Canadian dollar’s sensitivity to interest rates
Is more caution required in raising interest rates?

The Canadian dollar was volatile this spring, even hitting a cyclical peak at nearly US$1.06 in April (graph 1). As of the beginning of May, greater uncertainty in the financial markets and the correction by commodities helped pull the Canadian dollar down. Another argument that can be put forward to explain the dip is the Bank of Canada’s (BoC) hesitancy about raising its key interest rates. In its recent monetary policy decisions, among other things, the BoC has shown concern about the strong loonie and the threat it poses for Canadian exporters.

We may wonder about the extent to which the loonie is actually sensitive to interest rate movements. Slight sensitivity would not justify greater prudence in raising interest rates. This Economic Viewpoint discusses some empirical estimates that suggest that its sensitivity is, in fact, slight. However, these results obscure the highly unstable link between the Canadian dollar and interest rate differentials. Using a model based on daily exchange rate data and interest rates, we establish a range for this sensitivity.

EMPIRICAL ESTIMATES OF THE CANADIAN EXCHANGE RATE’S SENSITIVITY TO INTEREST RATE FLUCTUATIONS
A number of models have been estimated to explain the Canadian dollar’s movements since the end of the fixed exchange rate system in the 1970s. The first models were primarily based on monetary theory associated with fluctuations in the money supply, interest rates and prices. However, these models did not perform very well over long periods.

An article published in the Bank of Canada Review in the spring of 1995 presented a model that did a good job of capturing the Canadian dollar’s movements over long periods. Based on the work of Robert Amano and Simon van Norden, this model explains the Canadian real exchange rate’s long-term behaviour in terms of the evolution of deflated energy and non-energy commodity prices. In the shorter term, some of these movements are explained by the interest rate spread between Canada and the United States. The spread is between interest rates on 90-day commercial paper. At the time, estimates suggested that a 100 basis point fluctuation in the interest rate differential changed the exchange rate by about 0.5%.

In a 2004 article, BoC researchers suggested an alternative to the above model, as it had not been doing as good a job of capturing Canadian exchange rate movements since the beginning of the last decade. This model explains long-term Canadian dollar fluctuations using real commodity prices excluding energy, productivity gaps and purchasing power parity. In the near term, the fluctuations are explained by the interest rate spread, movements by the U.S. dollar, and a variable that captures international investors’ risk aversion. According to this model, a 100 basis point fluctuation in the interest rate differential to Canada’s advantage pushes the loonie up by about 2%.

In a 2006 Economic Viewpoint, we developed an exchange rate equation that drew on the old BoC model. Over the long term, exchange rate movements are explained by prices for energy and non-energy commodities. Yet the relationship with energy prices changed in the 1990s with the development of Canada’s energy sector. Previously, a rise in energy prices pulled the loonie down; today, the opposite is apparently true. The estimation sample was curtailed to get around this problem. For short-term exchange rate fluctuations, our model considers the interest rate differential on three-month Treasuries and U.S. dollar fluctuations. Based on this modeling, a 100 basis point change in the interest rate spread changes the Canadian exchange rate by just under 2%.

**OTHER VARIABLES SEEM TO HAVE A GREATER INFLUENCE ON THE LOONIE**

Empirical estimates do not indicate strong Canadian exchange rate sensitivity to interest rate movements. The models look to other variables, such as commodity prices, productivity or purchasing power parity, to explain long-term movements by the Canadian dollar. The strongest relationship seems to be with commodity prices. In recent years, the correlation has been especially strong with oil prices (graph 2).

Canada is a major commodity producer; its economy benefits when resource prices go up, putting pressures on the currency. These pressures can come from the prospect of higher Canadian revenues (business, government and household), the improvement to the trade balance or heightened global demand for securities denominated in Canadian dollars. Moreover, appreciation by the loonie helps stave off economic overheating by curbing growth in some sectors to compensate for the boom in resources.

The results are similar, regardless of the interest rates used. However, in recent times, the correlation with two-year bond yields has gone up more. The rise occurred in April 2010 after the BoC announced the end of its commitment to keep interest rates at their floor. The markets then focused all of their attention on upcoming key interest rate increases. The two-year rates do a good job of incorporating expectations of monetary firming over a horizon of several quarters, which may explain their sometimes stronger correlation with the exchange rate.
ESTIMATE OF A SENSITIVITY RANGE
The highly unstable daily connection between the exchange rate and interest rate spread suggests that, during some periods, increasing interest rates in Canada can push the loonie up more than suggested by empirical estimates done using samples that cover many years. A Canadian dollar interest rate sensitivity range can therefore be estimated. It can be done using an exchange rate model constructed with daily data and estimated recursively with a sample that covers some months at a time. It is then possible to track the evolution over time of the impact of an interest rate shock on exchange rates and observe the recent maximums and minimums.

Applying this approach shows that, since the spring of 2010, a 100 basis point change in the interest rate spread can lead to a cumulative effect of five to nine cents on the Canadian exchange rate (graph 4). According to our estimates, most of the exchange rate’s response occurs on the day of the interest rate change. Box 1 presents the equation used to obtain these estimates.

PRUDENCE IS IN ORDER
The Canadian exchange rate’s recent sensitivity to interest rates is higher than empirical estimates that are done over a long period. These levels are more worrisome, which may justify greater prudence by the BoC.

Box 1
Daily exchange rate estimation model

The following econometric model has been estimated recursively using a sample of 100 observations. The model is not as comprehensive due to the limited selection of daily variables. The estimates done over the last year using this formula help explain about 50% of the daily exchange rate fluctuations, a good result for this type of model. Additionally, the influence of potential variables, such as the productivity gap or price movements, would probably not seem meaningful over periods as short as this.

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\Delta(CAD_t) = \alpha(CAD_{t-1} + \beta oil_{t-1}) + \theta_1 \Delta(oil_t) + \theta_2 \Delta(spread_t) + \theta_3 \Delta(spread_{t-1}) + \theta_4 \Delta(CAD_{t-1}) + \varepsilon_t
\]

\(CAD\): Canadian exchange rate (US$ per CS1)
\(Oil\): Price of a barrel of WTI (West Texas Intermediate)
\(Spread\): Spread between two-year Canadian and U.S. bond yields
\(\varepsilon\): An error term corresponding to Canadian exchange rate fluctuations that are unexplained by the model

The equation includes an error correction process between the exchange rate and oil prices. The relationship between the Canadian dollar and crude prices has proven especially solid in recent years. As for the interest rate differential, better results were obtained in a recent period using 2-year bond yields, which prompted us to use them. The movement by these rates also helps to capture key interest rate increase expectations over a horizon of several quarters.

The model chosen assumes that the exchange rate responds on the day on which a change in the interest rate differential occurs, as well as the day after. The model’s dynamic may reveal partial feedback from the initial effect of an interest rate movement. This phenomenon seems to be limited in the estimates derived, and the exchange rate usually stabilized three or four days after a simulated interest rate shock.
The fact that our estimate uses two-year interest rates rather than three-month interest rates makes the comparison imperfect, however. The two-year interest rate dynamic is not the same and we have to wonder whether it would be possible to see a 100 basis point change to this interest rate differential between Canada and the United States in the coming months.

The market is currently anticipating very little in the way of key interest rate increases in Canada (graph 5). A change in stance from the BoC and sudden market realignment could, as a result, translate into a rapid surge by two-year rate. Our base scenario, which calls for economic growth to continue, anticipates at most three 25 basis point increases to key interest rates by the end of the year, and perhaps three or four additional increases next year. In this context, Canada’s two-year bond yield, which is currently fluctuating around 1.60%, could end 2011 close to 2.20%, opening the door to a 60 basis point increase to the interest rate differential with the United States. Nonetheless, it would be fairly improbable for U.S. interest rates to remain stable until the end of the year. They are also expected to go up, assuming that the economic news becomes positive again in the United States (graph 6). The interest rate spread increase could thus be limited to about 20 basis points, which would translate into a rise of one to two cents U.S. by the loonie. This is not a strong rise, but it is not trivial either, particularly as it could be amplified by an upswing by commodity prices. However, the BoC has no control over the second factor.

Alternatively, in a scenario in which it would take some time for economic statistics to improve in the United States in the coming months, and in which tangible uncertainty remains in the financial markets, the interest rate differential could behave quite differently. If the BoC decided to go forward with monetary firming, the rate spread would increase more than in our base scenario, and the loonie could show a dangerous rise. Such a reaction from the BoC would be surprising, however. In this alternative scenario, the BoC would probably be cautious and curb the increase to the interest rate spread with the United States.

THE BoC IS IN AN UNCOMFORTABLE POSITION

The BoC is certainly living through a period of tough choices. By placing greater emphasis on the Canadian dollar’s appreciation in its risks, the BoC is suggesting that it will wait longer before firming up its monetary policy. Even though the exchange rate could show a significant reaction to an interest rate increase, this should not be a good enough reason for the BoC to lose sight of its inflation target, in particular if the economic situation improves in the coming months as forecast. The latest inflation figures are also raising some concerns (graph 7). An upcoming Economic Viewpoint will take a more in-depth look at the many factors that could guide the BoC’s next few decisions, as the exchange rate cannot be the only element to consider in the equation.

What’s more, a real appreciation by the exchange rate that would follow higher inflation in Canada would be just as harmful as nominal appreciation. Economic theory would have it that the only way to simultaneously curb exchange rate fluctuations and inflation pressures is to control the flow of...
capital. Canada does not seem to be willing to take this road, and probably rightly so. That would amount to playing the much denounced game played by some countries that control their currencies, such as China.

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