

The Exchange Rate and Canadian Inflation Targeting

Christopher Ragan*

- *An essential part of the Bank of Canada's inflation-control strategy is a flexible exchange rate that is free to adjust to various developments in the Canadian and world economies. The Bank of Canada does not set a target for the exchange rate.*
- *A change in the Bank's target for the overnight interest rate generally leads to a change in the exchange rate which, in turn, alters international relative prices and changes net exports and aggregate demand. The exchange rate is an integral part of the transmission mechanism.*
- *When the exchange rate changes for reasons unrelated to a change in domestic monetary policy, the cause of the change must be identified in order to determine the appropriate monetary policy action. A central challenge for the Bank is to determine the cause and persistence of the change in the exchange rate and the likely net effect on aggregate demand. The Bank can then design the appropriate policy action consistent with its objective of keeping inflation low, stable, and predictable.*
- *A complication of monetary policy is that observed changes in the exchange rate are often the result of multiple changes in the Canadian or world economies. In these situations, the Bank must determine the relative importance of the various forces affecting the exchange rate and their combined effect on the Canadian economy.*

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Fluctuations in Canada's exchange rate are a popular topic in discussions of the Canadian economy and of the Bank of Canada's monetary policy. Movements in the exchange rate have important implications for the Canadian economy, but views differ as to how the Bank should respond to them. Those apparently in favour of a strong currency argue that the Bank should prevent substantial depreciations of the Canadian dollar. Others appear to favour a weaker currency when they argue that the Bank should act to prevent significant appreciations of the dollar. Both arguments assume that there is a "right" value for the Canadian exchange rate and that the Bank should prevent the actual exchange rate from straying too far from this value.

A non-technical explanation of how the exchange rate fits into the Bank's framework for monetary policy is presented in this article.¹ Four key points are made. First, a flexible exchange rate is an essential part of the Bank's overall policy framework—within which it acts to keep inflation low, stable, and predictable. Second, the Bank does not target any specific value for the exchange rate. Third, changes in the exchange rate are very important for the conduct of monetary policy because (i) such changes often reflect events in Canada or abroad that have a direct influence on the Canadian economy; and (ii) changes in the exchange rate cause adjustments in relative prices that, in turn, influence the Canadian economy. Fourth, following any given change in the exchange rate, the appropriate response

1. This article is a much condensed version of a forthcoming Bank of Canada Working Paper, "The Exchange Rate and Canadian Inflation Targeting," which provides background to a speech made by Governor Dodge on 17 February 2005 (available at www.bankofcanada.ca). Both were written while I was the visiting Special Adviser at the Bank of Canada. I wish to thank many people for very valuable comments on earlier drafts, including Bob Fay, Donna Howard, Peter Howitt, Paul Jenkins, Tiff Macklem, John Murray, Dale Orr, and James Powell. This article and the Working Paper represent my own view on the topic and should not be interpreted as the official view of the Bank of Canada. All errors are mine.

for monetary policy depends crucially on the cause of the change. Only by identifying the reason for the change is it possible to determine the net impact on Canadian aggregate demand and thus the appropriate response, if any, for monetary policy.

A Review of Canada's Monetary Policy Framework

Why target inflation?

The Bank's ultimate objective is to make the best possible contribution to the overall well-being of Canadians. Based on a large body of theoretical and empirical research, the Bank's policies (and those of most other central banks) are grounded in two essential propositions:

1. high inflation is damaging to the economy and costly for individuals and firms; and
2. monetary policy is unable to have systematic and *sustained* effects on any economic variables other than the rate of inflation.

These two propositions are the basis for the Bank's policy objective of maintaining low, stable, and predictable inflation. Specifically, the Bank aims to keep the annual rate of inflation of the consumer price index (CPI) at 2 per cent, the midpoint of a target range of 1 to 3 per cent. In practice, given the volatility of the prices of specific products, the Bank pays particularly close attention to the behaviour of "core" inflation, which is derived by stripping out the eight most volatile elements² from the broader measure of CPI inflation and adjusting the remaining components for the effects of changes in indirect taxes.

The transmission mechanism

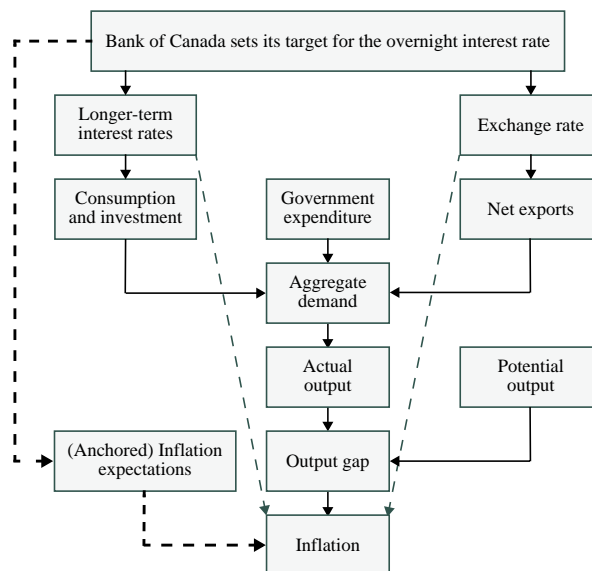
The Bank's commitment to maintaining low, stable, and predictable inflation is essential for influencing firms' and households' *expectations* of future inflation. Faced with a shock that pushes inflation either above or below the inflation target, Canadian firms and households are confident that the Bank will take actions to bring inflation back to the 2 per cent target. As a result, they are less likely to allow the current shock to alter their expectations of future inflation—their expectations tend to be well anchored.

The importance of well-anchored inflation expectations is best illustrated by recalling what happens when

2. The eight most volatile components are fruit, vegetables, gasoline, fuel oil, natural gas, intercity transportation, tobacco, and mortgage-interest costs.

Chart 1

The Transmission Mechanism of Monetary Policy



such anchoring is not present, as in the 1970s and 1980s. During those years, inflation was difficult to control because economic shocks led to adjustments in expectations which, in turn, led to behaviour that influenced actual inflation. An important lesson learned since the early 1990s, in Canada and elsewhere, is that keeping inflation expectations anchored at the 2 per cent target is important for keeping actual inflation low and relatively stable.

The Bank's commitment to maintaining low, stable, and predictable inflation is essential for influencing firms' and households' expectations of future inflation.

Chart 1 is a simplified illustration of the transmission mechanism for monetary policy. To illustrate how it works, consider a situation where the Bank expects strong demand growth to push inflation above the 2 per cent target. The Bank's appropriate policy response is to tighten monetary policy in order to slow the growth of aggregate demand and prevent inflation from rising

above the target. How does the Bank achieve this objective?

It begins by increasing the target for the overnight interest rate. Two responses are expected, assuming no other economic shocks occur. First, there will generally be an increase in longer-term interest rates. Second, rising interest rates in Canada attract mobile financial capital, which increases the demand for the Canadian dollar and causes it to appreciate relative to other currencies.

The policy-driven increase in interest rates slows the growth in demand for consumer durables and business investment; the associated appreciation of the Canadian dollar reduces the expansion of exports and boosts imports. The combined effect is a reduction in the growth of aggregate demand for Canadian goods and services. Since the economy's level of total output, gross domestic product (GDP), is determined in the short run by the level of aggregate demand, the reduction in the growth of demand caused by the Bank's policy action causes a slowing of aggregate output. With some underlying trend growth rate of the economy's level of productive capacity ("potential output"), the reduction in the growth rate of GDP implies a widening of the *output gap*—the difference between actual output and potential output.

The final step in the transmission mechanism is the link from the output gap to the rate of inflation. If the slowing of actual output causes the level of actual GDP to fall below potential output, firms are producing below their capacity. This state of excess supply is eventually felt in the markets for labour and other inputs, and it leads to reductions in wages and other factor prices (or reductions in their rate of growth). These lower costs for inputs then contribute to a reduction in the rate of inflation relative to what would have occurred had the Bank not tightened its policy.

The increase in longer-term interest rates and the appreciation of the Canadian dollar also have a more immediate effect on inflation unrelated to their influence on aggregate demand. As interest rates rise, the cost of home mortgages increases, pushing up the prices of some components of the CPI. As the Canadian dollar appreciates, the price of imported consumer goods falls, reducing the prices of other components of the CPI, an effect known as *exchange rate pass-through*. Both effects are observed relatively quickly but are also quite modest in magnitude. They are shown with dashed lines in Chart 1.

Considerable time lags exist between the time of the Bank's policy actions; changes in quantities such as consumption, investment, and net exports; the full impact on aggregate output; and the eventual effect on the rate of inflation. The Bank currently estimates that it takes between 12 and 18 months before most of the effect from a policy action on aggregate output is observed, and between 18 and 24 months before most of the effect on inflation occurs. And even these estimates are subject to considerable variation.

The role of the exchange rate

It is clear from Chart 1 that policy actions by the Bank will have their intended effect on aggregate demand and inflation only if they also have their intended effect on interest rates and the exchange rate. In other words, monetary policy works, in part, through its effect on the exchange rate.

Exchange rates do not change only because of monetary policy actions, however. Shocks to foreigners' demand for Canadian goods or services, as well as shifts in global asset portfolios away from or towards Canadian assets, can also cause the exchange rate to change. In general, it is helpful to remember that exchange rates are simply the price of one country's currency in terms of the currency of another country, and this relative price is determined in the world's foreign exchange markets, which in turn are influenced by the global demand for supplies of goods, services, and assets. Changes in flexible exchange rates are therefore market adjustments to underlying changes in some element of the world economy, changes that may be driven by monetary policy or by numerous other factors.

The exchange rate is not a policy target

The exchange rate is important to monetary policy for two reasons. First, monetary policy works partly through its effect on the exchange rate, as Chart 1 illustrates. Second, most changes in the exchange rate are caused by economic shocks of various types, and the change in the exchange rate therefore provides valuable information about developments in the Canadian and global economies.

Under the Canadian regime of *flexible* exchange rates, the value of the exchange rate is determined by market forces. As a result, there is no time-invariant "right" value for the exchange rate—or, more correctly, the current value of the exchange rate *is* the right value in the sense that it reflects changes in demand or supply conditions in the world's foreign exchange markets. The

exchange rate may rise or fall in the future as events or policies change, both in Canada and abroad. But when the exchange rate is determined in free markets by the actions of millions of participants in hundreds of countries, it makes little sense to think of today's rate as being either "too low" or "too high."

There is no time-invariant "right" value for the exchange rate—or, more correctly, the current value of the exchange rate is the right value in the sense that it reflects changes in demand or supply conditions.

The Bank views any change in the exchange rate as a reflection of some underlying change in world markets and also recognizes that the change will itself have effects on the Canadian economy. Since the Bank's policy goal is to keep inflation at its 2 per cent target, it must determine the source of any persistent change in the exchange rate in order to understand how the underlying shock will affect the future path of aggregate demand, output, and inflation. Only then can it hope to design a policy that can, if necessary, offset the effects of the shock in an attempt to meet its inflation objectives. But the exchange rate is not a policy target for the Bank of Canada.

Type One Exchange Rate Movements

In what follows, it is useful to remember that exchange rates change when shocks have *different* effects on one country than on another. For example, when we consider a shock that increases the demand for Canadian goods and services, and argue that it will tend to cause the Canadian dollar to appreciate, we really mean that the shock increases the demand for Canadian products *relative* to those from other countries.

Defining Type One exchange rate movements

We define Type One appreciations of the Canadian dollar as those caused by economic shocks that effect a direct increase in the demand for Canadian goods and services. Similarly, Type One depreciations are caused by shocks that directly reduce the demand for Canadian

products. Three examples, each leading to an appreciation of the Canadian dollar, illustrate the point (the opposite shock in each case would cause a Type One depreciation):

1. an increase in world demand for Canadian-produced goods and services;
2. an increase in the world prices of raw materials (caused by either growing world demand or reductions in supply by non-Canadian producers), which leads to an increase in the income of Canadian commodity exporters; and
3. a flow of financial capital into Canada that finances new investment in Canadian physical capital ("greenfield" investment).

The first example is the simplest. An increase in world demand for Canadian products *relative to the demand for other countries'* products creates an increase in the relative demand for the Canadian dollar, causing it to appreciate against other currencies. The second example involves an increase in the prices of many of the products exported by Canada; it is an improvement in Canada's terms of trade and a special case of the first example. This increase in income to Canada's exporters again represents a direct positive shock to Canadian aggregate demand, and it will cause an appreciation of the Canadian dollar. The third example illustrates that not all Type One exchange rate changes originate on the current account of the balance of payments. Suppose entrepreneurs rely on foreign financial capital to finance new investment projects in Canada. The new investment is a direct positive shock to Canadian aggregate demand; the inflow of financial capital increases the demand for domestic currency and causes an appreciation of the Canadian dollar.

Direct and relative-price effects on aggregate demand

An appreciation of the Canadian dollar, by changing the relative prices of domestic and foreign products, leads to *substitution* in spending. Both Canadian and foreign consumers are led to substitute away from the now relatively more expensive Canadian goods and services towards the now relatively less expensive foreign products. In other words, by changing international relative prices, an appreciation of the Canadian dollar leads to a decrease in Canadian exports and an increase in Canadian imports.

Thus there are two distinct effects on Canadian aggregate demand with a Type One appreciation. At the initial

value of the exchange rate, the shock itself represents a direct increase to aggregate demand—the *direct effect*. But the shock also causes an appreciation which, by changing relative prices, leads to a reduction in net exports and aggregate demand. This is the *relative-price effect*. The overall net effect on aggregate demand is given by the sum of the direct and relative-price effects, which is generally not zero.

A defining characteristic of Type One exchange rate movements is that the direct effect and the relative-price effect push aggregate demand in opposite directions.

A defining characteristic of Type One exchange rate movements, therefore, is that the direct effect and the relative-price effect push aggregate demand in *opposite* directions; the movements in the exchange rate help to dampen or absorb the effects of the initial shock to aggregate demand.

Implications for monetary policy

Owing to the time lags in the transmission mechanism, it is undesirable for the Bank to respond to exchange rate movements that are expected to be short lived. The effects on the economy are likely to be small, and any effects from a monetary policy response would probably occur only after the effects of the shock had disappeared. For this reason, as difficult as it is to do in practice, the Bank attempts to “see through” short-lived exchange rate changes and to focus only on persistent changes.

The appropriate policy response to a change determined to be persistent and Type One depends on the overall net effect on aggregate demand. Consider the case of an increase in world commodity prices that causes the Canadian dollar to appreciate. The direct effect is a positive shock to aggregate demand; the relative-price effect crowds out net exports and thus dampens the direct effect. In the typical case, the overall net effect on aggregate demand will still be positive, and thus monetary tightening by the Bank of Canada will be appropriate.

Chart 2 shows the results of simulating the effects of a temporary 10 per cent increase in real commodity

prices in the Bank’s new projection model, TOTEM (for Terms of Trade Economic Model). TOTEM can be used to predict the effects of shocks on the Canadian economy and to analyze the effects of monetary policy actions. The model can also be used to examine the aggregate demand consequences of external shocks to the demand for goods and services or shocks to the risk premium on Canadian assets—that is, it can be used to explore the different consequences of Type One and Type Two forces.³

Panel A shows the time path of the underlying shock to commodity prices: a sharp 10 per cent increase that dissipates fully over four years. Panel B shows the resulting appreciation of the Canadian dollar. (The nominal exchange rate is measured as the Canadian-dollar price of one unit of foreign currency, so a reduction in the exchange rate is an appreciation of the Canadian dollar.) Panels C and D show that commodity exports rise significantly, whereas manufactured exports, facing the headwinds of the stronger currency, are adversely affected. Total exports nonetheless increase markedly in Panel E, and this increase contributes to a boost in GDP, which leads to an increase in the output gap, as seen in Panel F (imports, not shown, rise in response to the appreciation, but net exports increase). Since output is determined by demand in the short run, the increase in GDP reveals that the net effect on aggregate demand of the Type One appreciation is indeed positive. The opening of a positive output gap implies the creation of excess demand in the Canadian economy. Monetary policy responds to this shock by raising the target for the overnight interest rate (Panel G). Despite the policy action, the excess demand results in an increase in the rate of core CPI inflation (Panel H), but the effect is reversed relatively quickly as inflation returns to its initial level within three years.

Type Two Exchange Rate Movements

Defining Type Two exchange rate movements

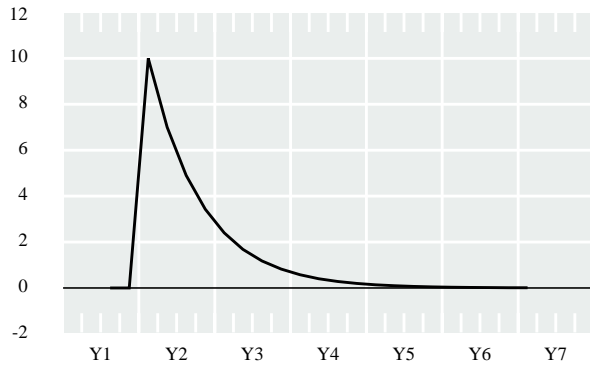
A Type Two exchange rate movement is associated with an underlying economic shock that *does not* impinge directly on the Canadian market for goods and services. Rather, any effect on Canadian aggregate demand or supply works through the exchange rate change itself. To illustrate, we consider three examples

3. TOTEM is currently a candidate for replacing the Quarterly Projection Model (QPM), the Bank’s main model for projection and policy analysis.

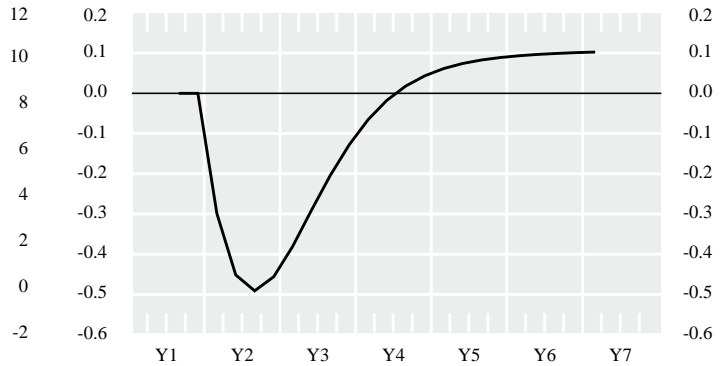
Chart 2

Type One Appreciation Caused by a Temporary Increase in Commodity Prices

A. Real commodity price



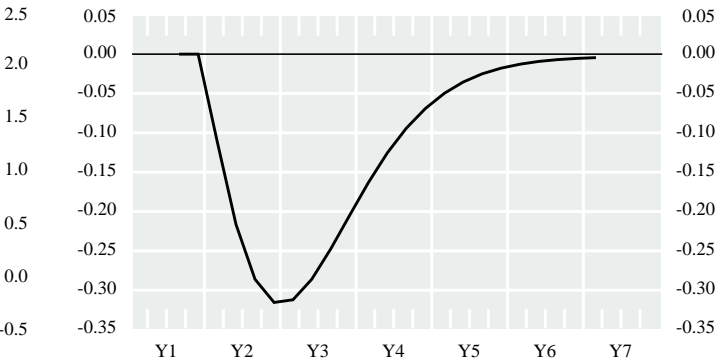
B. Nominal exchange rate (Can\$ price of foreign currency)



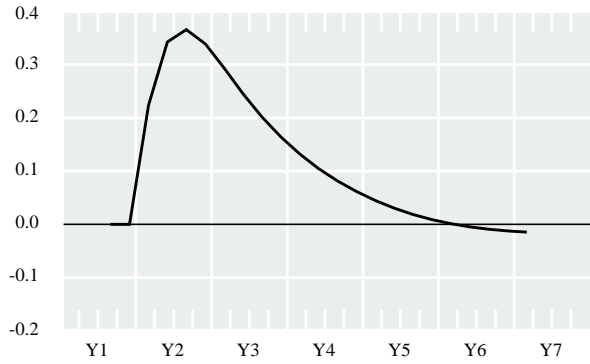
C. Commodity exports



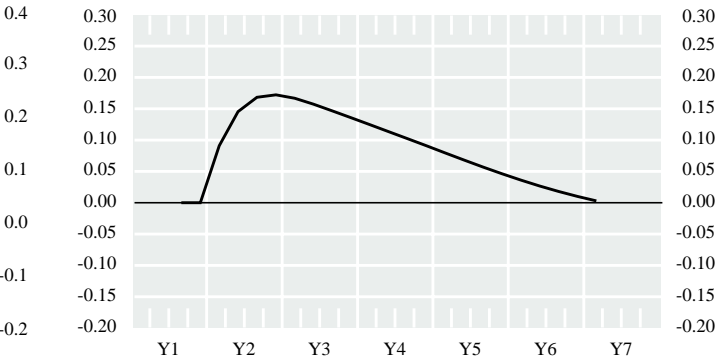
D. Manufactured exports



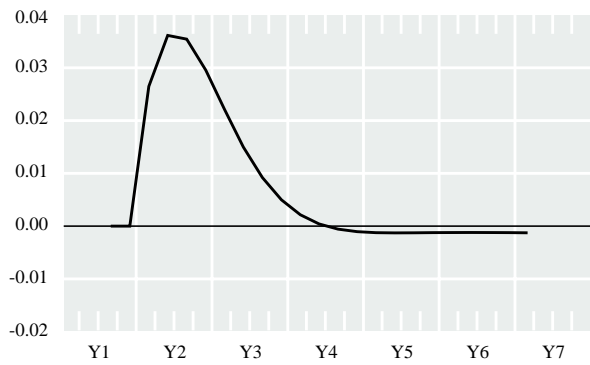
E. Total exports



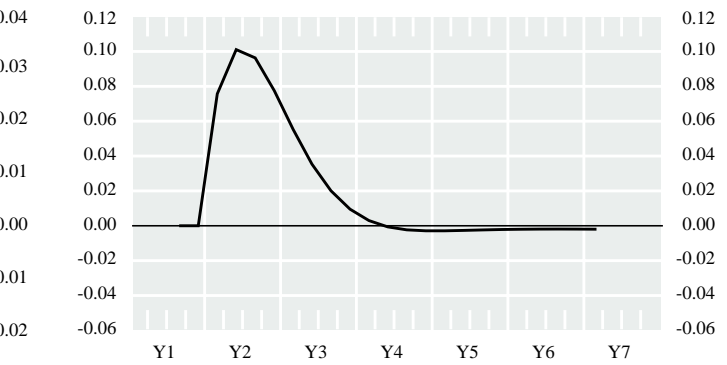
F. Output gap



G. Nominal policy interest rate



H. Core inflation



of shocks that would cause the Canadian dollar to appreciate (the opposite shock in each case would cause a Type Two depreciation):

1. an adjustment in domestic or international financial portfolios away from foreign assets and towards Canadian assets;
2. a flow of financial capital into Canada to finance the purchase of existing physical capital (“brownfield” investment); and
3. a multilateral depreciation of the currency of a major trading partner required to resolve its existing current account deficit.

In the first two examples, the increase in demand for Canadian assets—either financial assets or existing physical assets—leads to an increase in the demand for Canadian dollars on foreign exchange markets, causing the Canadian dollar to appreciate. Both involve flows of financial capital and transactions in the capital account of Canada’s balance of payments. In the third example, an appreciation of the Canadian dollar may be driven by the expectations of financial market participants, who see a Canadian-dollar appreciation as part of a global realignment of currencies required to resolve existing current account imbalances. Note that such adjustments may reflect less about the sustainability of Canada’s international position than about the multilateral currency adjustments required to resolve imbalances among other countries. Note also that such expectations-driven currency adjustments need not involve actual financial flows between countries.

A Type Two exchange rate movement is associated with an underlying economic shock that does not impinge directly on the Canadian market for goods and services.

Only relative-price effects on aggregate demand

In none of these three examples is there a direct impact on the demand for Canadian goods and services and hence on Canadian aggregate demand. This absence of any direct effect is the defining feature of Type Two

movements in the exchange rate. But, as with Type One changes, the appreciation of the Canadian dollar in each case leads to a change in international relative prices, increasing the relative price of Canadian products while decreasing the relative price of foreign products. Thus, consumers in Canada and the rest of the world are led to substitute away from relatively more expensive Canadian goods towards relatively less expensive foreign goods. This relative-price effect leads to a fall in Canadian net exports and thus to a reduction in Canadian aggregate demand.

Type One exchange rate changes create two distinct effects—the direct effect on aggregate demand is partially offset by the relative-price effect. Type Two changes, however, have only one effect—the relative-price effect. With no direct effect on aggregate demand, the overall net effect on aggregate demand is determined solely by the relative-price effect.

Implications for monetary policy

As we said in our discussion of Type One changes, it is undesirable for the Bank to respond to short-lived changes in the exchange rate. And changes caused by Type Two forces, which often derive from changes in investors’ perceptions about relative asset qualities, frequently last for only short periods before being reversed. Thus, faced with an apparent Type-Two-induced change, it is especially important for the Bank to assess the likely persistence of the shock.

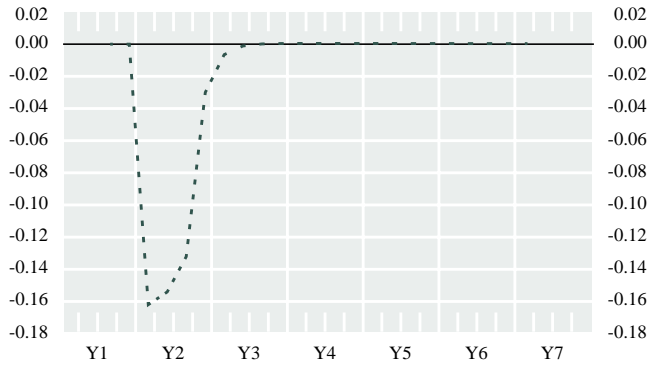
Chart 3 shows a simulation from the TOTEM model in which the underlying economic shock is a *decrease* in the perceived risk premium on Canadian financial assets. This shock reflects a special Type Two appreciation constructed to give the same initial exchange rate path as for the Type One appreciation shown in Chart 2 (also pictured), which allows us to compare the effects of equal-size currency appreciations that differ only with respect to their underlying causes. The solid lines show the effects of the commodity-price increase; the dashed lines show the effects of the decline in the risk premium on Canadian assets.

Panel A shows the time path of the underlying shock to the risk premium, a significant decrease that persists for two years; Panel B shows the effect on the nominal exchange rate, an initial path identical to that for the Type One appreciation. Panels C and D show the path of exports—commodity exports are only slightly affected because the Canadian-dollar appreciation has little or no effect on the world prices of these products (expressed in U.S. dollars). In contrast, the appreciation of the Canadian dollar clearly hampers economic

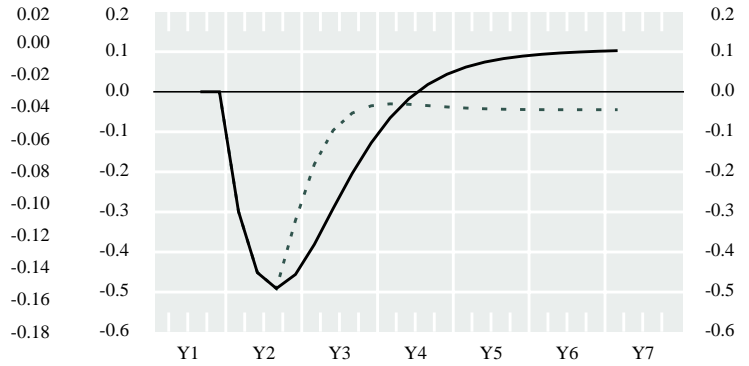
Chart 3

Type One and Type Two Appreciations Compared

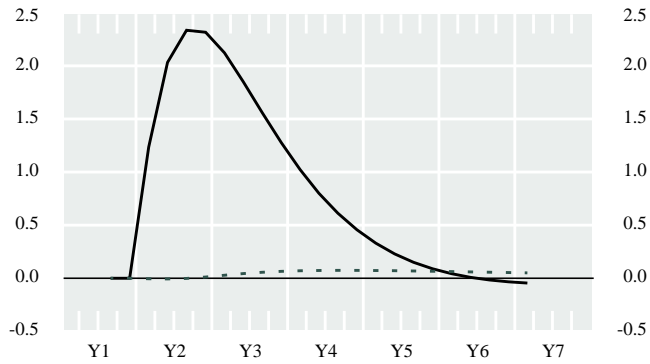
A. Risk premium



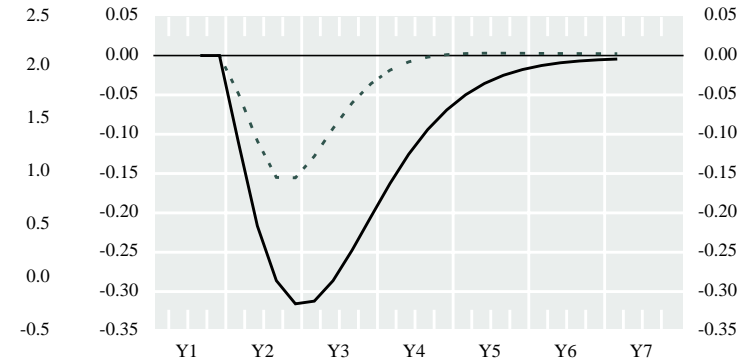
B. Nominal exchange rate (Can\$ price of foreign currency)



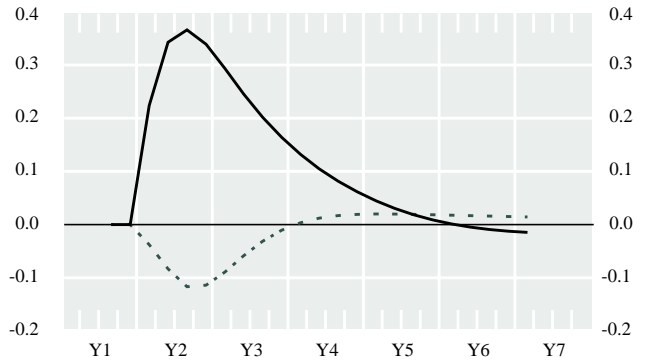
C. Commodity exports



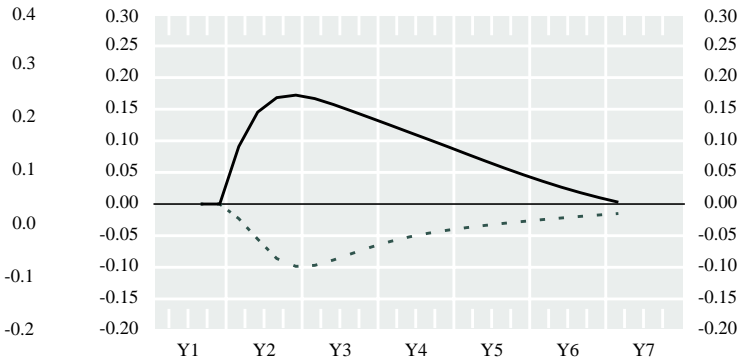
D. Manufactured exports



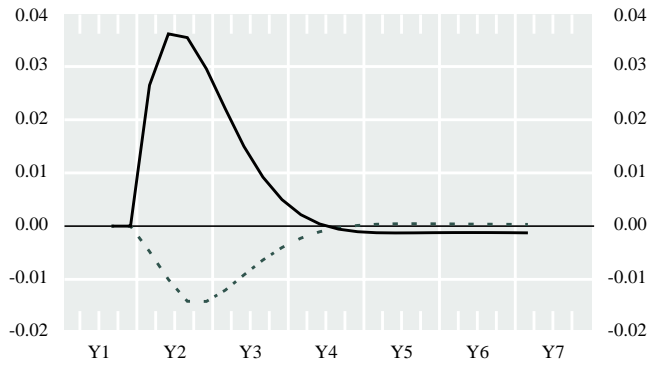
E. Total exports



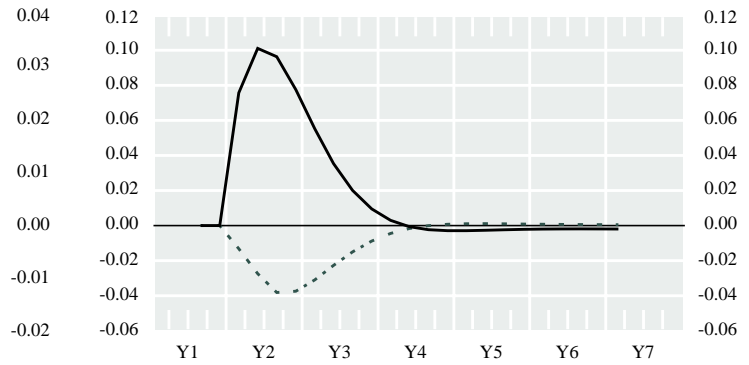
F. Output gap



G. Nominal policy interest rate



H. Core inflation



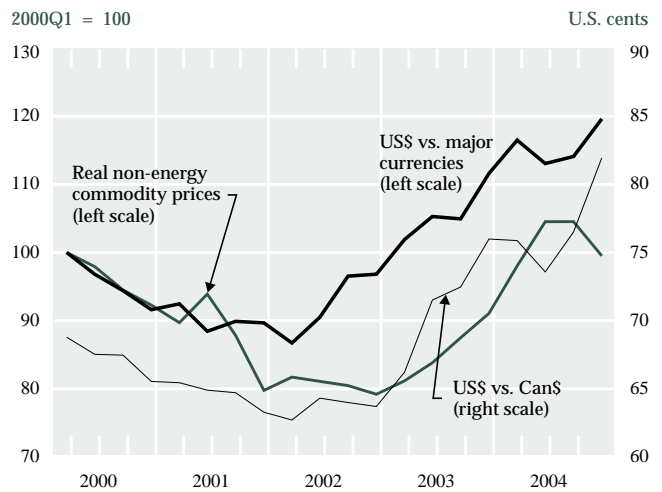
prospects for exporters of manufactured products. Total exports fall in Panel E, and this reduction contributes to a slump in GDP, and thus the opening of a negative output gap, as seen in Panel F. This negative output gap implies a state of excess supply. Monetary policy responds to this shock by lowering the target for the overnight interest rate (Panel G), but a reduction in core CPI inflation still occurs (Panel H) for a little over two years.

The Ongoing Challenge for Monetary Policy

While changes in the exchange rate become apparent almost instantly, it is not easy to determine what events are causing the change. And here lies the central policy challenge, for without identifying the cause of the change, it is not possible to determine the net effect on aggregate demand and thus the appropriate policy response. This challenge is frequently made even more difficult by the simultaneous occurrence of several shocks, so that an observed movement in the exchange rate may have more than one driving source. In such a situation, opposing forces would likely be acting on Canadian aggregate demand, and the task for the Bank would be to determine the relative importance of each force.

Consider a hypothetical, but realistic, example. Suppose the economic environment in Canada—including taxation, regulation, productivity growth, and inflation—improves in such a way that Canada is viewed as being a more favourable location in which firms can invest and operate. This improvement could lead to two different shocks for the Canadian economy. First, foreign or multinational firms may choose to locate more of their productive facilities or head offices in Canada, and they may bring the financial capital necessary to finance the construction of such facilities. The resulting inflow of financial capital will cause an appreciation of the Canadian dollar, and the new construction will represent new investment in physical capital. This is a Type One appreciation of the Canadian dollar, as there is a direct positive effect on aggregate demand. Second, global investors would choose to rebalance their portfolios towards Canadian financial assets. The inflow of financial capital used to make such purchases would lead to an appreciation of the Canadian dollar, but there would be no direct effect on Canadian aggregate demand. This is a Type Two appreciation. In this example, the Canadian dollar would likely appreciate in response to *both* Type

Chart 4
Two Forces Behind Movements in the Canadian Dollar



One and Type Two forces, and the task for monetary policy would be complicated by the need to determine the *relative* contribution to the overall appreciation from each force.

An example from recent history

Consider how the distinction between Type One and Type Two exchange rate changes can be used to interpret economic developments and the Bank of Canada's policy actions during 2003 and 2004, a time when the Canadian dollar appreciated sharply against the U.S. dollar. Both types of exchange rate movements appear to have been operating during this period, although their relative importance shifted over time, as shown in Chart 4.

In 2003, the Canadian dollar appreciated against the U.S. dollar by just under 20 per cent, from below 65 cents (US) in January to over 75 cents (US) in December. What caused this appreciation? Real non-energy commodity prices increased by about 12 per cent, a clear Type One force. At the same time, the U.S. dollar weakened against the currencies of all major countries (including other large commodity importers) by roughly 15 per cent, suggesting the presence of powerful Type Two forces. Net exports made a significant negative contribution to Canada's economic growth in 2003, and this slowdown is consistent with the possibility that Type Two forces were dominant at that time. The Bank's decision to reduce its target for

the overnight interest rate in early 2004 might be explained by the prospect that this slowdown in net exports was expected to continue.

By the late summer of 2004, however, rising world commodity prices and fast-growing world demand had been a key feature of the economic environment for several months. Though the U.S. dollar continued to weaken during this period, net exports made a substantial positive contribution to Canadian GDP growth in the first half of 2004. These developments are consistent with Type One forces playing the dominant role. With the Canadian economy fast approaching its capacity limits, the Bank of Canada raised its policy interest rate in September.

Not all changes in the exchange rate are created equal. The cause of any given change is as important for monetary policy as the change itself.

Late in 2004, however, the balance of economic forces shifted again, with an increase in the relative importance of Type Two factors. The U.S. dollar weakened

sharply against all the major floating currencies, and the Canadian dollar appreciated to a 13-year high of over 85 cents (US). This appreciation occurred despite a decline in commodity prices and a weakening outlook for global economic growth. Thus, Type Two forces were likely driving the strength in the Canadian dollar, offsetting the neutral or even negative Type One forces. The Bank left its target for the overnight rate constant at the time of its December 2004 policy decision. (By July 2005, the Bank's target for the overnight rate was still at the level from October 2004, unchanged for nine months.)

Conclusion

Not all changes in the exchange rate are created equal. The cause of any given change is as important for monetary policy as the change itself. The central point of this article has been to explain the difference between two important types of changes to the exchange rate, and to explain why they are associated with different net effects on Canadian aggregate demand. Determining the cause and persistence of exchange rate changes is an important ongoing challenge for the Bank of Canada. But such determination is essential if the Bank is to take the appropriate policy action, consistent with its objective of keeping inflation low, stable, and predictable.