Transparency and the Response of Interest Rates to the Publication of Macroeconomic Data

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- *It is now widely recognized that greater transparency facilitates the smooth implementation of monetary policy and increases its effectiveness.*

- *The response of interest rates to the publication of macroeconomic data depends on the degree of transparency in the conduct of monetary policy. In an efficient market, interest rates could rise or fall following the publication of macroeconomic data as a reflection of the market's revised expectations of monetary policy.*

- *To the extent that market participants are able to anticipate monetary policy decisions, announcements of changes to the target overnight rate should not normally cause pronounced fluctuations in the short-term interest rate.*

- *Since the implementation of fixed announcement dates for the target overnight interest rate, the response of interest rates to the publication of macroeconomic data and to changes to the target overnight rate are an indication of how well financial markets now understand the factors taken into account by the Bank of Canada in its conduct of monetary policy.*

S ince the early1990s, the Bank of Canada has taken various steps to increase the transparency of its monetary policy in order to help financial markets to identify the information on which the Bank bases its monetary policy decisions. Transparency should thus cause financial markets to adjust their interest rate expectations as soon as macroeconomic data are published, in advance of any action by the central bank. This article[1] examines this aspect of transparency in monetary policy by examining the response of interest rates to the periodic publication of macroeconomic indicators.

Definition, Benefits, and Practice of Transparency

We define transparency as the outcome of all measures taken by the central bank to allow financial markets and economic agents in general to acquire a thorough knowledge and understanding of the factors taken into account in the formulation of monetary policy.[2]

It is widely recognized today that transparency in monetary policy yields many benefits. First, by announcing its inflation targets, the central bank helps economic agents to form their expectations of future inflation. Thus, the formation of inflation expectations when credible targets exist will attenuate rather than exacerbate the effect of unanticipated shocks on inflation. Second, transparency allows financial markets to better anticipate the measures that the central bank will implement, and to account for them in their operations.

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1. This article is an extension of the work of Gravelle and Moessner (2002), which contains a detailed description of the assumptions used here. However, as is explained in note 9, the econometric methodology used in this article is slightly different.

2. The information and analysis for monetary policy decisions are described in Macklem (2002).

Thus, the central bank can change its target for the overnight rate without provoking too much market volatility.

During the 1990s, the Bank of Canada implemented several initiatives that were intended, among other things, to make monetary policy more transparent.[3] These measures included the establishment in 1991 of the inflation-control targets, the semi-annual publication, as of 1995, of the *Monetary Policy Report* and, beginning in 1996, the issuing of press releases explaining monetary policy decisions. More recently, in December 2000, the Bank of Canada instituted a schedule of fixed dates for announcing changes to the target overnight rate.

Market Efficiency and the Impact of Transparency

To determine the degree of monetary stimulus required to achieve the inflation target midpoint of two per cent, the Bank of Canada monitors many macroeconomic indicators, including monthly release of the GDP and CPI data. When financial markets properly understand the factors that affect inflation, how the Bank evaluates them, and the steps it will likely take to deal with them, interest rates should instantly adjust to the information provided by new macroeconomic data. The theory of efficient markets predicts that the prices of financial instruments will always reflect all available information. If markets are efficient, interest rates should adjust virtually instantaneously after the release of data that modify financial markets'expectations concerning monetary policy.

Clearly, it is impossible to perfectly predict the decisions of the central bank, since they are not simple mechanical reactions but are taken in the context of economic uncertainty.

In a context of perfect transparency and symmetric information, changes to the overnight rate announced by the Bank of Canada would thus be completely anticipated by the markets, and consequently would

not result in any changes to the yield curve. The opposite would be true if monetary policy were poorly understood or if markets did not share the Bank's evaluation of the state of the economy. Clearly, it is impossible to perfectly predict the decisions of the central bank, since they are not simple mechanical reactions but are taken in the context of economic uncertainty.[4] For that reason, judgment remains critical to the decision-making process. Nevertheless, even if the conduct of monetary policy continues to be characterized by some uncertainty, increased transparency should yield a closer correlation between how the Bank and markets interpret economic developments.

Before December 2000, uncertainty associated with monetary policy sprang partly from the fact that markets did not know precisely when the Bank would change the overnight rate. Understanding the role of Canadian macroeconomic data in the decision-making process shed little light on this issue, so market participants put limited effort into understanding the possible impact this data might have on monetary policy. In addition, since participants always had to position themselves in markets with an eye to a possible change in the overnight rate, trading slowed to a snail's pace on mornings when the announcement of a change to the overnight rate was expected. This uncertainty sometimes lasted for several consecutive days. The new system was meant to allow financial markets to better anticipate changes to the interest rate and to encourage them to pay closer attention to the economic and monetary environment in Canada.[5] One of our specific purposes here is to determine whether these goals have been met.

Modelling Factors That Affect Interest Rates

For the purposes of our analysis, we used a model that allowed us to measure the impact that the "surprise" component of published macroeconomic data and changes to the overnight rate have on short-term rates. This model is based on simple linear regressions and is written as follows:

$$\Delta y_t = \alpha + \sum_{i=1}^{n} \beta_i (x_{i,t} - x^e_{i,t}) + \eta \Delta r_t + \sum_{i=1}^{m} \lambda \Delta y_{t-i} + \varepsilon_t,$$

4. See Jenkins and Longworth (2002).

5. See Dodge (2002).

3. See Thiessen (2000).

where the dependent variable, Δy_t represents the daily change in the interest rate for a given term,[6] α is a constant, $x_{i,t}$ reflects the value of macroeconomic indicator i published on day t, n is the number of macroeconomic indicators, $x^e_{i,t}$ captures market expectations for this indicator,[7] Δr is the change in the target for the overnight rate, and Δy_{t-i} is the lagged value of the dependent variable.

Financial markets' expectations are given by the median of the responses from Standard & Poor's MMS survey conducted before each release of data. On days when no announcements are made, $x_{i,t} - x^e_{i,t}$ is equal to zero. The coefficients of each regression are estimated using ordinary least squares.[8] Including the change in the overnight rate allowed us to verify whether changes to this rate were anticipated by the markets. The closing rates on futures contracts for three-month bankers' acceptances (BAX contracts), as well as yields on two-year benchmark bonds issued by the Government of Canada, were our dependent variables. We used BAX futures rather than another money market instrument because they tend to react more rapidly than other financial instruments to macroeconomic announcements. Harvey (1996) explains that, "The higher degree of flexibility provided by the BAX market may encourage participants to deal in the BAX market before dealing in the spot market when new information is available."

We used both Canadian and U.S. economic indicators in our study. Since Canada is an open economy closely linked to the economy of the United States, we expected the U.S. data to affect the Canadian yield curve. We therefore used 10 explanatory variables from the U.S. economy in addition to Canadian macroeconomic data. The Canadian indicators are the consumer price index (CPI); the CPI excluding food,

energy, and the effects of changes in indirect taxes; the producer price index; wage settlements; employment; the unemployment rate; retail sales; the merchandise trade balance; GDP; and the current account. The U.S. macroeconomic indicators are non-farm payrolls, the unemployment rate, the CPI, the producer price index, housing starts, retail sales, the index produced by the National Association of Purchasing Management (NAPM, recently renamed ISM), industrial production, trade in goods and services, and the GDP.

Empirical Evidence

To evaluate the Bank's success in achieving greater transparency, we estimated the model for two periods. The first ran from February 1996, when the Bank began to issue press releases explaining the reasons underlying each monetary policy decision, until November 2000, i.e., immediately before the establishment of the system of fixed announcement dates. The second period began in December 2000 and ended in September 2002. We used this second period to determine whether the new system appears to have focused the attention of market participants more on the Canadian economy. Clearly, care must be taken in evaluating the results of this process, since the second sample is very short.

One striking result from the analysis of the first period is the significant impact that changes to the overnight rate had on interest rates (see Table 1). This result is consistent with our expectations, since the higher levels of uncertainty that existed before the implementation of the fixed announcement dates made predicting monetary policy much harder. The opposite result

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6. Ideally, one would measure interest rate variations occurring within minutes of the publication of data. Indeed, Ederington and Lee (1993) and Fleming and Remolona (1999) show that price reactions to an anticipated publication of economic data are exhausted after one or two minutes. In many empirical studies, however, the researcher does not have access to high-frequency data—for example, minute-by-minute observations. Consequently, the interest rate variations we used in this study reflect changes in the closing rate observed between two consecutive working days.

7. According to the theory of efficient financial markets, interest rates should react exclusively to the unanticipated element of announcements. If announcements perfectly reflect the participants' expectations, then interest rates do not react to this information.

8. A covariance matrix adjusted by the Newey-West method yields unbiased estimates in the case of heteroscedasticity and serial correlation of the residuals (Newey and West 1987).

Table 1

The Response of Interest Rates to Changes in the Overnight Rate

	BAX contracts	Two-year interest rates
Coefficient of the variation in the overnight rate (from February 1996 to November 2000)	0.450	0.161
(*p*-value)	(0.001)	(0.011)
Coefficient of the variation in the overnight rate (from December 2000 to September 2002)	0.082	0.022
(*p*-value)	(0.298)	(0.764)

Note: When the *p*-value is less than 0.01, the coefficient of the variable is significantly different than 0 at the 1 per cent level.

was evident when the same estimation was performed on data from the period following the establishment of the new system, suggesting that the system of fixed announcement dates improved market participants' ability to predict monetary policy measures.

With regard to the importance assigned to macroeconomic data, results from the first period indicate that Canadian interest rates did not measurably react to the publication of Canadian data.

With regard to the importance assigned to macroeconomic data, results from the first period indicate that Canadian interest rates did not measurably react to the publication of Canadian data. Aside from employment data, which significantly affected the two-year rate at the 5 per cent level, no release of Canadian macroeconomic data affected interest rates before the implementation of fixed announcement dates.[9] Moreover, our results reveal that, taken together, the Canadian data did not have a significant impact on interest rates (see Table 2). During the period preceding the adoption of the fixed announcement dates, U.S. indicators significantly explained the changes in Canadian interest rates. In fact, several coefficients of U.S. indicators are significant and have the expected sign. Four U.S. indicators had an impact on both the two-year interest rates and the BAX futures: industrial production, the ISM index, non-farm payrolls, and retail sales. Comments from market participants and analysts confirm that these four variables are indeed likely to affect markets.[10]

Given the size of the U.S. market and the level of openness of the Canadian economy, we would expect Canadian interest rates to be affected by the economic

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9. At the 1 per cent level, no coefficient associated with Canadian announcements is significantly different than zero. Gravelle and Moessner (2002) obtain the same result. Their model is similar, except that they do not include lagged values for the dependent variable.

10. U.S. GDP also counts among the variables with a significant impact on the BAX, but it does not have the expected positive sign.

Table 2

Tests for Exclusion of Canadian Data

	BAX contracts	Two-year interest rates
p-value associated with a Wald test (sample February 1996 to November 2000)	0.238	0.370
p-value associated with a Wald test (sample December 2000 to September 2002)	0.000	0.000

Note: When the *p*-value is less than 0.01, the assumption that Canadian data have no significant impact at the 1 per cent level is rejected.

developments observed in the United States. However, Canadian data should also have an impact on short-term interest rates, since the Bank's monetary policy is clearly targeting, first and foremost, the Canadian economy. The fact that, taken together, Canadian data were not significant prior to the implementation of the new system raises important questions.

According to Gravelle and Moessner (2002), the results showing that Canadian interest rates principally reacted to American data before the adoption of the fixed announcement dates can be explained by the considerable convergence in the business cycles of the two countries, which gives rise to substantial correlation in their monetary policies. During the first of the sample periods, one-quarter of the decisions taken by the Bank of Canada to raise or lower the overnight rate were made the day following a meeting of the FOMC (Open Market Committee of the Federal Reserve). Moreover, these changes were in the same direction, and of the same magnitude, as those of the Federal Reserve. Given the impossibility of predicting exactly when the overnight rate would be changed by referring only to data published in Canada, Canadian financial markets focused on developments within the U.S. business cycle. Comments gathered from Canadian market participants further confirm that they believed that the U.S. business cycle was a good indicator of Canadian monetary policy.

The results obtained from the period following the adoption of the fixed announcement dates reveal a radical change. First, it appears that Canadian macroeconomic data now play a greater role in short-term interest rate fluctuations in Canada. In particular, retail sales and the unemployment rate affect both the two-year rates and the BAX rate. Moreover, the producer price index and the GDP also affect BAX futures, and all the coefficients associated with these variables

have the expected sign.[11] In addition, the number of U.S. indicators having a significant impact on the interest rate has declined, though some U.S. data retain their importance. This result confirms the assumption that market participants assigned far too much weight to announcements made in the United States when Canadian data did not allow for precise forecasts of the timing of interest rate changes in Canada.[12] Note that U.S. data, taken together, remain significant at the 1 per cent level after the establishment of the new system.

This result confirms the assumption that market participants assigned far too much weight to announcements made in the United States when Canadian data did not allow for precise forecasts of the timing of interest rate changes in Canada.

We have already established that, since the institution of the fixed announcement dates, changes to the overnight rate have not had a significant impact on the short-term interest rates, since financial markets are generally able to anticipate these changes. However, we know that on some occasions under the new system the Bank did surprise financial markets. To measure the impact of these surprises, we replaced the variable for changes to the target overnight rate in the preceding model with the unexpected portion of the changes.[13] Our results indicate that these surprises

Table 3

The Response of Interest Rates to Surprise Changes in the Overnight Rate

Post-fixed announcement dates

	BAX contracts	Two-year interest rates
Coefficient associated with the surprise (*p*-value)	0.699 (0.000)	−0.036 (0.881)

did not have the same impact on the BAX rate as on the rate for the two-year benchmark bonds (see Table 3). In fact, they seem to have had a significant effect on the BAX futures, while having none at all on the two-year rates. This may be explained by the fact that BAX contracts are shorter-term instruments and more likely to react to a surprise because their rates are tightly linked to the overnight rate. On the other hand, two-year interest rates more closely reflect the overall direction of monetary policy. That these rates do not significantly react to a surprise occurring on a predetermined date suggests that financial markets did not adjust their expectations regarding the direction of monetary policy in the medium term. Financial markets are thus able to accurately anticipate general trends in interest rates, even if they are sometimes surprised on a given date by a specific announcement.

Financial markets are thus able to accurately anticipate general trends in interest rates, even if they are sometimes surprised on a given date by a specific announcement.

While there is some indication that market participants now pay more attention to the economic and monetary environment in Canada, it is difficult to determine whether this change is exclusively attributable to the system of fixed announcement dates or whether other factors also play a role. We may, in particular, be inclined to believe that, if a shock affected the Canadian and U.S. economies differently—for example, the recent bursting of the speculative bubble

in the hi-tech sector—the monetary authorities of the two countries would need to take different steps. According to market participants, it would thus become necessary to attribute greater importance to developments in the Canadian economy. In any event, considering that the system of fixed announcement dates has only been in place for a relatively short time, the estimations of these models should be repeated in the future to determine whether they bear out the current conclusions.

Conclusions

Our research indicates that, first, changes made to the overnight rate before the establishment of the system of fixed announcement dates created some volatility in interest rates; and, second, the publication of Canadian macroeconomic data appears not to have had a major impact on interest rates. Under the new system, the impact of the publication of Canadian macroeconomic data on short-term interest rates has increased. This observation suggests that financial markets now have a greater understanding of the elements that contribute to the conduct of monetary policy, and that the Bank of Canada's efforts to increase transparency have yielded the desired results.

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