy-makers and business leaders cannot ignore.

Conclusion

We know that the challenges facing our economy will not be easy to meet. We know that tough choices will have to be made to secure an economic framework that enhances Ontario's efficiency and its flexibility. We know that the burden of adjustment will fall disproportionately on some individuals and groups and that we have a collective responsibility to help with that adjustment.

This province has tremendous human and natural advantages. I am confident that it also has the will to make the choices that will help Ontario thrive in this new world economy.

But we also know that Canadians and Ontarians have made tough choices in the past that have proved right. These choices have yielded an economy that is resilient, and capable of competing with the best in the world. That tradition must continue. The choices Ontarians make in the years ahead will determine our ability to meet the challenges thrown at us by this changing world economy, and to seize the opportunities that growth in world markets will bring. This province has tremendous human and natural advantages. I am confident that it also has the will to make the choices that will help Ontario thrive in this new world economy.

Canadian Monetary Policy in an Evolving World Economy

Remarks by David Dodge
Governor of the Bank of Canada
to the Canadian Chamber of Commerce
Calgary, Alberta
20 September 2004

Good afternoon. I'm glad to be back in Calgary. We at the Bank of Canada welcome these opportunities to get out across the country, to speak to business people, and hear your perspectives on the economy. The feedback we receive from businesses from coast to coast is an important part of our monetary policy deliberations. I know that the staff of our regional office here in Calgary work hard to stay on top of local business conditions on the Prairies, as do our other offices for their regions.

I am happy to have the opportunity to meet with the national body of the Chamber of Commerce. I can tell you that my regular contacts with the Ottawa liaison group are very valuable to me. The Bank does look to the Chamber to help us understand how economic developments are unfolding at the industry level. And I particularly want to thank the Chamber for being an ongoing partner in our efforts to smoothly introduce three new high-denomination bank notes this year. This is the second straight year in which we have set up a currency-education kiosk at your annual meeting, to help spread the word about our new bank notes. You can learn about the security features that we have included in our high-denomination notes. And we have materials about our new $20 note that we unveiled last month, and which goes into circulation beginning next Wednesday, 29 September.

I should add that I'll be back here in Calgary on 13 October to unveil the new $50 bank note, which goes into circulation beginning in mid-November.

The evolution of the global economy is not a short-term event. Some of the forces currently at work have been building for years.

During the past year, powerful forces have continued to shape the global economy. Alberta, and indeed all of Canada, have felt the impact of these forces. Of course, the evolution of the global economy is not a short-term event. Some of the forces currently at work have been building for years. Similarly, today's developments may have repercussions, and raise the need for adjustments, for years to come. So today, I want to talk about Canada's economic outlook and the prospects for monetary policy within the context of the evolving world economy.

How the Monetary Policy Framework Works

I will start with a brief review of our monetary policy framework. Let me remind you of the goal of Canadian monetary policy. Experience has taught us that the best contribution the Bank of Canada can make to good economic performance is to keep inflation low, stable, and predictable. By doing so, we can provide the backdrop that best allows our economy to grow in a strong and sustainable way.

We aim to keep inflation—as measured by the annual rate of increase in the consumer price index—at 2 per cent. It's important to note that we conduct monetary policy in a symmetric way. This means that we will raise interest rates to dampen total demand when we see that inflation is threatening to rise above our 2 per cent target over the next 18 to 24 months. In the same way, we will lower interest rates to stimulate demand when we see that the trend of inflation is poised to fall below the target. This symmetric approach to monetary policy has delivered an average rate of inflation that has been very close to 2 per cent since inflation targeting was adopted in 1991.

It is also important to keep in mind that monetary policy actions take time to have their full effect. The lags are variable, but it typically takes a year and a half to two years for a change in interest rates to have its *full* impact on the economy and inflation. That is why we say that we need to be forward looking with our monetary policy, and that is why we are always trying to assess the state of the economy 18 to 24 months into the future. Specifically, we try to evaluate the various factors that will affect supply and demand, to help us estimate the future size of the output gap.

What do I mean by "output gap?" That term refers to the difference between actual output—what the economy is producing—and potential output—the maximum amount the economy could produce without triggering higher inflation. Another way that we sometimes refer to this concept is to talk about how close the economy is to its production capacity. This idea is important because when economies operate above their capacity—or, as economists like to put it, there is excess demand and a positive output gap—inflationary pressures can build. But when economies operate below capacity—meaning that there is excess supply and a negative output gap—disinflationary pressures can set in. Ideally, we want to see the economy operating close to its capacity, with total demand roughly in balance with total supply. If we achieve this, we can have the best outcome over time—strong, sustainable growth that avoids booms and busts, along with rising employment and low inflation.

One major problem is that we cannot directly measure potential output. Further, the economic data that measure actual output are often revised—sometimes significantly so. The challenge for us, then, lies in estimating the size of the output gap, and there is always a significant degree of uncertainty around that estimate. So we look at a number of other economic variables to help us form an opinion about how large the output gap is. You can find out more about these variables on our Web site. They include, among others, indicators of capacity in goods markets, signs of tightness in labour markets, and signals of pressures in the real estate market. Some of these are quantitative, and some are qualitative, based on surveys of businesses conducted by our regional offices. Another indicator is the rate of inflation itself. If core inflation—which strips out eight highly volatile components of the consumer price index—is *consistently* coming in above or below our expectations, it may lead us to adjust our view about the current size of the output gap.

Earlier, I said that when the economy is operating near its capacity, total demand for Canadian goods and services—or what economists like to refer to as "aggregate demand"—is roughly in balance with total supply. Total demand has two components—domestic demand and foreign demand. Assessing foreign demand is difficult, but because it represents such a large share of total output in Canada, we at the Bank spend a great deal of time and effort trying to gauge that demand.

Many of today's global economic developments have their origins outside North America, most notably in Asia.

Of course, it is nothing new to say that our economy is importantly affected by events abroad. Canada has always relied on international trade. For a long time now, the United States has been the focus of attention in assessing the world economy. But many of today's

global economic developments have their origins outside North America, most notably in Asia.

Before I talk about their current implications, I would like to take a few minutes to discuss the nature of these developments and their likely implications over the next decade or so.

The Medium-Term Implications of Global Developments

Just as Japan and Korea emerged as major players on the global stage in previous decades, China is now quickly becoming an economic powerhouse. And India is not far behind. When you consider that these two countries account for 40 per cent of the world's population, it is not hard to see why they are having such an impact on the global economy.

The integration of these countries into the global economy represents both a competitive challenge and a tremendous opportunity for the industrialized world.

As we look ahead, it is clear that China and India will be major global competitors, not just in labour-intensive industries, but increasingly in skill-intensive industries as well. It's a pattern of development that the world has seen before. Established firms in many industries will feel competitive pressure from China and India, until the large pool of surplus labour in those countries can be absorbed. But at the same time, this process will create income and wealth in China and India and, hence, increase their ability to buy more goods and services from abroad.

So, the integration of these countries into the global economy represents both a competitive challenge and a tremendous opportunity for the industrialized world. These emerging markets are just that—markets. China is already one of the largest importers in the world and its importance will increase over the next decade. This source of growing demand can provide a much-needed boost to the global economy in general and to the Canadian economy in particular. We have already seen some Canadian commodity producers step in to fill the demand from Asia. Indeed, Statistics Canada recently reported that the value of Canadian exports to China in the first seven months of this year rose by 58 per cent compared with the same period in 2003.

There will also be opportunities for Canadian firms to integrate low-cost components into their own production processes, through direct investment or joint ventures. This will be an increasingly important way for Canadian firms to maintain cost competitiveness. Over the medium term, it will be absolutely crucial for all Canadian businesses and governments to continue to take advantage of these opportunities as they arise.

At the same time, Canadian businesses and governments need to recognize that these global developments will require adjustments here in Canada. There will be some activities, particularly those that are labour-intensive and lower-value-added, where Canadian firms will not be well placed to compete with lower-cost producers in Asia. The key will be to adjust by shifting resources into expanding, higher-value-added activities, where Canadian firms can exploit the opportunities presented by the changing world economy. By making these adjustments, we will be able to increase productivity and raise our standards of living over the medium term.

Of course, it is not just developments in Asia that will require us to make adjustments here in Canada. We will also have to adjust as the U.S. economy reduces the size of its fiscal and current account deficits. But the subject of adjustments to global imbalances is beyond the scope of my remarks today. What I can say, though, is that the Bank of Canada will facilitate whatever adjustments are necessary by keeping inflation low, stable, and predictable. This will help Canadian firms and individuals read market signals more clearly and allow them to make plans with confidence in the future value of their money.

Near-Term Implications of Global Developments

That's a look at the medium term, and it is important for business people and economic policy-makers to always keep an eye on the horizon. But, as you run your business from day to day, and as we at the Bank conduct monetary policy, it is the shorter-term developments that are the greater focus of attention. So, let me spend a few minutes on the near-term outlook for

the world economy, and what that outlook implies for foreign demand for Canadian goods and services.

As I said before, the emergence of China and India is having an important impact on the Canadian economy through an increase in demand for many of the commodities that we produce. This has caused a run-up in the prices of nickel, potash, and steel, among others. And, in turn, this has boosted the income of many Canadian producers, even after taking into account the effects of the large appreciation of the Canadian dollar that we saw in 2003.

Of course, the most high-profile price increase recently has been that of oil. Very rapid growth in Asia has led to unexpected additional demand for oil. For the time being, this unanticipated demand is putting pressure on a market that already had little spare capacity. Over the medium term, oil production will, in all likelihood, increase to meet this additional demand. But it takes time for new production to come on line. Thus, it is not unreasonable to think that oil prices will be higher in the near term than what we might expect them to be over the medium term.

Our best judgment at the moment is that high levels of growth in Asia will continue over the next couple of years, and that demand for commodities will continue to grow, although perhaps not quite as rapidly as in the past couple of years. This is based on the not-unreasonable assumption that the Chinese authorities will be able to manage economic growth at a more sustainable pace.

High levels of growth in Asia will continue over the next couple of years, and . . . demand for commodities will continue to grow.

While developments in Asia are likely to play a very important role in supporting continued strength in the global economy, developments in the United States will still have the largest impact on the volume of Canada's exports over the short term. As we said in our July *Monetary Policy Report Update*, recent data point to some slowing of U.S. growth from the red-hot pace of the second half of 2003 and the first quarter of 2004. Higher oil prices appear to be having some restraining effect on U.S. consumer spending, and both consumers and businesses seem to be somewhat less optimistic than they were earlier this year. Nevertheless, we still expect growth to be similar to what we forecast in July—that is, faster than the growth rate of U.S. production capacity. This strong U.S. growth bodes well for continued high *levels* of Canadian exports, although they are unlikely to continue to grow at the rapid pace of the first half of this year.

Consistent with this profile for solid U.S. and global economic growth and with the expectations of financial markets, we continue to assume some upward movement in global policy interest rates to moderate inflation pressures as output levels approach production capacity.

Canada's Economic Prospects

Let me now turn to Canada, beginning with a quick recap of the first half of 2004.

At the start of the year, we said that we did not expect *net* exports—the difference between what we export and what we import—to make a significant contribution to Canada's economic growth in 2004 or 2005, because of the sharp appreciation of the Canadian dollar last year. We also said that economic growth would have to come primarily from domestic demand in order to eliminate the excess supply that existed at the start of the year and to close the output gap. To facilitate growth in domestic demand, we reduced our key policy interest rate from 2 3/4 per cent to 2 per cent in three steps earlier this year.

However, Canada's economic performance in the first half of 2004 turned out somewhat differently from our expectations. The volume of exports grew much more rapidly than we had anticipated. So did imports, but not to the same extent as exports. As a result, *net* exports made a very significant contribution to growth, and aggregate demand in the first half of the year grew more strongly than we had expected at the beginning of 2004. So the output gap at mid-year was smaller than we had projected. Indeed, the Bank judges that the Canadian economy is now operating close to its production capacity.

As we look ahead to the remainder of this year and to 2005, we expect that exports will grow more slowly than in the first half of 2004. But there are lots of uncertainties that cloud the outlook for foreign demand and Canadian growth. These include uncer-

tainty about the western grain crop, the re-opening of the U.S. border to live cattle exports, and auto production, as the "Big Three" automakers face softer markets for their products. Despite these caveats, aggregate demand will likely grow at a rate equal to, or marginally above, the rate of growth of production capacity over the next four quarters.

With the economy currently operating close to capacity, we reduced the amount of monetary stimulus in the economy two weeks ago by raising our key policy interest rate to 2 1/4 per cent.

Inflation, both total and core, has been volatile in recent months, primarily because of swings in energy prices and because of automobile purchase-incentive programs. But despite this volatility, we continue to project that core inflation will be a bit above 1.5 per cent for the second half of 2004, before gradually moving up to the 2 per cent target in 2005.

Looking forward, we will need to continue to reduce monetary stimulus to avoid a buildup of inflationary pressures and to contribute to sustainable, solid economic growth. However, the pace of our actions will depend on our continuing assessment of the evolving prospects for pressures on capacity and inflation.

In this context, there are several key factors that the Bank will be watching closely. As always, there is uncertainty about the exact size of the output gap. There is also considerable uncertainty at this time about the future growth rate of both exports and imports, and about the evolution of world prices for energy and non-energy commodities. And we will be watching the impact of geopolitical developments on global confidence and demand. We will update our outlook for the Canadian economy in our next *Monetary Policy Report*, which will be published on 21 October.

Conclusion

Let me conclude by going back to my earlier point about the need to adjust to changes in the world economy. We can be certain that the powerful global economic forces I spoke of today will continue to be felt as the world economy continues to evolve. This evolution will lead to challenges that we must face, but it will also lead to opportunities that we must seize.

At the Bank of Canada, we will continue to monitor these global forces closely and assess their impact at home and abroad. This will help us contribute to Canada's future economic prospects through low and stable inflation.

This evolution will lead to challenges that we must face, but it will also lead to opportunities that we must seize.

For Canada to grow and prosper over the long run, Canadian businesses and governments will need to make the right adjustments to the evolving world economy. As leaders in the business community, your job will not be easy. But over the past several years, we have seen ample evidence that you can face challenges and take advantage of opportunities. I am confident that you will continue to do so in the future.

Monetary Policy and Uncertainty

Remarks by David Longworth
Deputy Governor of the Bank of Canada to the
*Canadian Association for Business Economics**
Kingston, Ontario
23 August 2004

Good evening, ladies and gentlemen. As a member of CABE and the Ottawa Economics Association, and as a frequent presenter at TABE, I am very pleased to speak to this audience of business economists, here at the Summer Outlook Policy Forum. Tonight, I want to talk about monetary policy and uncertainty.

If we could be certain that we had the true model of the world economy, complete with the right parameters and measurements, then being a macroeconomist would be extremely dull indeed. But it is impossible to have such a model, and that makes the work of macroeconomists—and central bank policy-makers—a lot more interesting.

Central bankers can be certain of one thing—we will always have uncertainty to deal with. Some of this uncertainty can be created, unwittingly, by central banks themselves. But there are two key strategies that can be followed to help mitigate this uncertainty for the public and, in turn, to reduce uncertainty for the central bank about how the public will respond to economic developments. First, a central bank should establish a clear policy objective. Second, it should operate within a transparent framework for meeting that objective.

The Bank of Canada's policy objective became clearer with the adoption of inflation targets in February 1991. Since then, the Bank has become increasingly transparent, both in its operating framework and in its communications.[1] This has reduced the private sector's uncertainty about how the Bank will respond to economic developments. Importantly, it has also tended to moderate the variability of inflation and of other economic and financial variables, notably interest rates.[2]

But there are other more general types of uncertainty that we always have to deal with when conducting monetary policy. Let me give you some examples. We cannot be sure that the data we look at give us a true and complete picture of the economy. Nor can we be sure precisely how our monetary policy actions affect the economy, or exactly how long it takes for those actions to have their impact. And we can never be sure what the state of the world economy—and thus of the Canadian economy—will be in the future, when today's monetary policy actions will have their full effect.

There are two key strategies that can be followed to help mitigate this uncertainty for the public and, in turn, to reduce uncertainty for the central bank about how the public will respond to economic developments.

Economists at central banks and elsewhere have developed strategies to deal with these more general types of uncertainty that we face. This evening, I plan to touch on two areas of uncertainty, drawing on the relevant theoretical literature and on current examples from Canada.[3] First, I will discuss data and measure-

* The speech has been slightly abridged for purposes of publication.

1. See Jenkins (2001).

2. See Longworth (2002).

3. More thorough reviews of the types of uncertainty facing policy-makers can be found in Jenkins and Longworth (2002) and Sellon (2003).

ment uncertainty, particularly as it applies to the output gap. Then, I will talk about model and parameter uncertainty; that is, uncertainty about which economic variables can best explain movements in other variables, and about the size of the effect that one variable has on another. In doing so, I will look at the effects of movements in both world oil prices and the exchange rate for the Canadian dollar on Canadian inflation and foreign trade. Finally, I will close with a brief review of the Bank's base-case outlook for the economy.

Data and Measurement Uncertainty

Let me start with data and measurement uncertainty. This refers to the possibility that economic variables are being measured in a fundamentally incorrect way, or that the data are subject to error or revision.

Theory tells us that if we had the correct model, in which monetary actions were determined by a complex, "optimal" policy rule, then data and measurement uncertainty that is random in nature would have no implications for monetary policy. But we can't be sure that mismeasurement occurs randomly. And since models used by central banks generally incorporate simple rules for setting interest rates, based on a relatively small number of variables, those rules should typically place less weight on economic concepts or variables that are more prone to data uncertainty.[4]

To illustrate this point, let's look at the output gap. This is the difference between actual output—what the economy is producing—and potential output—what it could produce without triggering inflationary pressures. The output gap is an extremely important concept for an inflation-targeting central bank. When economies start to operate above capacity, inflation pressures can build. And when economies operate below capacity, disinflationary pressures can set in.

But the output gap is not a variable that can be measured simply or directly, because potential output is not directly observable. So, to cope with this uncertainty, it is helpful to look at several different—but relevant—indicators when assessing the size of the output gap.[5] In weighing these, we should follow the principle that I just mentioned by putting less weight on indicators with higher levels of uncertainty.

The output gap is an extremely important concept for an inflation-targeting central bank.

The Bank's primary measure of the output gap—the "conventional measure" that we refer to in our *Monetary Policy Reports* and *Updates*—uses a multivariate filter. To help mitigate the uncertainty associated with this key variable, we use a wide range of other indicators to come to a consensus about the likely size of the output gap. One key indicator is the performance of core inflation relative to projections. If core inflation is persistently surprising us by coming in above or below our projections—especially in the absence of identifiable special factors—this can lead us to adjust our view of the size of the output gap.

We provide an updated list of these other indicators on our Web site, under the heading "Indicators of Capacity and Inflation Pressures for Canada."[6] They include: Statistics Canada's measure of capacity utilization in the non-farm goods sector; the ratio of unfilled orders to shipments in manufacturing (excluding aerospace products and parts); labour market conditions, such as unemployment rates, participation rates, and hours worked;[7] measures of labour shortages (especially skilled labour); and the responses of firms to our *Business Outlook Survey*.[8] Our analysis has shown one question in this survey to be particularly useful in assessing capacity pressures, and that is the proportion of companies reporting that they would have difficulty meeting an unexpected surge in demand.[9]

Currently, the Bank's conventional measure says that the output gap narrowed during the first half of 2004, shrinking to less than 0.5 per cent of GDP at mid-year.

4. See Swanson (2004) and Svensson and Woodford (2003).

5. The approach of focusing on the change in the output gap rather than the level of the output gap is unlikely to be appropriate, for reasons laid out in Longworth (2003).

6. http://www.bankofcanada.ca/en/indinf.htm

7. Because it is difficult to directly measure the degree of tightness in labour markets, we look at how these variables are performing relative to our estimates of their trend level.

8. See Martin (2004).

9. See Martin and Papile (2004).

Given this low number, and the uncertainty surrounding this measure, the Bank has been particularly interested in the messages coming from other indicators of the output gap. As we said in our July *Update*, indicators in the goods market are suggesting greater pressure on capacity than the conventional measure, while labour market indicators are pointing to less pressure on capacity. So, although a fairly wide band of uncertainty continues to surround our conventional estimate of the output gap, these other indicators lead us to believe that the conventional measure is providing a more or less balanced assessment of the size of the output gap at this time.

Although a fairly wide band of uncertainty continues to surround our conventional estimate of the output gap, these other indicators lead us to believe that the conventional measure is providing a more or less balanced assessment of the size of the output gap at this time.

Let me make two more brief comments about data. First, data revisions are an important source of uncertainty. Indeed, with the exceptions of the CPI and the labour force reports, nearly all of the economic data that we look at are subject to revision. And these revisions can be substantial. For example, export and import data have undergone particularly large revisions in recent years. This makes the Bank cautious about putting too much emphasis on the most recent data point. The second comment is that even if data are not revised, they can still be volatile. The consumer price index is a case in point. Here, we temper the uncertainty that stems from volatility by focusing on core inflation, which strips out the eight most volatile elements of the index. The more volatile a series has been historically, the less weight one should put on the most recent observation when assessing future trends. There is often uncertainty about the duration of a shock, but in the case of a volatile series it is best to start with the assumption that surprise movements do not signal the beginning of a trend.

Model and Parameter Uncertainty

Let me now turn to model and parameter uncertainty. As I said at the beginning, nobody has the true model of the economy. In particular, we don't know all the significant factors that explain the behaviour of any one economic variable. And even in those cases where we are fairly sure of the relevant explanatory variables, there is uncertainty about the parameters in the relationship; that is, about the size of the effect that one variable has on the other.

Economists have developed certain theoretical techniques to deal with model and parameter uncertainty. For example, one basic strategy the Bank uses to alleviate model uncertainty is to have the staff look at a variety of models and approaches in developing policy advice.[10] However, some techniques that reduce model and parameter uncertainty are very difficult to use in practice, except in the smallest of models—and our models are typically not small. One important practical way for central bankers to deal with these kinds of uncertainty is to test how sensitive policy recommendations are to the assumptions about the particular model of the economy and the size of the parameters in that model. In doing this, it is important to have updated estimates of the parameters as well as updated analysis of the various factors at play, since both of these can vary through time with structural changes in the economy, including those resulting from changes in the monetary policy framework.

One basic strategy the Bank uses to alleviate model uncertainty is to have the staff look at a variety of models and approaches in developing policy advice.

To make these concepts more concrete, let me discuss some aspects of model and parameter uncertainty in the context of recent changes in world oil prices, movements in the Canadian dollar, and the recent behaviour of exports and imports.

As an aside, let me start by summarizing some good news in terms of the uncertainty that stems from two

10. See Coletti and Murchison (2002) and Macklem (2002).

specific sources. During the past 15 years or so, movements in oil prices and in the exchange rate have had much smaller effects on core inflation than in the past. This is partly because of the increased credibility of monetary policy brought about by the inflation-targeting framework. The implication is that these movements no longer create as much uncertainty in inflation forecasts as before.

Now, to get to the heart of the matter, what are the factors that affect inflation? While we don't know every single factor involved, it is useful to think of inflation as being a function of capacity pressures in the economy—the output gap—and of inflation expectations. Relative price shocks, such as changes in oil prices or the exchange rate, also have a short-run impact on inflation rates. The task for policy-makers is to carry out the appropriate sensitivity analysis in order to deal with parameter uncertainty and model uncertainty.

One key uncertainty relates to the modelling of inflation expectations. Actual past inflation rates, particularly past total CPI inflation, seem to be a much less important factor in determining inflation expectations these days. Rather, the process has become more forward looking and is heavily influenced by our credible inflation target. But there is still some uncertainty about the extent to which inflation expectations have become forward looking.

There is a diverse body of theoretical literature that points to the dangers of central banks assuming that inflation expectations have become more forward looking than they actually are. Researchers have found that the costs of assuming too much forward-looking behaviour and too much central bank credibility—and thus typically failing to take timely action before inflation and inflation expectations move well away from the target—are much greater than the costs of assuming too little forward-looking behaviour. So, in dealing with uncertainty surrounding the modelling of inflation expectations, we should not assume that expectations will always remain well anchored.[11]

What about relative price shocks? In theory, given a credible inflation target, relative price shocks[12] should have only a temporary effect on inflation rates. Nonetheless, movements in world oil prices clearly affect measured total CPI inflation in the short run through their impact on the prices of fuel oil and gasoline. They also often lead to increases in natural gas prices, with further ramifications for the CPI. But, in recent years, we have found little evidence of a significant impact, through the cost channel, on other elements of the CPI. In short, the trend of inflation—or core inflation—now seems little affected by oil-price swings of the order of magnitude experienced from the late 1990s through 2003.[13] In addition, there is scant evidence of second-round effects on inflation expectations and wages. In part, this is likely because increases in energy prices tend not to persist—oil prices may rise for a period of time, but then they usually reverse course. Indeed, if one looks at the patterns of both oil prices and total CPI inflation over the past five years or so, they tend to fluctuate around the core rate of inflation. Particularly large spikes in energy prices—either upwards or downwards—are more likely than not to reverse over the following 12 months. So, unless such movements persist, or are thought to be highly likely to persist over significantly long periods, it seems reasonable to assume that there will be almost no second-round effects.

The costs of assuming too much forward-looking behaviour and too much central bank credibility—and thus typically failing to take timely action before inflation and inflation expectations move well away from the target—are much greater than the costs of assuming too little forward-looking behaviour.

11. Soderstrom (1999) and Srour (1999) can be read in this way if their models are interpreted as setting inflation expectations to a weighted average of past inflation and the inflation target. Walsh (2003, p. 327) notes that his "results suggest that policymakers should act as if inflation were more backward-looking than they perhaps actually believe it is." Sargent (1999) gets a similar result in a simple model when robust-control techniques are used.

12. The analysis in this paragraph holds for a temporary or permanent move in relative prices. It does not apply to persistent growth in relative prices.

13. Bank of Canada (2000a, b) noted this in the context of the energy-price increases through 1999 and 2000.

The effects of movements in the exchange rate on Canadian inflation are much more difficult to detect than those of oil-price movements. This is partly because the effects are more indirect, and because we do not have all the data needed to follow the transmission channel from exchange rate changes, through import and wholesale prices, to consumer prices. But we can say that a wide variety of statistical and econometric techniques show that exchange rate pass-through effects are not large. Moreover, these effects are likely spread out over time—perhaps over two years or so.

One piece of evidence common to countries that have reduced inflation to low, or even moderate, levels is that their estimated coefficients of pass-through have declined.[14] It is not clear who sees their profit margin reduced when the domestic currency appreciates—the foreign exporter who prices to market, the domestic importer or wholesaler, or the domestic retailer. We need more data to answer this question for the Canadian economy, which might then help us to better understand the pass-through process and estimate the coefficient.

How far has the pass-through coefficient declined in Canada's case? Parameter uncertainty remains. Although the estimated coefficient has not been statistically different from zero in recent years, zero seems an extreme value to assume. In the longer run, zero seems inconsistent with optimal behaviour, because it likely implies that the prices of traded goods at the consumer level are not affected by exchange rate changes over any time horizon. We deal with this parameter uncertainty by assuming a small, positive rate of pass-through, thus balancing theoretical considerations with the results of our estimates.

There is also uncertainty about the effects of exchange rate movements on exports and imports. As we noted in our last *Update*, quite apart from the large movements in the exchange rate over the past year and a half, there are other factors that make it difficult to project Canadian trade at this time. About a year ago, the levels of imports and exports were well below what we believe economic conditions would have suggested. Since then, export levels seem to have made up a good part of the lost ground, while imports have only partially recovered. Compounding these complexities is the inherent uncertainty involved in trade data. As I mentioned earlier, there have recently been sizable revisions to Canadian trade data.

14. See, for example, Bailliu and Bouakez (2004) and Bank of Canada (2000b).

Quite apart from the large movements in the exchange rate over the past year and a half, there are other factors that make it difficult to project Canadian trade at this time.

Once we cut through all of these difficulties, we are left with two main uncertainties. The first relates to model uncertainty. What are the fundamental factors to which exports and imports are adjusting? This would be an issue regardless of exchange rate movements over the past year and a half. The second relates to parameter uncertainty. How are trade volumes adjusting to changes in the exchange rate? What is the total effect, and how long are the adjustment lags? These are extraordinarily difficult questions. In our July Update, we used our models but we also applied judgment to arrive at our projection that net exports would act as a slight drag on GDP growth in 2004 and 2005.

I hope that I've been able to give you some idea of the kinds of uncertainty that the Bank of Canada faces in the conduct of monetary policy and how we deal with them. The examples I have used reflect some of the specific risks and uncertainties that are particularly relevant to our current base-case projection.

* * *

Conclusion

Let me conclude. It is true that uncertainty makes the work of macroeconomists and central bankers more challenging and interesting. That said, it is crucial that we at the Bank of Canada have ways to deal with this uncertainty. We have taken steps to reduce uncertainty about our monetary policy framework and actions. We mitigate data uncertainty by being cautious about our reliance on any single indicator and by looking instead at multiple indicators. And we temper model and parameter uncertainty by using a variety of different models and approaches, and by testing the sensitivity of policy recommendations to the assumptions of both the models and the parameters in the models.

But, of course, we will never eliminate uncertainty. Indeed, our current outlook is subject to factors that are particularly uncertain. I can't tell you how these factors will play out. But through our speeches, regular reports, and press releases, we will continue to address these uncertainties and keep Canadians informed about our views on the outlook for the Canadian econony.

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Summary Tables

A1 Summary of Key Monetary Policy Variables

Monthly		Inflation-control target (12-month rate)			Policy instrument			Monetary conditions			Monetary aggregates (12-month growth rate)			Inflation indicators					
		Target range	CPI	Core CPI*	Operating band for overnight rate (end of month)		Overnight money market rate	Monetary conditions index (January 1987=0)	90-day commercial paper rate	C-6 trade-weighted exchange rate (1992=100)	Gross M1	M1++	M2++	Yield spread between conventional and Real Return Bonds	Total CPI excluding food, energy, and the effect of changes in indirect taxes	CPIW	Unit labour costs	IPPI (finished products)	Average hourly earnings of permanent workers
					Low	High													
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
2000	O	1-3	2.8	1.3	5.50	6.00	5.7514	-5.70	5.85	81.87	17.5	9.6	7.5	2.09	1.5	1.6	3.4	3.5	3.7
	N	1-3	3.2	1.5	5.50	6.00	5.7500	-6.22	5.89	80.49	15.8	9.5	7.5	2.00	1.8	1.8	4.2	4.8	3.3
	D	1-3	3.2	1.8	5.50	6.00	5.8000	-5.92	5.71	81.66	15.6	10.1	8.0	2.14	1.9	2.0	3.7	3.0	3.2
2001	J	1-3	3.0	1.8	5.25	5.75	5.4914	-6.06	5.29	82.36	14.4	9.1	7.7	2.36	2.0	2.0	3.9	3.7	3.0
	F	1-3	2.9	1.7	5.25	5.75	5.4900	-6.94	5.05	80.78	14.3	8.5	7.7	2.27	2.0	1.9	3.6	3.8	3.5
	M	1-3	2.5	1.8	4.75	5.25	4.9927	-7.93	4.66	79.35	13.5	7.7	7.5	2.34	1.7	1.9	4.3	3.8	3.7
	A	1-3	3.6	2.3	4.50	5.00	4.7442	-7.71	4.49	80.28	11.3	7.2	7.3	2.36	1.9	2.4	0.4	4.3	3.5
	M	1-3	3.9	2.3	4.25	4.75	4.6700	-7.60	4.49	80.54	11.7	8.9	7.8	2.45	2.0	2.5	3.6	3.8	4.0
	J	1-3	3.3	2.3	4.25	4.75	4.4935	-7.03	4.38	82.21	10.0	8.0	7.2	2.36	1.9	2.4	3.3	2.8	3.8
	J	1-3	2.6	2.4	4.00	4.50	4.2414	-7.70	4.22	80.97	9.5	8.3	7.0	2.28	2.1	2.4	3.8	2.6	3.3
	A	1-3	2.8	2.3	3.75	4.25	4.1679	-8.28	3.96	80.18	9.1	8.7	7.0	1.99	2.1	2.3	2.8	2.5	2.5
	S	1-3	2.6	2.3	3.25	3.75	3.4858	-9.69	3.19	78.65	11.7	10.7	7.6	2.18	2.0	2.3	1.9	3.5	2.3
	O	1-3	1.9	2.2	2.50	3.00	2.7412	-10.59	2.45	78.28	12.0	10.8	7.8	1.71	1.8	2.1	2.6	1.4	2.5
	N	1-3	0.7	1.7	2.00	2.50	2.5955	-10.78	2.17	78.50	13.7	13.1	8.7	1.91	1.4	1.7	1.8	0.6	3.0
	D	1-3	0.7	1.6	2.00	2.50	2.2444	-10.94	2.08	78.33	14.3	14.0	7.6	1.93	1.3	1.6	2.3	1.0	3.3
2002	J	1-3	1.3	1.8	1.75	2.25	1.9923	-10.82	2.07	78.63	14.4	15.5	8.0	1.95	1.4	1.8	1.7	2.0	3.5
	F	1-3	1.5	2.2	1.75	2.25	1.9926	-11.07	2.16	77.84	12.7	15.5	7.5	1.96	1.4	2.1	0.7	1.5	3.4
	M	1-3	1.8	2.1	1.75	2.25	1.9933	-10.61	2.36	78.45	12.4	15.7	7.0	2.30	1.8	2.1	0.5	1.1	3.2
	A	1-3	1.7	2.2	2.00	2.50	2.2440	-10.07	2.46	79.48	11.8	15.3	7.0	2.29	1.9	2.1	-	0.6	2.8
	M	1-3	1.0	2.2	2.00	2.50	2.2471	-9.31	2.68	80.79	12.0	14.5	6.7	2.24	2.0	1.9	1.0	-0.3	2.4
	J	1-3	1.3	2.1	2.25	2.75	2.4964	-9.12	2.78	80.99	13.1	15.8	6.9	2.32	2.1	1.9	0.4	0.6	2.7
	J	1-3	2.1	2.1	2.50	3.00	2.7418	-10.40	2.88	77.71	13.4	14.8	6.8	2.28	2.1	2.0	-0.3	0.5	2.8
	A	1-3	2.6	2.5	2.50	3.00	2.7448	-9.68	3.09	78.90	13.8	15.2	6.7	2.18	2.2	2.4	0.5	1.3	3.0
	S	1-3	2.3	2.5	2.50	3.00	2.7447	-10.27	2.90	77.97	10.7	12.7	6.1	2.18	2.3	2.3	-	0.9	2.8
	O	1-3	3.2	2.5	2.50	3.00	2.7449	-10.06	2.83	78.63	11.4	12.5	5.6	2.18	2.5	2.4	0.5	2.1	2.7
	N	1-3	4.3	3.1	2.50	3.00	2.7431	-10.21	2.85	78.24	9.4	10.2	4.8	2.15	3.1	3.0	1.4	1.8	2.5
	D	1-3	3.9	2.7	2.50	3.00	2.7439	-9.80	2.83	79.24	6.8	8.0	3.8	2.09	3.3	2.4	0.7	2.1	1.9
2003	J	1-3	4.5	3.3	2.50	3.00	2.7439	-9.34	2.91	80.15	7.4	7.2	3.7	2.27	3.3	2.9	1.2	1.1	1.9
	F	1-3	4.6	3.1	2.50	3.00	2.7469	-8.61	2.97	81.78	6.9	6.3	3.3	2.40	3.3	2.9	1.3	1.1	2.1
	M	1-3	4.3	2.9	2.75	3.25	2.9920	-7.72	3.28	83.22	6.3	5.5	3.3	2.50	3.1	2.7	1.4	0.1	1.8
	A	1-3	3.0	2.1	3.00	3.50	3.2373	-6.92	3.35	85.07	6.7	5.3	3.0	2.28	2.8	2.1	2.1	-1.5	1.3
	M	1-3	2.9	2.3	3.00	3.50	3.2416	-6.02	3.27	87.60	7.3	5.5	3.5	2.12	2.5	2.2	1.3	-2.7	1.8
	J	1-3	2.6	2.1	3.00	3.50	3.2449	-5.11	3.11	90.45	7.9	5.5	3.3	2.04	2.1	2.0	1.4	-3.7	1.4
	J	1-3	2.2	1.8	2.75	3.25	2.9947	-6.60	2.89	87.07	10.0	6.7	3.6	2.25	1.7	1.9	1.8	-2.1	2.1
	A	1-3	2.0	1.5	2.75	3.25	2.9972	-6.68	2.80	87.11	9.4	6.7	3.5	2.29	1.7	1.7	1.8	-2.6	2.1
	S	1-3	2.2	1.7	2.50	3.00	2.7490	-5.93	2.64	89.52	8.4	6.5	3.4	2.15	1.8	1.9	1.2	-3.8	2.7
	O	1-3	1.6	1.8	2.50	3.00	2.7492	-4.85	2.71	92.25	7.2	6.1	3.0	2.38	1.8	1.8	1.2	-5.5	2.7
	N	1-3	1.6	1.8	2.50	3.00	2.7481	-4.73	2.73	92.54	8.6	6.7	3.1	2.38	1.8	1.7	0.3	-6.0	2.3
	D	1-3	2.0	2.2	2.50	3.00	2.7481	-4.68	2.66	92.87	9.8	7.5	3.8	2.41	1.5	2.1	0.6	-5.4	2.7
2004	J	1-3	1.2	1.5	2.25	2.75	2.4951	-5.77	2.37	90.68	10.7	8.3	3.7	2.66	1.5	1.5	0.6	-5.3	2.7
	F	1-3	0.7	1.1	2.25	2.75	2.4953	-6.21	2.25	89.82	13.3	9.6	4.4	2.53	1.0	1.2	1.2	-4.3	2.8
	M	1-3	0.7	1.3	2.00	2.50	2.2482	-5.72	2.10	91.55	14.3	10.4	4.6	2.65	1.1	1.2	0.4	-3.5	3.0
	A	1-3	1.6	1.8	1.75	2.25	1.9959	-6.98	2.05	88.28	15.7	12.0	5.1	2.85	1.2	1.7	0.8	-1.3	3.2
	M	1-3	2.5	1.5	1.75	2.25	1.9985	-7.08	2.07	87.98	16.4	13.1	5.1	3.00	1.2	1.8	0.8	2.8	3.0
	J	1-3	2.5	1.7	1.75	2.25	2.0005	-6.36	2.10	89.81	14.6	13.0	5.6	2.96	1.4	1.8	1.2	3.1	3.3
	J	1-3	2.3	1.9	1.75	2.25	1.9973	-6.03	2.12	90.65	11.2	11.6	5.1	2.98	1.4	1.9		0.5	2.5
	A	1-3	1.9	1.5	1.75	2.25	1.9979	-5.28	2.22	92.43	10.6	10.5		2.93	1.0	1.7		0.1	2.3
	S				2.00	2.50	2.2496	-4.22	2.50	94.63				2.72					2.1

* New definition for core CPI as announced on 18 May 2001: CPI excluding the eight most volatile components: fruit, vegetables, gasoline, fuel oil, natural gas, intercity transportation, tobacco, and mortgage-interest costs, as well as the effect of changes in indirect taxes on the remaining CPI components

A2 Major Financial and Economic Indicators

Rates of change based on seasonally adjusted data, percentage rates unless otherwise indicated

	Year, quarter, and month		Money and credit									Output and employment				
			Monetary aggregates					Business credit		Household credit		GDP in current prices	GDP volume (millions of chained 1997 dollars, quarterly)	GDP by industry (millions of 1997 dollars, monthly)	Employment (*Labour Force Information*)	Un-employment rate
			Gross M1	M1+	M1++	M2+	M2++	Short-term business credit	Total business credit	Consumer credit	Residential mortgages					
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	1991		2.7	4.9	2.9	8.6	7.6	1.0	3.5	2.0	8.2	0.8	-2.1		-1.8	10.3
	1992		7.1	4.2	0.2	5.8	7.1	-3.4	1.8	1.3	8.4	2.2	0.9		-0.7	11.2
	1993		9.4	5.1	-0.7	4.2	6.6	-6.3	0.7	2.3	7.6	3.8	2.3		0.8	11.4
	1994		13.2	8.4	1.4	1.9	6.8	1.6	4.8	7.9	6.4	6.0	4.8		2.0	10.4
	1995		6.6	0.8	-2.6	3.8	4.1	5.6	5.2	7.5	3.7	5.1	2.8		1.9	9.4
	1996		12.2	8.2	3.3	4.4	6.8	1.6	5.5	6.5	4.2	3.3	1.6		0.8	9.6
	1997		16.9	11.2	7.2	0.9	7.2	7.7	10.0	10.0	5.6	5.5	4.2		2.3	9.1
	1998		10.3	7.0	3.1	-1.1	5.5	11.5	11.6	10.1	4.9	3.7	4.1	3.8	2.7	8.3
	1999		7.6	6.0	4.3	3.6	5.3	1.9	6.2	7.9	4.3	7.4	5.5	5.6	2.8	7.6
	2000		14.7	10.6	8.8	5.9	7.0	6.4	7.4	12.6	4.8	9.6	5.2	5.5	2.6	6.8
	2001		12.1	10.3	9.6	6.6	7.6	-1.2	5.7	6.2	4.1	2.9	1.8	1.9	1.1	7.2
	2002		11.7	10.9	13.7	7.4	6.4	-5.8	3.9	6.0	7.3	4.5	3.4	3.5	2.2	7.7
	2003		8.0	5.1	6.3	4.7	3.4	-2.8	1.8	8.9	8.1	5.3	2.0	2.1	2.2	7.6
Annual rates	2000	III	11.6	8.4	6.4	5.0	6.8	3.1	5.5	11.3	2.1	8.4	5.1	4.7	1.4	6.9
		IV	9.1	9.8	7.6	3.4	7.0	7.1	7.2	8.1	3.6	4.1	1.1	2.3	3.0	6.9
	2001	I	13.5	7.8	6.1	7.7	8.4	-0.9	5.7	3.8	3.0	4.7	1.4	1.1	0.3	7.0
		II	10.0	12.7	12.1	8.1	7.5	-15.0	2.9	4.2	3.9	0.8	0.9	1.1	0.9	7.1
		III	7.8	7.9	11.2	5.1	5.8	-3.2	5.6	5.1	6.3	-5.6	-0.6	-0.3	0.2	7.2
		IV	22.6	16.4	21.6	13.4	10.4	-0.4	5.8	1.9	7.0	-1.3	4.0	2.6	0.3	7.6
	2002	I	12.7	14.2	17.6	8.4	6.3	-11.2	4.0	4.9	7.3	8.8	5.5	6.1	2.7	7.9
		II	6.7	7.4	10.7	4.2	4.9	-5.9	2.6	8.8	8.8	12.0	3.8	4.7	4.1	7.6
		III	9.1	7.3	7.6	5.8	4.6	-2.6	2.6	9.9	8.2	5.4	4.2	4.0	3.9	7.5
		IV	8.2	5.3	5.3	4.1	3.2	-0.5	2.1	9.6	7.3	6.4	1.9	1.6	2.8	7.6
	2003	I	3.4	0.5	1.9	4.5	1.0	-1.2	1.6	6.7	7.7	9.6	2.8	2.3	1.8	7.5
		II	8.7	5.2	6.9	6.2	4.5	-1.3	0.7	8.8	8.1	-2.6	-0.7	-0.1	0.7	7.7
		III	17.3	11.5	12.8	5.0	5.4	-6.7	1.6	11.5	8.9	4.2	1.4	1.6	0.8	7.9
		IV	5.2	4.0	5.7	0.2	2.4	-10.1	2.6	8.9	9.6	4.8	3.3	4.5	3.6	7.5
	2004	I	20.5	11.2	12.5	5.2	4.7	-3.2	4.7	8.2	8.5	7.6	3.0	3.0	1.1	7.4
		II	19.9	17.0	20.2	8.7	8.5	11.0	6.4	10.7	10.8	10.2	4.3	3.9	2.0	7.2
		III													1.3	7.1
Last three months			5.4	8.3	11.7	8.9	8.2	15.8	8.4	12.7	11.1			3.6	1.3	7.1
Monthly rates	2003	S	-0.1	-0.2	0.2	-	0.2	-1.3	-	0.8	0.8			1.2	0.3	7.9
		O	0.1	0.2	0.3	-0.3	-	-0.4	0.3	0.7	0.8			0.2	0.4	7.6
		N	1.2	0.7	0.8	0.2	0.5	-1.3	0.2	0.8	0.9			0.3	0.4	7.5
		D	1.0	0.3	0.5	0.5	0.1	-0.8	0.4	0.7	0.4			0.6	0.3	7.4
	2004	J	1.7	1.2	1.2	0.4	0.4	-0.1	0.5	0.8	0.8			-	0.1	7.4
		F	2.4	0.7	0.8	0.5	0.6	-0.1	0.3	0.3	0.7			-0.1	-0.1	7.4
		M	1.1	1.5	1.9	0.4	0.3	0.8	0.4	0.6	0.5			1.0	-0.1	7.5
		A	1.9	1.4	1.6	0.8	0.9	0.7	0.4	1.0	1.1			0.1	0.3	7.3
		M	1.7	1.6	1.7	0.8	0.7	0.9	0.6	1.1	0.9			0.1	0.4	7.2
		J	0.1	0.7	1.1	1.1	0.9	2.6	0.9	1.1	1.0			0.5	0.2	7.3
		J	-0.6	-0.3	0.1	-0.1	0.1	0.6	0.6	1.1	0.6			0.1	0.1	7.2
		A	-0.3	-	-0.1			-0.3	0.4						-	7.2
		S													0.3	7.1

A2 (Continued)

Capacity utilization rate		Prices and costs				Wage settlements		Bank of Canada commodity price index (unadjusted)		Securities mid-market yield			Year, quarter, and month
Total industrial	Manufacturing industries	CPI	Core CPI*	GDP chain price index	Unit labour costs	Public sector	Private sector	Total	Non-energy	Treasury bills 3-month	Canada 10-year benchmark bonds	Canada 30-year Real Return Bonds	
(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	
78.3	74.2	5.6	2.8	2.9		3.4	4.3	-11.2	-11.8	7.43	8.32	4.45	1991
78.2	76.4	1.5	1.8	1.3		2.0	2.6	-0.3	0.6	7.01	7.86	4.62	1992
80.0	79.9	1.8	2.1	1.4		0.6	0.8	0.5	3.0	3.87	6.57	3.78	1993
82.4	83.5	0.2	1.8	1.1		-	1.2	3.3	7.5	7.14	9.07	4.92	1994
81.6	83.9	2.2	2.3	2.3		0.7	1.4	8.3	11.1	5.54	7.11	4.42	1995
81.2	82.8	1.6	1.7	1.6		0.5	1.8	3.8	-1.2	2.85	6.37	4.09	1996
82.5	83.6	1.6	1.9	1.2		1.1	1.9	-3.7	-4.3	3.99	5.61	4.14	1997
83.3	84.3	0.9	1.3	-0.5	1.0	1.6	1.7	-15.3	-12.6	4.66	4.89	4.11	1998
84.4	85.9	1.7	1.4	1.7	0.1	1.9	2.7	6.7	1.5	4.85	6.18	4.01	1999
84.9	86.1	2.7	1.3	4.2	3.0	2.5	2.4	18.4	3.5	5.49	5.35	3.42	2000
82.2	81.7	2.6	2.1	1.1	2.8	3.3	3.0	-5.2	-6.9	1.95	5.44	3.76	2001
82.3	83.3	2.2	2.3	1.0	0.6	2.9	2.6	-5.9	-6.6	2.63	4.88	3.33	2002
82.1	83.0	2.8	2.2	3.2	1.3	2.9	1.5	20.1	8.8	2.57	4.66	2.79	2003
84.8	86.2	4.0	1.8	3.1	0.8	2.6	1.9	5.8	-17.6	5.56	5.75	3.60	2000 III
84.9	86.3	4.2	2.5	3.1	2.7	3.0	2.3	17.0	-7.6	5.49	5.35	3.42	IV
83.5	83.5	1.0	1.5	3.0	4.4	3.9	2.5	11.6	-5.5	4.58	5.41	3.45	2001 I
83.3	82.9	5.2	3.2	-	1.7	3.1	3.0	-16.0	23.0	4.30	5.73	3.53	II
81.5	80.8	0.5	2.2	-5.1	2.4	3.7	3.2	-38.1	-22.2	3.05	5.32	3.68	III
80.4	79.6	-2.1	0.6	-4.8	0.3	3.0	2.4	-41.3	-30.8	1.95	5.44	3.76	IV
81.3	81.6	2.9	2.6	3.1	-0.7	3.1	2.1	15.9	12.3	2.30	5.79	3.68	2002 I
82.3	83.3	4.5	3.2	7.8	-0.1	2.7	2.1	40.0	-1.8	2.70	5.37	3.42	II
82.9	84.2	4.3	3.2	1.1	0.8	3.2	2.5	2.8	-1.5	2.83	4.92	3.25	III
82.6	83.9	3.7	2.1	4.5	3.5	3.3	3.5	20.4	-4.0	2.63	4.88	3.33	IV
82.7	83.8	4.8	3.8	6.8	1.1	2.9	2.3	82.0	14.1	3.14	5.13	3.08	2003 I
81.4	82.2	-1.6	-0.4	-1.8	0.9	3.1	0.8	-17.4	14.8	3.07	4.37	2.99	II
81.3	81.6	1.8	1.1	2.6	1.0	3.2	2.3	0.6	20.8	2.58	4.64	3.08	III
83.0	84.2	2.0	3.4	1.4	-0.2	2.2	1.6	17.6	19.5	2.57	4.66	2.79	IV
83.4	85.0	1.3	1.0	4.4	1.3	2.8	2.7	45.3	38.9	1.98	4.33	2.39	2004 I
84.6	86.6	3.8	1.4	5.8	1.6	-0.4	2.5	36.7	34.4	2.01	4.83	2.37	II
								5.4	1.5	2.45	4.58	2.32	III
		2.4	1.5		1.6			5.4	1.5	2.45	4.58	2.32	
		0.2	0.4		-0.6			-1.8	3.6	2.58	4.64	3.08	2003 S
		-0.1	0.2		0.1			1.1	-0.8	2.64	4.85	3.00	O
		0.3	0.3		-0.2			1.3	2.5	2.67	4.79	2.91	N
		0.3	0.2		0.3			8.5	1.7	2.57	4.66	2.79	D
		-	-		0.1			2.8	2.7	2.25	4.61	2.57	2004 J
		-0.1	-0.1		0.4			-0.1	4.2	2.13	4.41	2.56	F
		0.2	0.1		-0.6			2.6	2.5	1.98	4.33	2.39	M
		0.4	0.2		0.5			3.2	3.4	1.95	4.71	2.46	A
		0.6	0.2		0.1			4.9	1.2	1.98	4.77	2.32	M
		0.1	0.2		0.4			-0.9	0.9	2.01	4.83	2.37	J
		-	0.2					0.3	-0.3	2.08	4.82	2.31	J
		-0.2	-0.2					1.0	0.5	2.13	4.68	2.22	A
								-1.9	-2.2	2.45	4.58	2.32	S

* New definition for core CPI as announced on 18 May 2001: CPI excluding the eight most volatile components: fruit, vegetables, gasoline, fuel oil, natural gas, intercity transportation, tobacco, and mortgage-interest costs, as well as the effect of changes in indirect taxes on the remaining CPI components

A2 (Continued)

	Year, quarter, and month	Government surplus or deficit (-) on a national accounts basis (as a percentage of GDP)		Balance of payments (as a percentage of GDP)		U.S. dollar, in Canadian dollars, average noon spot rate
		Government of Canada	Total, all levels of government	Merchandise trade	Current account	
		(28)	(29)	(30)	(31)	(32)
	1991	-5.4	-8.4	1.0	-3.7	1.1458
	1992	-5.1	-9.1	1.3	-3.6	1.2083
	1993	-5.5	-8.7	1.8	-3.9	1.2898
	1994	-4.6	-6.7	2.6	-2.3	1.3659
	1995	-3.9	-5.3	4.4	-0.8	1.3726
	1996	-2.0	-2.8	5.1	0.5	1.3636
	1997	0.7	0.2	2.9	-1.3	1.3844
	1998	0.8	0.1	2.6	-1.2	1.4831
	1999	0.9	1.6	4.3	0.3	1.4858
	2000	1.9	2.9	6.2	2.7	1.4852
	2001	1.3	1.1	6.3	2.3	1.5484
	2002	0.8	0.3	4.9	2.0	1.5704
	2003	0.4	0.6	4.8	2.0	1.4015
Annual rates	2000 III	2.3	3.3	6.3	2.9	1.4822
	IV	1.9	2.8	7.1	3.2	1.5258
	2001 I	1.7	2.1	8.0	3.9	1.5280
	II	1.8	2.0	7.0	2.9	1.5409
	III	1.2	0.7	5.1	1.1	1.5453
	IV	0.4	-0.3	5.2	1.1	1.5803
	2002 I	0.6	-0.1	5.4	2.8	1.5946
	II	0.6	0.1	5.1	2.4	1.5549
	III	0.7	0.3	4.7	1.5	1.5628
	IV	1.2	0.9	4.5	1.1	1.5698
	2003 I	0.8	0.9	5.2	1.7	1.5102
	II	-0.8	0.1	4.4	1.8	1.3984
	III	0.7	0.7	4.9	2.2	1.3799
	IV	0.8	0.8	4.6	2.2	1.3160
	2004 I	0.5	0.6	5.2	2.6	1.3179
	II	0.1	1.1	6.2	3.2	1.3592
	III					1.3072
Last three months						1.3072
Monthly rates	2003 S					1.3632
	O					1.3218
	N					1.3126
	D					1.3128
	2004 J					1.2960
	F					1.3290
	M					1.3284
	A					1.3425
	M					1.3783
	J					1.3577
	J					1.3219
	A					1.3118
	S					1.2878

Notes to the Tables

Symbols used in the tables

R Revised

– Value is zero or rounded to zero.

Note:

Blank spaces in columns indicate that data are either not available or not applicable.

A horizontal rule in the body of the table indicates either a break in the series or that the earlier figures are available only at a more aggregated level.

A1

(1) In February 1991, the federal government and the Bank of Canada jointly announced a series of targets for reducing inflation to the midpoint of a range of 1 to 3 per cent by the end of 1995. In December 1993, this target range was extended to the end of 1998. In February 1998, it was extended again to the end of 2001. In May 2001, it was extended to the end of 2006.

(2-3) Year-to-year percentage change in consumer price index (Table H8). The core CPI is the CPI excluding the eight most volatile components: fruit, vegetables, gasoline, fuel oil, natural gas, intercity transportation, tobacco, and mortgage-interest costs, as well as the effect of changes in indirect taxes on the other CPI components

(4–5) The *operating band* is the Bank of Canada's 50-basis-point target range for the average overnight rate paid by investment dealers to finance their money market inventory.

(6) The *overnight money market financing rate* is an estimate compiled by the Bank of Canada. This measure includes funding of the major money market dealers through general collateral buyback arrangements (repo) including special purchase and resale agreements with the Bank of Canada and funding through call loans and swapped foreign exchange funds. Prior to 1996, data exclude all repo activity with the exception of those arranged directly with the Bank of Canada. These latter have been included in the calculation since 1995.

(7) The *monetary conditions index* is a weighted sum of the changes in the 90-day commercial paper rate and the C–6 trade-weighted exchange rate (see technical note in the Winter 1998–1999 issue of the *Bank of Canada Review*, pages 125 and 126). The index is calculated as the change in the interest rate plus one-third of the percentage change in the exchange rate. The Bank does not try to maintain a precise MCI level in the short run. See *Monetary Policy Report*, May 1995, p.14.

(8) *90-day commercial paper rate.* The rate shown is the Bank of Canada's estimate of operative market trading levels on the date indicated for major borrowers' paper.

(9) The C–6 exchange rate is an index of the weighted-average foreign exchange value of the Canadian dollar against major foreign currencies. (See technical note in the Winter 1998–1999 issue of the *Bank of Canada Review*, pages 125 and 126.) Weights for each country are derived from Canadian merchandise trade flows with other countries over the three years from 1994 through 1996. The index has been based to 1992 (i.e., C–6 = 100 in 1992). The C–6 index broadens the coverage of the old G–10 index to include all the countries in the EMU.

(10) Gross M1: Currency outside banks plus personal chequing accounts plus current accounts plus adjustments to M1 described in the notes to Table E1 *(Bank of Canada Banking and Financial Statistics)*.

(11) M1++: M1+ plus non-chequable notice deposits held at chartered banks plus all non-chequable deposits at trust and mortgage loan companies, credit unions, and caisses populaires less interbank non-chequable notice deposits plus continuity adjustments.

(12) M2++: M2+ plus Canada Savings Bonds plus cumulative net contributions to mutual funds other than Canadian-dollar money market mutual funds (which are already included in M2+).

(13) Yield spreads between *conventional* and *Real Return Bonds* are based on actual mid-market closing yields of the selected long-term bond issue. At times, some of the change in the yield that occurs over a reporting period may reflect switching to a more current issue. Yields for Real Return Bonds are mid-market closing yields for the last Wednesday of the month and are for the 4.25% bond maturing 1 December 2026. Prior to 7 December 1995, the benchmark bond was 4.25% maturing 1 December 2021.

(14–15) CPI excluding food, energy, and the effect of changes in indirect taxes. CPIW adjusts each of the CPI basket weights by a factor that is inversely proportional to the component's variability. For more details, see "Statistical measures of the trend rate of inflation." *Bank of Canada Review,* Autumn 1997, 29–47

(16) *Unit labour costs* are defined as aggregate labour income per unit of output (real GDP at basic prices).

(17) IPPI: Industrial product price index for finished products comprises the prices of finished goods that are most commonly used for immediate consumption or for capital investment.

(18) Data for average hourly earnings of permanent workers are from Statistics Canada's *Labour Force Information* (Catalogue 71-001).

A2

The majority of data in this table are based on, or derived from, series published in statistical tables in the *Bank of Canada Banking and Financial Statistics.* For each column in Table A2, a more detailed description is given below, as well as the source table in the *Banking and Financial Statistics,* where relevant.

(1) Gross M1: Currency outside banks plus personal chequing accounts plus current accounts plus adjustments to M1 described in the notes to Table E1.

(2) M1+: Gross M1 plus chequable notice deposits held at chartered banks plus all chequable deposits at trust and mortgage loan companies, credit unions, and caisses populaires (excluding deposits of these institutions) plus continuity adjustments.

(3) M1++: M1+ plus non-chequable notice deposits held at chartered banks plus all non-chequable despoits at trust and mortgage loan companies, credit unions, and caisses populaires less interbank non-chequable notice deposits plus continuity adjustments.

(4) M2+: M2 plus deposits at trust and mortgage loan companies and government savings institutions, deposits and shares at credit unions and caisses populaires, and life insurance company individual annuities and money market mutual funds plus adjustments to M2+ described in notes to Table E1.

(5) M2++: M2+ plus Canada Savings Bonds plus cumulative net contributions to mutual funds other than Canadian-dollar money market mutual funds (which are already included in M2+).

(6) Short-term business credit (Table E2)

(7) Total business credit (Table E2)

(8) Consumer credit (Table E2)

(9) Residential mortgage credit (Table E2)

(10) Gross domestic product in current prices (Table H1)

(11) Gross domestic product in chained 1997 dollars (Table H2)

(12) Gross domestic product by industry (Table H4)

(13) Civilian employment as per labour force survey (Table H5)

(14) Unemployment as a percentage of the labour force (Table H5)

(15-16) Data for capacity utilization rates are obtained from the Statistics Canada quarterly publication *Industrial Capacity Utilization Rates in Canada* (Catalogue 31-003), which provides an overview of the methodology. *Non-farm goods-producing industries* include logging and forestry; mines, quarries and oil wells; manufacturing; electric power and gas utilities; and construction.

(17) Consumer price index (Table H8)

(18) Consumer price index excluding the eight most volatile components: fruit, vegetables, gasoline, fuel oil, natural gas, intercity transportation, tobacco, and mortgage-interest costs, as well as the effect of changes in indirect taxes on the other CPI components. (Table H8)

(19) Gross domestic product chain price index (Table H3)

(20) Unit labour costs are defined as aggregate labour income per unit of output (real GDP at basic prices).

(21–22) The data on wage settlements are published by Human Resources Development Canada and represent the effective annual increase in base wage rates for newly negotiated settlements. These data cover bargaining units with 500 or more employees. Contracts both with and without cost-of-living-allowance clauses are included.

(23–24) Bank of Canada commodity price indexes: Total and total excluding energy (Table H9)

(25) *Treasury bills* are mid-market rates for typical quotes on the Wednesday shown.

(26–27) *Selected Government of Canada benchmark bond yields* are based on actual mid-market closing yields of selected Canada bond issues that mature approximately in the indicated term areas. At times, some of the change in the yield occurring over a reporting period may reflect a switch to a more current issue. Yields for *Real Return Bonds* are mid-market closing yields for the last Wednesday of the month and are for the 4.25% bond maturing 1 December 2026. Prior to 7 December 1995, the benchmark bond was 4.25% maturing 1 December 2021.

(28-29) The data on the government surplus or deficit on a national accounts basis are taken from Statistics Canada's *National Income and Expenditure Accounts* (Catalogue 13-001), where the government surplus or deficit is referred to as "net lending."

(30) Merchandise trade balance, balance of payments basis (Table J1)

(31) Current account balance, balance of payments basis (Table J1)

(32) U.S. dollar in Canadian dollars, average noon spot rate (Table I1)