The Federal Government's Use of Interest Rate Swaps and Currency Swaps

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- *Interest rate swaps and currency swaps are contracts in which counterparties agree to exchange cash flows according to a pre-arranged formula. In its capacity as fiscal agent for the federal government, the Bank of Canada has carried out swap agreements since fiscal year 1984/85.*
- *The government uses these swap agreements to obtain cost-effective financing, to fund its foreign exchange reserves, and to permit flexibility in managing its liabilities.*
- *To minimize its exposure to counterparty credit risk, the government applies strict credit-rating criteria and conservative exposure limits based on a methodology developed by the Bank for International Settlements.*
- *Between fiscal 1987/88 and 1994/95, the government used domestic interest rate swaps to convert fixed-rate debt into floating-rate debt. Currently, the government uses interest rate swaps and currency swaps to convert its Canadian-dollar-denominated debt into foreign currency liabilities and to exchange foreign currency, fixed-rate issues into foreign currency, floating-rate debt.*
- *The government's swap program is cost-effective. The estimated past and projected savings on transactions undertaken since 1988 for which there are reliable cost comparisons amount to over $500 million.*

A swap agreement is a contract in which two counterparties arrange to exchange cash-flow streams over a period of time according to a pre-arranged formula. Two of the most common swap agreements are interest rate swaps and currency swaps. In an interest rate swap, counterparties exchange a series of interest payments denominated in the same currency; in a currency swap, counterparties exchange a series of interest payments denominated in different currencies. There is no exchange of principal in an interest rate swap, but a principal payment is exchanged at the beginning and upon maturity of a currency-swap agreement.

The swaps market originated in the late 1970s, when simultaneous loans were arranged between British and U.S. entities to bypass regulatory barriers on the movement of foreign currency. The first-known foreign currency swap transaction was between the World Bank and IBM in August 1981 and was arranged by Salomon Brothers (Das 1994, 14–36). This landmark transaction paved the way for the development of a market that has grown from a negligible volume in the early 1980s to a notional principal outstanding of US$46.380 trillion at the end of 1999 (Bank for International Settlements 2000).[1] Currently, the swaps market offers a broad range of financing instruments, liquid swaps in most currencies, and a wide spectrum of well-established portfolio-management applications.

The Government of Canada has been using interest rate swaps to help manage its foreign currency liabilities since fiscal 1984/85[2] and its Canadian-dollar liabilities

1. The US$46.380 trillion 1999 year-end total consisted of US$43.936 trillion in interest rate swaps and US$2.444 trillion in currency swaps.

2. A fiscal year is the time between yearly settlement of financial accounts. The fiscal year of the Canadian government ends on 31 March.

since 1987/88.[3] These transactions were designed to help the government obtain floating-rate funding[4] at more attractive rates than by issuing short-term, fixed-income securities. Similarly, the government has used currency swaps to provide low-cost, indirect foreign currency funding to help manage its foreign currency liabilities since 1984/85 and its Canadian-dollar liabilities since 1994/95. At the end of 1999/00, the notional value of the government's swap portfolio stood at Can$23.5 billion.

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This article describes the characteristics of swap agreements and the motivation behind the federal government's use of these transactions. The valuation of swap agreements and the government's management of credit-risk exposure are also examined, together with the manner in which swap transactions are undertaken to satisfy the government's various objectives. Finally, the article illustrates the cost-effectiveness of the federal government's use of swap agreements.

Characteristic Features of Swap Agreements

Swap agreements are used to manage risk in financial markets, to exploit opportunities for arbitrage in capital markets, and to avoid adverse market conditions or regulations. Swaps are also used in asset/liability management to obtain cost-effective financing and to generate higher risk-adjusted returns (Kolb 1999, 608–47). Although exchange-traded derivatives, such as interest rate and foreign currency futures, could be used instead, the swaps market offers several advantages. First, swap agreements are undertaken privately, while transactions using exchange-traded derivatives are public. Second, since swap products are not standardized, counterparties can customize cash-flow streams to suit their requirements.

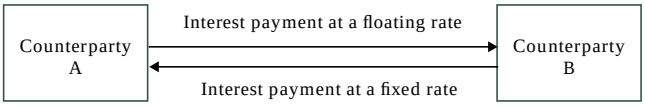
The swaps market does have limitations, however. The privacy of swap agreements exposes counterparties to the risk of default, since there are no explicit performance guarantees on contracts, such as those provided through the clearing houses of futures and options exchanges. It is difficult to alter or terminate a swap agreement after its inception, and it can be difficult to find a counterparty willing to take the opposite side of a specific transaction. The latter limitation has been alleviated in recent years as the number of swap facilitators has increased.[5]

In a typical interest rate swap, one counterparty agrees to exchange a fixed rate of interest on a specific notional principal in return for a floating rate of interest on the same notional principal. The arrangement also stipulates the term to maturity of the agreement. No principal is exchanged in this transaction. The interest rate on the floating leg of the swap transaction is typically reset at the beginning of each interest-payment period, and the cash interest payment is made at the end of the period. The London Interbank Offered Rate, or LIBOR, is commonly used as the floating rate.[6] Payments between counterparties are usually netted, and a single amount is settled on each payment date. Figure 1 illustrates an interest rate swap. In this example, counterparty A pays counterparty B the floating rate, and B pays A the fixed rate over the term of the swap agreement.

A currency swap is a contract between two or more counterparties to exchange streams of payments

Figure 1

The Structure of an Interest Rate Swap



3. This article extends Thibault's (1993) study of the role of interest rate swaps in managing Canada's debt. The swaps discussed here should not be confused with Exchange Fund Account swaps, which are used to manage the government's day-to-day Canadian-dollar cash balances. For more information on Exchange Fund Account swaps, see Nowlan (1992). Also, not discussed in this article are the Bank of Canada's foreign currency swap facilities with other central banks (see Bank of Canada 2000, 57).

4. The government defines "floating-rate" funding as debt that matures within one year, or that matures beyond one year but has a variable interest rate (Finance Canada 2000, 14-15).

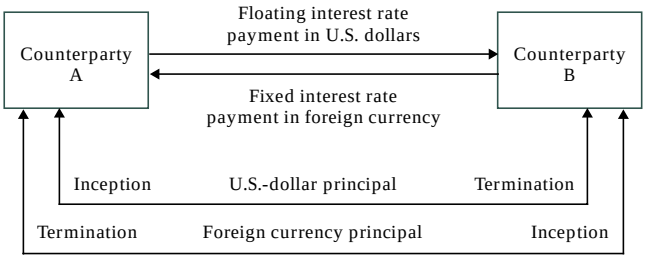
5. Swap facilitators are firms that assist in the completion of swap transactions, through informational intermediation, market making, and by serving as counterparties.

6. LIBOR is the interest rate offered by a specific group of London banks for deposits in the Eurocurrency market with maturities that range from one month to one year.

denominated in different currencies, with each stream calculated using a different interest rate. When a typical currency swap is initiated, one party exchanges the principal in one currency for an equivalent amount denominated in another currency. The principal is converted to the other currency using the then-current spot exchange rate. Each counterparty makes interest payments on the principal received at each settlement date over the life of the swap. These payments are not netted. At the end of the swap agreement, principal payments are exchanged using the spot exchange rate that prevailed when the contract was initiated. The most common type of currency swap involves an exchange of interest payments at a fixed rate in one currency for floating LIBOR payments in U.S. dollars. Figure 2 illustrates this type of currency swap. In this example, counterparty A pays counterparty B the floating rate in U.S. dollars, and A receives from B the other foreign currency fixed rate over the term of the swap agreement. At the inception of the agreement, B pays A the principal in U.S. dollars, while A pays B the principal in the other foreign currency. At the termination of the agreement, these principal payments are reversed.

Figure 2

The Structure of a Currency Swap



The terms and conditions of most swap contracts are set so that the initial market value is zero. However, as interest rates and exchange rates change, swap values change. A swap's market value is defined as the difference between the present value of one party's receive-side and pay-side cash flows. Swap valuation is important for measuring performance and exposure to credit risk. Box 1 provides an overview of swap-valuation procedures.

Government Use of Swap Agreements

As fiscal agent for the federal government, the Bank of Canada undertakes swaps to allow flexibility in its management of the government's liabilities and to obtain cost-effective Canadian-dollar and foreign currency financing. Between 1987/88 and 1994/95, interest rate swaps were used extensively to convert fixed-rate Canadian securities into floating-rate liabilities under the domestic interest rate swap program. The government currently uses swap agreements in two ways. First, under the domestic currency-swap program, the government converts issues denominated in Canadian dollars into foreign currency liabilities. Second, by using foreign interest rate and currency swaps, the government exchanges various foreign currency, fixed-rate issues into foreign currency, floating-rate liabilities. The domestic currency-swap program began in 1995, and the foreign interest rate and currency-swap programs began in 1985.

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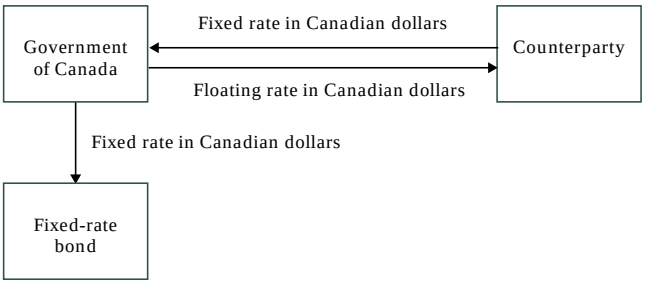
Between 1987 and 1995, the objective of the domestic interest rate swap program was to convert fixed-rate Canadian debt into floating-rate financing. Swap transactions allowed the government to achieve floating-rate financing at a rate below the yield on three-month treasury bills. Figure 3 shows the structure of a typical domestic interest rate swap. The fixed interest rate payable to the government by the swap

Figure 3

The Government's Use of Domestic Interest Rate Swaps



Box 1: Swap Valuation—An Overview

A typical interest rate swap can be valued by characterizing the instrument as a combination of two bonds. For example, the swap illustrated in Figure 1 is equivalent to a transaction in which counterparty A buys a fixed-rate bond from counterparty B and sells B a floating-rate bond. The value of the swap to A at any particular date is given by the present value of the fixed-rate bond less the present value of the floating-rate bond.[1] Hence, the value of an interest rate swap depends on the yield curve of swap interest rates.[2] The swap market is generally liquid and transparent enough that such yield curves are available for most currencies. At inception, the fixed rate on most interest rate swaps is calculated so that the fixed and floating sides have the same present values, making the initial value zero. Because the swap curve shifts over time, however, the value of the swap to each party can be either positive or negative.

A similar procedure can be applied to price a typical currency swap. For example, the swap illustrated in Figure 2 is equivalent to a transaction in which counterparty A buys a foreign currency fixed-rate bond from counterparty B and sells B a U.S.-dollar, floating-rate bond. Principal amounts in the two currencies are exchanged at both the inception and the termination of the swap agreement. The value of the swap to A is given by the value of the foreign currency, fixed-rate bond (converted to U.S. dollars at the current exchange rate) less the value of the U.S.-dollar, floating-rate bond. Thus, the value of the currency swap depends on the domestic and foreign yield curves and on the spot exchange rate. As in the case of interest rate swaps, the fixed rate on most currency swaps is set so that the value of the swap is zero at inception. After this, the value changes with shifts in the two yield curves and in the spot exchange rate.

1. The present value of a bond is calculated by multiplying each of its individual cash flows by present-value factors that are derived from the yield curve of swap interest rates. (See Ron 2000.) Essentially, these present-value factors represent the amount that must be invested at the time of the calculation in order to reach a value equal to one monetary unit, taking into account the time to payment and the appropriate "spot" rate extracted from the yield curve of swap rates. A spot rate is an interest rate associated with a single cash flow received on a specific date. For more detail on spot rates and present-value calculations, see Whittingham (1996–97).

2. The yield curve of swap interest rates describes the relationship between "plain vanilla" interest rate swap fixed rates and time to maturity. A "plain vanilla" interest rate swap is one whose floating rate is set equal to the floating-rate index (the three-month BA rate in the case of a Canadian-dollar-denominated swap or three-month LIBOR in the case of a U.S.-dollar-denominated swap) and whose market value is zero. Ron (2000) describes a method for deriving the yield curve of swap interest rates.

counterparty generally corresponded to the yield of an existing Canada bond with a similar maturity. The floating interest rate payable by the federal government was based on the rate on a three-month banker's acceptance (BA), a standard floating-rate benchmark in the Canadian market. The difference between the floating rate payable by the government and the BA rate—referred to as the swap spread[7]—is a rough indicator of the government's comparative advantage in the fixed-rate domestic market.[8] Table 1 shows the number of transactions, the notional amounts, and the swap spreads associated with this program. The domestic interest rate swap program has been inactive since 1994/95. As the government's comparative advantage narrowed, the government shifted towards targeting a higher level of fixed-rate funding (Finance Canada 1999, 14). In addition, the government

7. In the Canadian swap market, the term "swap spread" is usually used to describe the difference between the fixed rate on the swap and the yield on a Canada bond with the same term to maturity, when the floating rate is the three-month BA rate. Government swaps are usually structured so that the government receives the comparable Canada bond yield and pays a spread below the BA rate.

8. The government possesses an absolute borrowing advantage in the Canadian markets for floating- and fixed-rate debt, since it is the low-cost borrower in both markets. In addition, it enjoys a comparative advantage in the longer-term, fixed-rate market. Comparative advantage refers to the fact that the difference between the cost of borrowing for the government and other borrowers is larger in the long-term, fixed-rate market than in the floating-rate market.

decided that its comparative advantage could be put to better use in the domestic currency-swap program.

The current domestic currency-swap program converts Canadian-dollar-denominated debt into foreign currency fixed- or floating-rate funding. This program has become one of the government's primary sources of foreign exchange reserves and a major component of its swap business. Table 2a shows the rapid rise in the cumulative notional amount outstanding of this program. Table 2b isolates the U.S.-dollar, floating-pay domestic currency-swap transactions, along with the yield spreads below LIBOR, which give a very rough indication of cost-effectiveness. The program's cost-effectiveness (and that of the domestic interest rate swap program) is discussed later in more detail.

Figure 4 shows the structure of a typical operation in the domestic currency-swap program. This swap is similar to that depicted in Figure 3 except that instead of paying a floating rate in Canadian dollars, the government pays a fixed rate in a foreign currency. In addition, at the inception of the agreement, the government pays the principal in Canadian dollars and receives the principal in the foreign currency; these transfers of principal are reversed when the swap is terminated. The government uses the foreign currency principal received to increase its holdings of foreign exchange reserves while the swap is outstanding. By undertaking this transaction, the government obtains fixed-rate, foreign currency funding at a cost below that of a direct issue of debt denominated in a foreign currency.

The government has used interest rate swaps and currency swaps to convert foreign currency, fixed-rate government issues into foreign currency floating-rate liabilities since 1984/85. The use of these swaps is part of the government's overall approach to maintaining and managing foreign exchange reserves. The timing of the use of these swaps, as indicated by the ebbs and flows of transactions made under this program and shown in Table 3, is determined by market conditions. All of the recent transactions have converted fixed-rate issues in various currencies[9] into floating-rate liabilities denominated in U.S. dollars, although six swaps transacted in 1989/90 and 1990/91 were swapped into floating-rate Japanese yen.

As illustrated in Figure 5, the government's foreign currency interest rate swaps allow it to acquire floating-rate, foreign currency financing at a lower cost than by directly issuing foreign currency, floating-rate debt.[10] The government's foreign currency swaps, an example of which is illustrated in Figure 6, enable the government to transform a fixed-rate, non-U.S.-dollar liability into a cost-effective floating-rate liability in another foreign currency, usually U.S. dollars. Once again, there is an exchange of principal at the inception and termination of the swap agreement. Table 4 summarizes the government's swap programs.

The government's swap counterparties must meet strict criteria regarding creditworthiness, and the government also applies conservative exposure limits to counterparties based on guidelines suggested by the BIS.

The government's swap counterparties must meet strict criteria regarding creditworthiness, and the government also applies conservative exposure limits to counterparties based on guidelines suggested by the Bank for International Settlements (BIS) (1988).[11] Box 2 discusses the BIS methodology in more detail and how the government applies it. All swap agreements between the government and a given counterparty are covered by a single contract. The terms of these contracts are based on a standard document created by the International Swaps and Derivatives Association (ISDA) (1991, 1998), with some clauses reflecting the government's status as a sovereign borrower. Swap counterparties include many of Canada's chartered banks as well as international banks, securities firms, and affiliates of insurance companies.

9. Most of the underlying issues were denominated in U.S. dollars and Japanese yen, but other currencies include Australian, New Zealand, and Hong Kong dollars, as well as British pounds, Norwegian kroner, Danish kroner, and Greek drachma.

10. See the article by De Leon (2000-01) on page 13 for more information on the government's foreign funding programs.

11. To be eligible to carry out swap business with the government, a counterparty must have a credit rating of A or better from two of five specified credit-rating agencies of which one must be Standard & Poors or Moody's. However, the minimum counterparty rating for swaps with terms to maturity beyond three years is AA-.

Box 2: Swaps and Credit Risk—An Overview

Swap agreements entail two dimensions of credit risk. The first is the *actual* credit risk, which represents the cost of replacing a swap if the counterparty defaults at the time of the calculation. Actual credit risk is relevant if the default occurs when the swap has a positive market value[1] to a party; otherwise, the default has no financial impact on this party in the transaction. This risk exposure is complicated if the defaulting counterparty holds a number of outstanding swaps, because the defaulting counterparty can choose to shirk its obligations only on those swaps with negative market values. To guard against this possibility, most parties have one master agreement with each counterparty that includes an early-termination provision covering all the transactions under the master agreement. In regulatory parlance, this is called a "netting" arrangement. All Government of Canada swaps are covered by one master agreement with each counterparty.

The second dimension of credit risk in swap agreements is *potential* credit risk. This refers to the possibility that the actual exposure to risk will increase from its current level and depends on changes in the probability that a counterparty will default and on future market conditions.

The Government of Canada currently employs the framework for measuring swap credit risk developed by the Bank for International Settlements (BIS).[2] According to this framework, total exposure to credit risk is the sum of the current and potential exposure. In the absence of a legally enforceable netting agreement, the total actual risk with respect to a particular counterparty is the sum of all the positive swap values, while total potential risk is the sum of the potential risk of all the individual contracts. The potential exposure of each contract is calculated by multiplying its notional value by a credit-conversion factor. These factors are listed in the table below. For example, the potential exposure on a US$100 million five-year interest rate swap is US$0.5 million, whereas on a US$100 million five-year currency swap it would be US$5.0 million. If these contracts were the only two with a particular counterparty, the total potential exposure would be US$5.5 million.

Swap Conversion Factors

Years to maturity	Swap type	
	Interest rate (%)	Currency (%)
One or less	0.0	1.0
One to five	0.5	5.0
Over five	1.5	7.5

The BIS framework recognizes the benefits of netting by calculating the current exposure to each counterparty as the maximum value of the sum of market values of all outstanding swap contracts or zero. The potential exposure is calculated by multiplying the notional underlying principal, adjusted for the credit-conversion factor, by the following scaling factor:

$$\alpha + (1 - \alpha)(N/G),$$

where N is the net replacement cost, which represents the maximum market value of the entire swap portfolio held by a counterparty, or zero; G is the gross replacement cost, which represents the sum of the positive swap values; and α is a minimum weight that ensures the maintenance of some protection against adverse fluctuations in the net replacement cost. The maximum value of α is one, at which the scaling factor is also one and no netting benefits are recognized by the potential exposure calculation. The government has adopted the BIS's recommendation of $\alpha = 0.4$. The scaling factor also reflects the extent to which the swaps with a particular counterparty are profitable. For example, if all of the swaps with a particular counterparty (with whom netting agreements are in place) are profitable, the net and gross replacement costs are equal (N=G), the scaling factor would be one, and there would be no potential exposure reduction.

1. The market value of a swap reflects current market conditions. Swap valuation is discussed in Box 1 on page 26.

2. The Bank of Canada is also examining other techniques for modelling credit risk to supplement and enhance the BIS framework. Caouette, Altman, and Narayanan (1998) present a variety of alternative credit-risk models.

Table 1

Domestic Interest Rate Swap Program

Fiscal year	Number of transactions	Notional amount transacted (Can$ millions)	Cumulative outstanding notional amount (Can$ millions)	Swap spread[a] (basis points versus BAs)
1987/88	2	300	300	-93
1988/89	14	1,250	1,550	-79
1989/90	30	2,300	3,850	-101
1990/91	22	1,425	5,275	-88
1991/92	15	850	5,775	-73
1992/93	26	2,500	7,775	-66
1993/94	11	1,100	8,050	-46
1994/95	1	100	6,425	-40
Total	121	9,825		-78

a. The average swap spreads are weighted by transaction volumes.

Figure 4

The Government's Use of Domestic Currency Swaps

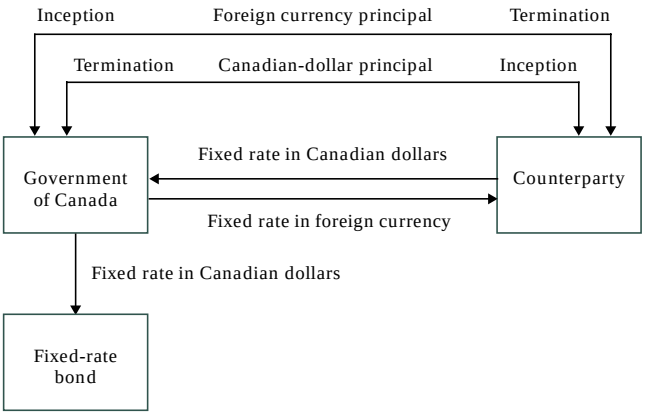


Table 2a

Domestic Currency-Swap Program

Fiscal year	Number of transactions		Notional amount transacted		Cumulative outstanding notional amount	
	US$-pay	Euro-pay	US$-pay (Can$ millions)	Euro-pay (Can$ millions)	US$-pay (Can$ millions)	Euro-pay (Can$ millions)
1994/95	1	0	400	0	400	0
1995/96	1	0	681	0	1,081	0
1996/97	2	0	1,360	0	2,441	0
1997/98	13	0	5,053	0	7,494	0
1998/99	57	2	6,925	142	14,419	142
1999/00	12	45	1,276	4,236	14,940	4,378
Total	86	47	15,695	4,378		

Table 2b

Can$ Fixed-Pay/US$ Floating-Pay Swaps

Fiscal year	Number of transactions	Notional amount transacted (Can$ millions)	Cumulative outstanding notional amount (Can$ millions)	Swap spread[a] (basis points versus LIBOR)
1997/98	10	4,067	4,067	32
1998/99	51	5,694	9,762	35
1999/00	10	982	10,389	38
Total	71	10,744		34

a. The average swap spreads are weighted by transaction volumes.

Table 3

Foreign Interest Rate and Currency Swaps

Fiscal year	Number of transactions		Notional amount transacted		Cumulative outstanding notional amount	
	US$-pay	Yen-pay	US$-pay (US$ millions)	Yen-pay (Yen billions)	US$-pay (US$ millions)	Yen-pay (Yen billions)
1984/85	1	0	500	0	500	0
1985/86	4	0	1,810	0	2,310	0
1986/87	1	0	120	0	2,430	0
1987/88	1	0	556	0	2,986	0
1988/89	0	0	0	0	2,986	0
1989/90	0	1	0	10	2,036	10
1990/91	7	5	675	50	2,301	60
1991/92	0	0	0	0	2,301	60
1992/93	0	0	0	0	1,745	60
1993/94	0	0	0	0	1,625	0
1994/95	0	0	0	0	1,625	0
1995/96	0	0	0	0	0	0
1996/97	0	0	0	0	0	0
1997/98	12	0	982	0	982	0
1998/99	9	0	2,045	0	3,027	0
1999/00	0	0	0	0	3,001	0
Total	35	6	6,688	60		

Figure 5

The Government's Use of Foreign Interest Rate Swaps

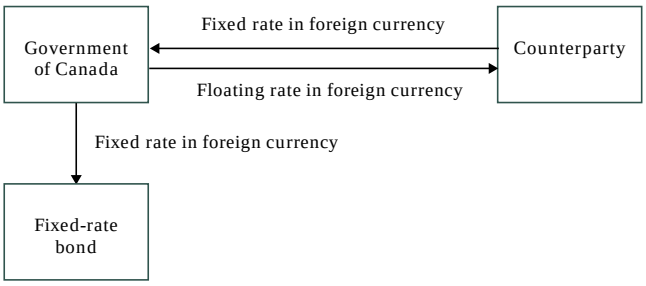


Figure 6

The Government's Use of Foreign Currency Swaps

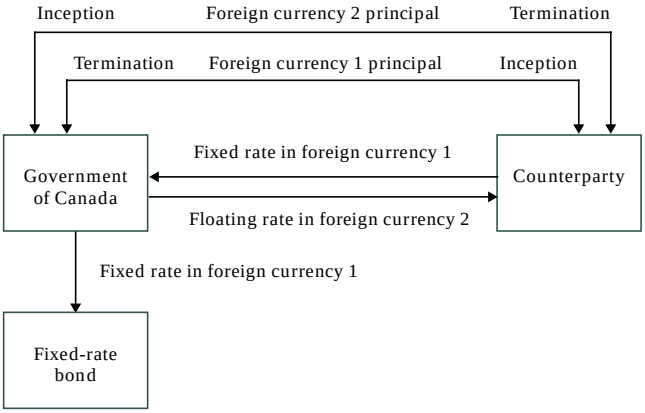


Table 4

Summary of Government Swap Programs

	Receive-side		Pay-side
Domestic interest rate swap program	Canadian-dollar fixed rate	to	Canadian-dollar floating rate
Domestic currency-swap program	Canadian-dollar fixed rate	to	U.S.-dollar floating rate U.S.-dollar fixed rate
	Canadian-dollar floating rate	to	U.S.-dollar floating rate
	Canadian-dollar fixed rate	to	Euro fixed rate
Foreign interest rate swap program	U.S.-dollar fixed rate	to	U.S.-dollar floating rate
	Yen fixed rate	to	Yen floating rate
Foreign currency swap program	Australian dollar fixed rate	to	U.S.-dollar floating rate
	British pounds fixed rate		
	Danish kroner fixed rate		
	Greek drachma fixed rate		
	Hong Kong dollars fixed rate		
	New Zealand dollars fixed rate		
	Norwegian kroner fixed rate		
	Yen fixed rate		

Swap Portfolios: Implementation and Strategy

At the beginning of each fiscal year, the Bank of Canada and the Department of Finance establish a debt-management strategy. This strategy establishes funding targets in terms of amounts to be issued and the predictability of the interest costs of the liabilities issued to achieve these targets. The target amount is based on a combination of the government's Canadian-dollar-denominated financial requirements and its desired level of foreign exchange reserves. Although the strategy determines the amount of foreign currency debt to be issued, the breakdown in terms of currencies is a tactical decision made jointly by the Bank and the Department of Finance, and is based on issuance and reinvestment opportunities. The cost-predictability decision is based on the trade-off between long-term, fixed-rate debt and less-predictable, but (usually) cheaper, short-term floating-rate debt. Once the strategy is established, a debt program is developed and implemented. It is at this point that swaps play an important role.

For example, when the domestic interest rate swap program was active, the debt strategy was based on a preference for issuing floating-rate debt. The program achieved this objective cost-effectively by capitalizing on the Canadian government's comparative advantage at the longer end of the domestic yield curve.

Currently, the government wants to increase its foreign exchange reserves and is using currency swaps to effectively convert Canadian-dollar-denominated fixed-rate bonds into synthetic fixed-rate,

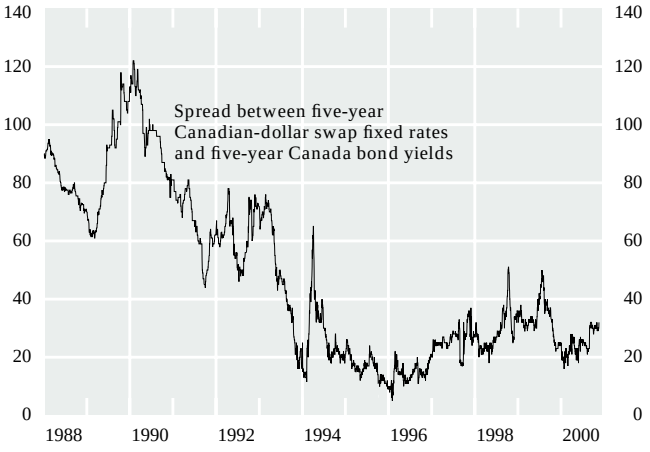
euro-denominated bonds.[12] The government also stands ready to issue bonds in other currencies and to use swaps to convert them into synthetic instruments that suit its overall targets for holding foreign currency.

In the domestic swap program, transactions are generally spread more or less uniformly across the entire fiscal year to diversify swap spreads. As shown in Chart 1, domestic swap spreads can be quite variable. By spreading out the trades, the Bank also avoids taking speculative positions on the future directions of currencies and interest rates—obviously an inappropriate activity for a central bank.[13] However, the Bank can, and does, increase or decrease the frequency and size of transactions according to market conditions and the volume of transactions concluded earlier in the fiscal year. As a relatively large participant in the Canadian-dollar swap market, the Bank is cognizant of the potential impact of its domestic swap transactions on the market and paces the program accordingly.

Chart 1

Canadian-Dollar Interest Rate Swap Spreads

Basis points



12. As detailed in De Leon (2000–01), the Exchange Fund Account investment guidelines prescribe that the government's foreign currency assets and liabilities are to be managed on the basis of matching currencies and maturities. They also prescribe limits to credit-risk exposure that can restrict investment opportunities. Since mid-1999, these rules have meant that the proceeds of euro-pay swaps can be invested more profitably than the proceeds of U.S.-dollar-pay or Japanese-yen-pay swaps.

13. In fact, the government's own treasury risk-management guidelines forbid the taking of financial positions based on views regarding future movements in financial markets, particularly interest rates and exchange rates. However, operational staff are permitted to exercise judgment in executing the best available transactions to meet risk and strategic treasury objectives in a cost-effective and prudent manner.

The Bank is also mindful that one of the government's strategic debt-management objectives is to maintain a well-functioning market for Government of Canada securities. In keeping with that objective, the Bank makes every effort to minimize the impact of its swap activity on that market. Thus, the Bank prefers to deal with counterparties that are less likely to offset their additional Canadian interest rate risk exposure with offsetting positions in government bonds. The ideal counterparty would want to use the swap transaction with the Bank to offset a pre-existing or pending asset-liability imbalance.

Foreign currency swaps are made in a much more opportunistic fashion. Details on the operation of the government's medium-term note and global bond programs are available in De Leon (2000–01), but generally the Bank of Canada continuously monitors global debt markets for attractive borrowing opportunities. The attractiveness of such opportunities is usually measured in terms of a target level for the U.S.-dollar floating rate, expressed as a spread below U.S.-dollar, three-month LIBOR. The ability to use swaps together with any new bond issue makes this target relevant for all borrowing opportunities in virtually any currency and at any term to maturity. In fact, the swap market has made LIBOR the borrowing-cost index of choice for almost all global borrowers. The government's target is not a fixed number but varies over time according to funding requirements. The target can change at any time, according to the size of the potential issue—the target for small issues tends to be more aggressive than that for a large global issue.

Cost-effectiveness

It can be said with certainty that the government's swap programs have been cost-effective, given the role they play in the general borrowing program. The fact that a particular swap may have required the government to make payments that exceeded its receipts, in no way affects the savings that the government made by opting for a swap rather than for an equivalent direct issue of securities. Estimated and projected savings are summarized in Table 5 for those swap transactions that allow reasonably accurate calculation of such costs. It can be seen that the government's swap programs have saved at least $500 million since 1988, and this does not include the savings associated with foreign currency swaps prior to 1997.

Table 5

Estimated and Projected Cost Savings

Type of swap[a]	Average spread[b]	Comparable direct funding spread	Cost saving[c]
Can$ fixed to Can$ floating	3-month BA - 78 bps	3-month BA - 13 bps[d]	Can$ 338 million
Can$ fixed to US$ floating	3-month LIBOR - 34 bps	3-month LIBOR - 12.5 bps	US$ 109 million
Post-95 non-Can$ to US$ floating	3-month LIBOR - 28 bps	3-month LIBOR - 12.5 bps	US$ 40 million
Pre-95 non-Can$ to US$ floating	3-month LIBOR - 38 bps	3-month LIBOR - 25 bps[e]	US$ 27 million
Can$ fixed to euro fixed[f]	3-month LIBOR - 38 bps	3-month LIBOR - 12.5 bps	US$ 44 million
Can$ fixed to US$ fixed	3-month LIBOR - 28 bps	3-month LIBOR - 12.5 bps	US$ 9 million

a. Only swaps transacted on or before 31 March 2000 are considered.
b. The average spreads are weighted by transaction volumes.
c. For swaps that were still outstanding on 31 March 2000, the estimated cost savings are projected out to the maturity dates of the swaps.
d. Canadian government treasury bills are used as the comparable direct funding for the domestic interest rate swap program.
e. The higher comparable direct funding spread on the pre-1995 U.S.-dollar, floating-pay swaps reflects the fact that Canada issued a U.S.-dollar, floating-rate note in 1994 at LIBOR less 25 basis points.
f. The spreads reported on the euro fixed-pay swaps are actually floating-rate spreads versus U.S.-dollar LIBOR into which the euro fixed-pay swaps could have been swapped on their respective trade dates. Hence, the corresponding minimum cost savings are denominated in U.S. dollars.

For example, Tables 1 and 5 show that, on average, the government effectively achieved floating-rate funding via the domestic interest rate swap program at 78 basis points less than the floating three-month BA rate. If the government had not entered into these swap agreements, it would have borrowed directly in the treasury bill market at yields that were about 13 basis points lower than those on BAs. Hence, the effective cost saving is about 65 basis points. In dollar terms, the government saved approximately $338 million, if it is assumed that the domestic interest rate swap program was devoted entirely to replacing three-month treasury bills in the borrowing program.

Similarly, Tables 2b and 5 show that, on average, the government effectively achieved U.S.-dollar, floating-rate funding via the domestic currency-swap program at 34 basis points less than the floating three-month LIBOR rate. If the government had not entered into these swap agreements, however, it might have issued more Canada Bills.[14] Through most of the late nineties and into 2000, the government's direct floating-rate funding cost has been about LIBOR less 12.5 basis points, thus the effective cost saving is about 21.5 basis points. In dollar terms, if the alternative direct funding cost remains at LIBOR less 12.5 basis points over the lives of these swaps, the government will save about US$109 million.

Substantial cost savings have been, and will be, realized on the government's U.S.-dollar, floating-pay, foreign currency swaps. On swaps initiated since 1995, the average cost is about LIBOR less 28 basis points. In dollar terms, if the alternative direct funding cost remains at LIBOR less 12.5 basis points over the lives of these swaps, the government will save about US$40 million. On swaps initiated prior to 1995, the average cost was about LIBOR less 38 basis points, but the alternative direct funding cost was probably also lower. For example, in 1994, Canada issued a U.S.-dollar-denominated, floating-rate note at LIBOR less 25 basis points. If this 25-basis-point spread is used to evaluate the pre-1995 U.S.-dollar, floating-pay, foreign currency swaps, the cost savings would be about US$27 million.

Calculations on the government's fixed-pay swaps are more difficult to perform, given the paucity of recorded information regarding alternative fixed-rate funding at the time the swaps were initiated. For many of the more recent domestic fixed-pay currency swaps, however, records have been kept of what the U.S.-dollar floating-pay cost would have been on the trade date. The appendix shows that the government's cost savings on any of these swaps into fixed-rate, euro-denominated bonds should be at least equal to the cost savings on floating-pay, U.S.-dollar swaps that could have been initiated at the same time. As described in detail in the appendix, this result occurs because the government's treasury risk-management guidelines require that all foreign funding proceeds be invested on a currency- and maturity-matched basis, and all such investments typically earn a return that is close to the funding cost. Hence, these hypothetical U.S.-dollar, floating-pay costs, for which records do exist, can be used to accurately calculate minimum cost savings on domestic fixed-pay currency swaps.

For example, if all of the euro fixed-pay swaps made up to the end of 1999/00 had been swapped into U.S.-dollar floating-pay swaps, the average cost of this

14. Canada Bills are promissory notes denominated in U.S. dollars and issued for terms of up to 270 days. From December 1997 (when the government started swapping Canadian-dollar-denominated, fixed-rate debt into U.S.-dollar, floating-rate debt) to 31 March 2000, yields on three-month Canada Bills have averaged 6 basis points below LIBOR, making the funding-cost estimate of LIBOR less 12.5 basis points rather conservative.

hypothetical funding would have been about LIBOR less 38 basis points. In dollar terms, if the alternative direct funding cost remains at LIBOR less 12.5 basis points over the lives of these swaps, the government will save just over US$44 million.

Similarly, on the government's fixed-pay swaps of Canadian dollars to U.S. dollars, the average cost of the hypothetical U.S.-dollar, floating-rate funding was about LIBOR less 28 basis points. In dollar terms, if the alternative direct funding cost remains at LIBOR less 12.5 basis points over the lives of these swaps, the government will save almost US$9 million.

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Appendix: Cost Estimates on Fixed-Pay Swaps—An Example

Near the end of 1999/00, the government entered into a six-year currency swap in which it committed to pay a 5.003 per cent fixed rate of interest on €50 million notional. At that time, the government probably could have issued fixed-rate, six-year, euro-denominated bonds that would have paid a 5.378 per cent fixed rate of interest.[1] Hence, the swap will save the government about 37.5 basis points annually on €50 million over a period of six years. At the time the swap was initiated, the government could have alternatively entered into a six-year swap in which it would have committed to pay a floating rate of LIBOR less 34 basis points on US$48 million notional. Hence, given the estimated funding cost of LIBOR less 12.5 basis points, the U.S.-dollar floating-pay swap would have saved the government only about 21.5 basis points on US$48 million over six years.[2] Thus, the projected savings on this swap would be about US$619,200 (US$48 million x 6 years x 21.5 basis points).

The fact that the euro and U.S.-dollar alternatives are in different currencies, and that one is fixed rate and the other is floating rate, is rendered virtually irrelevant by the requirement that all funds so raised must be invested on a currency- and maturity-matched basis (footnote 12). Also, a key fact that enables the two funding alternatives to be compared so directly, is that the funds so raised can be invested at rates of return that are very close to the rate of interest paid on the funding. In fact, as shown in the following analysis, the government's superior euro-market reinvestment opportunities make the above-calculated savings only the minimum savings.

The table below shows that if the government had issued six-year, euro-denominated bonds that paid a 5.378 per cent rate of interest and invested the proceeds in six-year, euro-denominated bonds that paid the same rate, the net return on this package would have been negligible, as would have been the currency and interest rate risk. However, the government actually engaged in a six-year, euro-pay currency swap at a fixed interest rate of 5.003 per cent, and if the proceeds had been invested in the aforementioned six-year, euro-denominated bonds, the net return would have been 37.5 basis points, and the currency and interest rate risk still negligible.[3]

Comparative Cost Calculations
As a per cent of notional amount

	€50 million		US$48 million	
	Bond	Swap	Bond	Swap
Cost of funds	5.378	5.003	LIBOR - 0.125	LIBOR - 0.340
Return on funds	5.378	5.378	LIBOR - 0.125	LIBOR - 0.125
Net return	0	+0.375	0	+0.215

If instead, the government raised U.S.-dollar-denominated, floating-rate funds at LIBOR less 12.5 basis points, and reinvested the proceeds at the same LIBOR less 12.5 basis points, the net return would have been negligible, as would have been the currency and interest rate risk. However, there would be some refinancing and reinvestment risk, to the extent that over the six-year period being evaluated, the funding and investment spreads (the 12.5 basis points) would not be guaranteed. If instead, the government had swapped into six-year, floating-rate U.S. dollars at LIBOR less 34 basis points and reinvested at the aforementioned LIBOR less 12.5 basis points, the net return would have been 21.5 basis points, and the currency and interest rate risk would again have been negligible. Also, in this case, the funding spread would have been locked in, although uncertainty would remain as to future investment spreads.

Hence, the euro-denominated, fixed-pay swap actually saved the government at least 37.5 basis points on €50 million, which will produce savings of at least the equivalent of US$1,080,000 (US$48 million x 6 years x 37.5 basis points).[4] This is U.S.$460,800 more than the savings estimated using the more conservative U.S.-dollar, floating-rate basis, and similar more substantial savings would be calculated for all of the government's fixed-rate, domestic-currency swaps, if the historical data were available.

1. The estimated alternative fixed-rate, euro-denominated funding rate was about 30 basis points over maturity-matched German government bonds, based on the market yields of existing fixed-rate, euro-denominated Canadian government bonds.

2. In addition to being more expensive, the cost of the floating-rate, U. S.-dollar funding is also more uncertain than the fixed-rate, euro-denominated cost because of the potential variability of the 12.5-basis-point funding spread. However, the spread could be locked in by the issuance of a LIBOR-based, floating-rate bond.

3. To be more precise, there is some marginal currency and interest rate risk on the reinvestment of the positive net return.

4. The actual €50 million swapped was converted to U. S. dollars at the exchange rate prevailing at the transaction's inception.