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Foreign Portfolio Investment in Canadian Bonds

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FOREIGN PORTFOLIO INVESTMENT IN CANADIAN BONDS
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INTRODUCTION

Non-residents have been sharply increasing their investment in Canadian bonds since the eighties. By 1995, these holdings amounted to $330 billion or almost 40% of all Canadian bonds outstanding. The interest they earned on these holdings ($25 billion in 1995) continued to be the driving force behind Canada's Current Account deficit.

With the magnitude and the wide diversity of Canadian bonds held by non-residents, it is important that adequate and consistent statistics be maintained on these series. This is facilitated in Canada by using a detailed and complex statistical system[1] to process these series.

In a nutshell, the Canadian system uses various detailed characteristics on each specific bond to generate statistics which are integrated in Canada's Balance of payments and International Investment Position. This document reviews how these statistics are generated. A first part describes the various prices which are used to value bonds, notably the value used to measure foreign holdings of Canadian bonds outstanding at the end of a period. The next part describes methods which can be used to calculate income to non-residents (Canada accrues the expense income of the Canadian issuer). A third part covers capital transactions with non-residents in Canadian bonds. Next reviewed is the reconciliation between the capital transactions and the positions outstanding. A final part describes the commissions earned by and paid to non-residents on trading Canadian bonds.

The statistics described in the aforementioned parts can be generated because of the very detailed characteristics on Canadian bonds which are maintained in the system. Each Canadian issuer is identified by name, sector (federal government, private company, etc.), industrial classification; each bond held abroad is listed with the dates of issue and of maturity, the currency of issue, the interest rate, the timing of payments of interest, etc.; and foreign holders are identified on the basis of their respective country of residence, when available, or at least by broad geographical area and whether or not they are related to the Canadian issuers.

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[1]The system is being currently redesigned to increase its functionality.

1. BOND PRICING

From the time a bond is issued through to the time it is redeemed, its price fluctuates largely as a result of movements in interest rates in the market. In the Canadian statistical system, four prices are maintained: issue prices, maturity prices, book value of the issuer and market prices at year-ends. Each of these prices is in turn used to derive related statistics. For example, the prices on new issues are used to derive capital flows on new issues while maturity prices are used to generate retirements. Both new issue and retirement prices are used to assist in compiling yields on a bond. The book value of the issuer is currently used to value the amounts outstanding on bonds and work is underway to value bonds outstanding at market prices.

1.1 Issue prices

The issue price represents the proceeds received by the issuer when issuing the bond. At the time of issue, the bonds are generally priced at the prevailing market price. This market price is in turn equivalent to the present value of the stream of future payments, that is the coupons and capital discounted at the market interest rate.[2] If the coupon rate is set equivalent to the prevailing interest rate, the issue price will be the same as the maturity price. If the coupon rate is different from the prevailing interest rate, the issue will be priced at discount or premium from the maturity price.

In general, a bond is issued at a given date and, hence, has one issue price. There are, however, bonds, especially Government of Canada bonds, which are issued in tranches over a period of time. Each tranche has the same maturity date and coupon rate of an existing issue, but the issue price of tranche varies according to the interest rates prevailing at the time the tranches were issued. Hence, each of these bonds has as many issue prices as there are tranches.

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[2]for an illustration please refer to Appendix 1.

1.2 Maturity prices

The maturity price[3] is the amount the issuer will pay the holder at the date of redemption of the bond. As mentioned previously, it is the future value of the principal after the coupons have been paid out.[4] The maturity price of a bond is the same as the market price which will prevail on that bond at the date of its maturity. In other words, the maturity values for bonds outstanding are a mixture of market values at different future points in time.

1.3 Book value price of the Canadian bond issuer

Book value tracks the cost plus the income accrued but not paid out. The book value can be calculated from different viewpoints. From the point of view of the *issuer* of a bond, the book value is the issue price plus the income accrued but not yet paid out. From the viewpoint of the *holders* of the bond, the book value consists of the acquisition cost plus the income earned but not yet received. Reflecting that the holders of Canadian bonds may have bought their bonds at various prices, there will be as many book values for the holders as there are prices and times at which the bonds were bought.

In the Canadian statistical system, only the book value of the issuer is maintained. This book value is made up of the issue price plus the income expensed but not paid out by the issuer. The income expense is calculated as the accrual of the coupon plus the accrual of the difference between the issue price and the maturity price. Hence, at any given time, the book value of the issuer is made up of three parts: the issue price, the coupon accrued by not yet paid out and the amortization of the discount/premium, if any, between the issue and the maturity prices. This book value is currently used to value all Canadian bonds outstanding in Canada's International Investment Position. This method of income calculation follows the debtor principle in that it calculates the investment income expense of the debtor (as opposed to the income earned by the foreign creditor). For more details on possible income calculations, please refer to section 2 on income.

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[3]often referred to as par, face, principal and redemption value.

[4]please refer to Appendix 1 for an illustration.

1.4 Market prices

1.4.1 Description of market prices

The market price is the price which would be used to sell or acquire a bond at a <u>given time</u>. Throughout its lifetime, a bond will have many market prices depending upon the time at which the value is taken. For instance, the issue price is, in most cases, the market price which prevailed at the time the bond was issued and the maturity price is the market price which prevails at the time the bond matures.

When valuing several bonds, such as when measuring positions at a given time, it is extremely important to use a common yardstick, that is to use prices which are comparable. A prevalent and misleading measure in valuing positions outstanding consists in adding the maturity (or par) values of bonds. Such valuation ignores completely the time value of money, a major factor in valuing bonds. For example, a 10% bond with a par value of $100 due in the year 1997 will have a significantly different price than a similar bond due in the year 2025; the differences are even more accentuated with deep discount bonds. While not perfect, a more appealing value consists in using the prices of bonds which prevailed in the market for the period at which the measurement applies. This measure, which is referred to as the market price valuation, has been adopted internationally as the standard in national accounting to value positions outstanding at a given time. Its main advantage is that it uses prices which are comparable at a given time. This advantage outweighs some shortcomings inherent in market price valuation, such as valuing an entire stock of bonds with a marginal price, that is the market price at which the last transaction occurred, or would occur if there was a transaction. Obviously, if all bonds were sold or redeemed at once, the market price would drop drastically. It is unlikely that all bonds are to be sold or redeemed at once and the market price valuation remains an appealing yardstick. Although not yet incorporated in Canada's official series, plans are to publish the market price valuation of bonds in the near future.

1.4.2 Derivation of market prices

In the Canadian system, the market prices are either observed
from bond trading survey in the month preceding the valuation,
or calculated. To the extent that bonds are traded in the
month preceding the period of valuation, such as December
trading for December-end valuation, the average price on such
trading is used as the proxy for market prices on the bonds
traded.

For bonds whose market price are not readily available, the
system devises a market price using as proxy the present value
of all the future stream of payments of the bond:

$$Present \quad value = \sum_{t=1}^{N} \frac{C}{(1+i)^t} \quad + \quad \frac{M}{(1+i)^N}$$

where   C is the coupon rate times the maturity value
              i.e. coupon interest for the year

           N is the number of years left to maturity

           M is the maturity value

           I is the market yield of the bond

The coupon rate (C), the number of years left to maturity (N)
and the maturity value (M) are readily available from the
characteristics of the bond. The market yield (i) of the bond
is the most difficult component to obtain as it embodies the
credit risk of the issuer as well as the credit conditions in
the financial markets at the time the valuation is conducted.
On the basis of a complex mixture of market observations and
derived data[5], the system generates yields for a broad range
of bonds. Each bond is then assigned a yield which is
incorporated into the above equation to carry out the present
value calculation.

While it factors in certain variables, the present value
remains, however, only a proxy for market price since it

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[5]for a detailed application of the formula, please refer to B. Nichols, *The yield matrix for Canadian bonds in the Debt Inventory System*, September 1995.

ignores other pertinent variables[6]. Among the variables taken
into account, the calculation first reflects that the price of
the security moves in an opposite direction to the change in
interest rate(the market risk, also known as the interest
risk); and that the higher the coupon rate, the less the
price of the security will change. Second, the yield is
selected to reflect some of the risk that the issuer may
default (credit risk or default risk). Third, the yield is
also selected to reflect to some extent the marketability (or
liquidity risk) of the security, that is the ease at which a
security can be sold at or near its true value[7]. The selection
of the yield also takes into account some of the exchange rate
risk by using the changes of interest rates in foreign markets
for foreign currency denominated bonds.

The present value measurement ignores, however, other factors
which are bound to affect the market price of specific bonds.
First, it does not take into account the call risk, that is
the risk that a bond may be retired prior to maturity. This
risk is prevalent for sinking funds issues, issues with
callable provisions as well as mortgage-backed securities[8].
Second, it assumes that the coupon will be reinvested at the
yield rate and, as such, ignores the reinvestment risk (also
called the interest-to-interest risk). Third, it also ignores
the yield-curve (or maturity risk)as some yields are obtained
by assuming certain relationships among different maturities;
if these relationships change, the various yields derived from
these relationships are affected. Fourth, it also ignores the
greater volatility in market prices for bonds with embedded
options. Fifth, the calculation of market price does not take
into account the inflation or purchasing power risk, which is
the loss in purchasing power of coupon and principal flows in
times of high inflation. Finally it does not take into
account risks attached to political or other events.

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[6]please refer to Fabozzi, Frank J. and Fabozi T. Dessa, *The Handbook of Fixed Income Securities*.

[7]normally evidenced by the size of the spread between the bid price and the offer price quoted by the dealer.

[8]in case of mortgage-backed securities, this risk is called prepayment risk reflecting the fact that the owners may prepay or extend all or part of their mortgage.

2 INCOME FROM HOLDING BONDS

2.1 Description of income

Income from bonds can be calculated in a number of ways which represent variations of two main methods: the cash (*realized*) method or the accrual (*expected*) method. Under the cash method, income can be narrowly recognized only when coupons are cashed (Case 1); a broader type of cash income is to recognize the receipt of coupons as well as the difference between the cost and the selling prices (Case 2). Under the accrual method, a narrow type of income is to accrue only the coupons (Case 3); and a broader type consists in also accruing the fluctuations in the prices of bonds (Case 4). Cases 2 and 4 recognize as income the fluctuations in the price of the underlying bond on the basis that the price of bonds embodies expectations on future income.

Cash(realized)		**Accrual**(expected)	
Coupon (Case 1)	Coupon and capital (Case 2)	Coupon (Case 3)	Coupon and capital (Case 4)

2.2 Calculation of income[9]

Case 1-Cash coupon

Income is simply the product of the coupon rate and the maturity value and is recognized when paid out.[10] Under this method, zero-coupon bonds do not earn income.

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[9]a simplified example is provided in Appendix 2 to illustrate the various cases.

[10]interest on bonds issued in North America and Japan is generally paid every six months while interest on bonds issued in Europe is paid annually.

Case 2-Cash coupon and realized capital gain/loss

The income is made up of the coupon when paid out; and the difference between the purchase (cost) and the selling prices when the bond is sold. Under this method, any capital gain/loss between the buying and selling prices is recognized as income.

Case 3-Accrued coupon

The income is made up of the accrual of the coupon with a corresponding interest payable entered in the Capital Account. Again, under this method, zero-coupon bonds do no earn income.

It should be noted that bonds bought in the secondary market at a date other than the coupon date contain an element of accrued interest. This accrued interest on the coupon is not income for the purchaser. It is the capitalized income already earned by the seller and received as capital from the purchaser in addition
to the market price of the bond; the capitalized income will be returned to the new holder at the next coupon payment.

Case 4: Accrual of coupon and capital

The income is made up of the accrual of coupon (as in case 3) as well as of the amortization of the fluctuations in the price of the bond. Two cases of amortization are presented.

Case 4A- Return of the foreign holder
          (*Amortization of the difference in market prices*)

The income is defined as the accrual of the coupon plus the amortization of the difference between the market prices at the beginning of the period and that at the end of the period. This income is referred as the return of the foreign holder because it shows how much foreign holders earn from the accrual of the coupons and from the fluctuations in market prices.

Case 4B- Income expense of the domestic issuer[11]
       (*Amortization between the issue price and the
       maturity price*)

The income is made up of the accruals of the coupon and of the difference, if any, between the issue price and the maturity price. When the issue price differs from the maturity price[12], the difference is effectively an income expense (positive for bonds issued at discount and negative for bonds issued at premium)for the issuer. The system amortizes that difference over the remaining life of the bond using the formula of internal rate of return. This difference is not, however, paid out/received until maturity. Therefore, the cumulated amortization is recorded as a payable in the Capital Account, payable will be paid out/reimbursed at maturity.

As noted earlier, there are bonds, especially Government of Canada bonds, which are issued as tranches of an existing issue. The different tranche prices will in turn affect the income accruing from the amortization of the difference between the issue and maturity prices. Hence, a bond with tranches will have several costs reflecting the various issue prices of the tranches.[13]

The income incurred by the Canadian issuer is recorded in Canada's Current Account. This income is calculated from the point of view of the issuer and, as such, is based on the debtor principle. The incorporation of such income in the Current Account ensures a full concordance with the expenses recognized by the Canadian issuers. As for foreign holders, their income under this method is made up of two components: a current income accruing from the issuer (entered in the Current Account); and a realized capital gain/loss arising from the difference of the market price and the book value of

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[11]For a detailed presentation, please refer to Réjean Tremblay,*BP 2000, Calcul de positions et d'intérêt*, Statistique Canada, 25 août 1995.

[12]Extreme examples are zero coupon bonds as well as strip bonds. For ordinary bonds, the price will be at discount (premium) from the maturity value when the coupon rate is lower (higher) than the market interest rate. At the time of issue, the price is the same as the maturity value if the coupon rate is the same as the prevailing interest rate. (An example is provided in appendix 1).

[13]For the detailed calculation of the income and related book value arising from the tranches, please refer to Réjean Tremblay, _op. cit._

the bond (entered in the Capital Account) only if and when
they sell their bonds.

3.   CAPITAL TRANSACTIONS

Capital transactions can be broken down into four major types:
new issues, retirements, trade in outstanding securities and
amortization and changes in interest payable,

3.1 New issues

New issues with non-residents are restricted to newly issued
bonds floated directly abroad that is foreign issues and the
portion of global issues floated in the foreign markets. New
issues include tranches floated directly in foreign markets at
the time the borrowings occur. Foreign purchases of new
Canadian bonds floated in the domestic market, including the
domestic portion of global bonds, are classified as trade in
outstanding issues.

New issues denominated in foreign currencies are entered in
the system in original currencies and the system converts them
in Canadian dollars using the noon average exchange rate of
the month. When the Canadian dollar proceeds are known, this
information is instead used to calculate new issues.

3.2 Retirements

Retirements represent the amount of capital reimbursed by the
issuer at the date of maturity of the bond. Retirements are
generated automatically by the system at maturity. While
there is generally one date of maturity, some bonds may have
several maturity dates as the retirements are spread over time
(e.g. sinking funds bond). For bonds issued in tranches, the
system prorates the retirements according to the weight of the
tranches[14].

Retirements of bonds in foreign currencies are converted in
Canadian dollars at the monthly noon average rate in the month
of retirement. Again, when the Canadian dollar proceeds are
known, this information is used to calculate retirements.

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[14]Please refer to Réjean Tremblay, *op. cit*.

3.3 Outstanding bonds

After having been issued, bonds trade in the secondary market as outstanding securities. Trading involving residents and non-residents on Canadian bonds is largely on domestic issues, especially Government of Canada bonds. Three cases of trading require special treatment: bonds under repurchase agreements; bonds which have been stripped; and trading which is reported as aggregates instead of on a bond by bond basis by few security dealers.

Bonds traded under repurchase agreements are effectively loan/borrowings where bonds are used as collateral. Hence, the trading in such bonds need to be reclassified as loan/borrowing. This can easily be done for those financial intermediaries who identify separately the trading involving repurchase agreements. For the others, the system matches, for each financial intermediary, the sale and purchase of the same securities in a single month and treats such trading as repurchase agreements.

Transactions involving bonds which have been stripped are processed as transactions in bonds but are not yet reflected in positions in the Canadian system.

> *The strip or zero* coupon *bond first appeared in Canada in 1982. It is created by a dealer acquiring a block of existing high quality bond and then physically separating certain individual interest coupons from the underlying residue. These two units are then sold separately at significant discounts to their face value. The bond residue consist of principal plus undetached semi-annual interest coupons between the call date and the bond issue's maturity date. Holders of strip bond receive no interest payments. Instead, the bonds are purchased at a discount at a price that will result in a certain compounded rate of return.*[15]

Work is underway to find a procedure to reflect strip bonds in the positions. At issue is whether or not to link the strip bonds to the original bonds or to treat the strips as new bonds. If the strips were to be linked to the original bond, that is to show them as a liability of the initial issuer, it will be necessary to neutralize the original bond in the inventory and to replace it with the totality of its strip components with as many bonds as there are strips (as

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[15]The Canadian Securities Course, 1993, page 158.

illustrated in Appendix 1). If, on the other hand, it is decided to show the strips independently of the original bond, the issue is how to present the strips. Should they be shown as liabilities of the financial institutions which stripped the bonds? In any cases, the strips will show as zero interest bonds in the inventory.

There are also bonds which are not identified on a bond by bond basis by few security dealers for a number of reasons. These bonds are regrouped by sector and treated as a component of a synthetic single issue of the sector (e.g. bonds issued by provinces).

Once adjusted to exclude bonds under repurchase agreements and strips, the system checks if each bond traded resides in the inventory as having been issued.[16] The market prices of both sales and purchases for the month are entered as transactions in the inventory, with these sales/purchases being also revalued at the book value of the issuers. For bonds traded the same month and year of a new issue, the system deems the trading to have occurred at the date of new issue; otherwise, the trading is deemed to have occurred on the fifteen day of the month of trading.

The trading in bonds does not cover derivatives contracts which can be carried out on bonds, such as swapping the interest or the currency. These derivative contracts, when recorded statistically, are classified, for the time being, as short term assets/liabilities in Canada's Balance of Payments and International Investment Positions.

3.4 Amortization and changes in interest payable

Amortization arises from the income accrual of the changes in prices. Changes in interest payable arise from the accrual of the coupons. These two components represent the capitalization of that portion of income which has been recognized but which has not yet been paid out.

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[16]If not, an adjustment is made in the inventory to birth the bond as a new issue.

4. RECONCILIATION BETWEEN CAPITAL FLOWS AND POSITIONS

The value of foreign holding of Canadian bonds fluctuate from
one period to another as a result of transactions with non-
residents as well from price changes in the value of the bonds
held. The basic equation is as follows:

Position at the beginning of the period
plus capital transactions
plus changes in the prices of bonds (holding gains and
losses)[17]
equals position at the end of the period.

The following shows the reconciliation between transactions
and positions for bond positions valued at book value and at
market price. To the extent that Canadian bonds are
denominated in foreign currencies, their conversion into
Canadian dollars need also be taken into account in compiling
holding gains/losses.

Reconciliation between capital transactions and positions

Given t_0 the position at the beginning, t_i and $t_{i+ ...}$
transactions at times i and i+..; and t_n the position at the
end of the period, the holding gains and losses will be as
follows:

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[17]No attempt will be made here to distinguish neutral holding gain/loss from real holding gain/loss. For more details, please refer to System of National Accounts, 1993.

	Canadian bonds denominated in Canadian dollars		Canadian bonds denominated in foreign currencies
	Book value	Market value	
a) bonds held throughout the period	no change	*plus* difference due to market prices at t_0 and t_n	plus difference due to exchange rates at t_0 and t_n
b) bonds bought during the period and held to the end of the period	*plus* difference due to market buying price t_i and the book value at t_n	*plus* difference due to market buying price t_i and the market price at t_n	*plus* difference due to exchange rates at t_i and at t_n
c) bonds sold during the period and held at the beginning of the period	*plus* difference due to market selling price t_i and the book value at t_0	*plus* difference due to market selling price t_i and the book value at t_0	*plus* difference due to exchange rates at t_i and t_0
d) bonds traded (bought and sold) during the period but not held at the beginning nor at the end of the period	*plus* difference due to market prices at t_i and $t_{i+..}$	*plus* difference due to market prices at t_i and $t_{i+..}$	*plus* difference due to exchange rates at t_i and $t_{i+..}$

5 COMMISSIONS

Commissions are incurred every time a bond is traded.

Initially, domestic issuers pay foreign financial intermediaries to place or float their new issues in foreign markets. The proceeds from new issues show as a credit entry in the Capital account with a debit entry in the Current Account to show the amount that the issuers pay the foreign financial intermediaries. The commissions are recorded at the time of issue and not spread over the life of the bond as is suggested in private accounting.

Canadian bonds traded across the border with non-residents are deemed to earn commissions for the Canadian intermediaries with whom or through whom the trading occur. Such commissions are imputed since in Canada there is no quoted commissions for trading bonds. Commissions are derived between the bid (offer to buy) and the offering (offer to sell) prices.

CONCLUSION

In the Canadian statistical system, foreign holdings of Canadian bonds are valued according to four valuations. First, the *issue price* is maintained to derive the amount of new issues and, if the issue price differs from the maturity price, to accrue this difference as income. Second, the *maturity price* is also maintained to derive the amount of retirements and to compile the income arising from coupons as well as from the difference, if any, between the issue and maturity prices. The *book value* of the Canadian issuers is maintained to track the income expense incurred by Canadian issuers which has not been paid out. Finally, the *market price* is also maintained in the Canadian system although it is yet to be used in the official series in Canada's International Investment Position.

Positions outstanding at the end of the period can be calculated as the positions at the beginning of the period plus the transactions on bonds plus the holding gains and losses. Obviously, holding gains and losses depend upon the valuation used to value positions outstanding. Bonds valued according to the book of the Canadian bond issuers will produce different holding gains/losses than those arising from valuing bonds at market prices.

Two types of income arise from foreign holding of Canadian bonds: investment income and income in the form of fees and

commissions (services). The investment income on foreign
holding of Canadian bonds can be calculated in various ways,
ranging from a very narrow cash basis to a full accrual basis.
The income calculated in the Canadian system is that incurred
by the Canadian issuer from accruing both the coupon and the
difference between the issue and maturity prices.   Income in
the form of services is generated both at the time of issue
(commissions paid by Canadian issuers to foreign financial
intermediaries for issuing their bonds in foreign markets) and
when trading Canadian bonds with non-residents (Canadian
financial intermediaries earning commissions from both the
foreign sellers and the foreign buyers of Canadian bonds).

The degree of details maintained and the flexibility of the
Canadian system make it possible to generate many more
variables than have been covered in this document. Additional
variables generated include the funds that will be needed to
service the debt in the years to come, taking into account the
coupons to be paid as well as the retirements which are
expected. An other feature consists in studying in the time
the term to maturity of the debt and its evolution throughout
the years. An other feature is to derive a weighted coupon
rate on the external bond liability or the size of the foreign
versus domestic currency portion of bonds held by non-
residents.

The possibilities are multiple and they provide a major
analytical tool to a wide range of users from policy makers to
private analysts and debt issuers.

APPENDIX 1: ISSUE PRICE AND MATURITY PRICE

Say, a $100 bond issued in 1995 with a coupon of 10% paid annually and maturing in 2000 will have the following present value if the prevailing interest rate is 10%:

Present value as of 1995	1996	1997	1998	1999	2000
9.09	$10/(1+0.1)$				
8.26		$10/(1+0.1)^2$			
7.52			$10/(1+0.1)^3$		
6.83				$10/(1+0.1)^4$	
6.21					$10/(1+0.1)^5$
= 37.91	$10/(1+0.1)$	$10/(1+0.1)^2$	$10/(1+0.1)^3$	$10/(1+0.1)^4$	$10/(1+0.1)^5$
+62.09					$100/(1+0.1)^5$
=100.00					

The $100 present value, which is also the **issue price**, is made up of $37.91 for the coupons and $62.09 for the principal. In other words, the investor disburses $37.91 to receive an annuity of $10 every year for five years and $62.09 to receive a lump sum of $100 in five years, i.e. at maturity.

The issue price is equal to the **maturity price** because the 10% coupon rate is the same as the market interest rate. If the coupon rate was set lower than the prevailing interest rate (say a 8% coupon rate and a 10% market interest rate), the issue price of the bond would be lower than the maturity price:

Present value as of 1995	1996	1997	1998	1999	2000
7.27	$8/(1+0.1)$				
6.61		$8/(1+0.1)^2$			
6.01			$8/(1+0.1)^3$		
5.46				$8/(1+0.1)^4$	
4.97					$8/(1+0.1)^5$
- 30.31	$8/(1+0.1)$	$8/(1+0.1)^2$	$8/(1+0.1)^3$	$8/(1+0.1)^4$	$8/(1+0.1)^5$
+62.09					$100/(1+1.01)^5$
=92.40					

It should be noted that the discounted value of the principal
remains the same at $62.09, but that the discounted values of
the coupons are lower at $30.31, depressing in turn the issue
price to $92.40. Conversely if the coupon rate was set higher
than the interest rate, the issue price of the bond would also
be higher than the maturity value. If the bond was issued with
no coupon (zero coupon and strip bonds), the issue price would
be equal to the maturity value discounted at the prevailing
interest rate (that is $62.09 in the example above). In other
words a conventional bond is potentially made up of as many
bonds as are there are coupons and capital. In fact, both the
coupons and capital are often stripped and sold individually
as zero-coupon bonds.

Issue price = Maturity price if coupon = interest rate

Issue price < Maturity price if coupon < interest rate

Issue price > Maturity price if coupon > interest rate

APPENDIX 2: ILLUSTRATION OF INCOME CALCULATIONS

On January 1, 1995, a one-year less one day Canadian bond is
issued abroad at discount at $94 with a coupon of 12% payable
in June and in December. The bond is bought back in Canada at
$97 on June 30 and sold back abroad at $98 (plus interest
accrued of 3 months) on September 31 where it is held to
maturity on December 1995.

	J	F	M	A	M	J	J	A	S	O	N	D
Issue/maturity prices	94											100
Market Price	94	94	94	94	94	97	97	97	98	98	98	100
Market yield(%)		12.8	12.8	12.8	12.8	12.6	12.4	12.4	12.2	12.2	12.2	12
Coupon payment						6						6
Interest payable	1	2	3	4	5	0	1	2	3	4	5	0
Change in int. payable	+1	+1	+1	+1	+1	+1 -6	+1	+1	+1	+1	+1	+1 -6

Case 1-Cash coupon

Income is simply the product of the coupon rate and the
maturity value divided by 2 and is recognized when paid out.
The entries in the BOP are as follows:

	QI	QII	QIII	QIV	YEAR
Curr. Acc-Income		-6		-3	-9
Cap. Acc.-Bonds	+94	-97	+98	-100	-5
-Change in int. payable			+3	-6,+3	-
-Reserves	-94	+6,+97	-3,-98	+6,+100	+14

Case 2-Cash coupon and realized capital gain/loss

The income is made up of the coupon and the change in the price of the bond from purchase (cost) to selling prices.

	QI	QII	QIII	QIV	YEAR
Curr. Acc-Income: - coupon		-6		-3	-9
-amortization		-3	+1	-3	-5
Cap. Acc.-Bonds	+94	-94	+97	-97	-
-Change in int. payable			+3	-6,+3	-
-Reserves	-94	+6,+97	-3,-98	+6,+100	+14

The calculation of this income requires that the purchase and selling prices of the holder be known ($94 and $97 in the first transaction and $98 and $100 in the second transaction); and that the difference between these two prices be recorded as income. Income of $9 ($6 interest plus discount of $3) in the first transaction for a return of 9.6% ($9 on a capital of $94) and of $5 on the second transaction (receipt of coupon $6 minus $3 already advanced plus $2 of capital appreciation).

Case 3-Accrued coupon

The interest is initially calculated in the same way as in Case 1, that is the product of the coupon rate and the maturity value divided by 2; the resulting income is then accrued over the number of days from the time of the cost, i.e. the issue price or the purchasing price in the secondary market.

	QI	QII	QIII	QIV	YEAR
Curr. Acc-Income (coupon)	-3	-3		-3	-9
Cap. Acc.-Bonds	+94	-97	+98	-100	-5
-Change in int. payable	+3	+3,-6	+3	+3,-6	-
-Reserves	-94	+6,+97	-3,-98	+6,+100	+14

Case 4: Accrual of coupon and capital

The income is made up of the accrual of coupon (as in case 3) as well as of the accrual of the capital arising from the fluctuations in the price of the bond.

Case 4A- Return of the foreign holder
(*Amortization of the difference in market prices in the period)*

The income is defined here as the accrual of the coupon as well as the amortization of the difference in market prices from the beginning to the end of the period.

	Q1	Q2	Q3	Q4	YEAR
Curr. Acc.-Income: coupon -amortization	-3,	-3, -3		-3 -2	-9 -5

Cap. Acc.-Bonds
     -Change in int. payable (+) (-)
     -Amortization (+) (-)
	+94
	+3
		-97
		+3,-6
		+3
			+98
			+3
				-100
				+3,-6
				+2
					-5
					-
					+5

-Reserves	-94	+6,+97	-3,-98	+6,+100	+14

The incorporation in the Balance of Payments of this income, entail identifying whether the capital gain/loss has been realized or not. If realized, the gain/loss would show in the price of bonds sold/purchased and, if not realized, an entry needs to be made under amortization.

Case 4B- Income expense of the domestic issuer[18]
(*Amortization between the issue price and the maturity price*)

Using the example above, the entries in the balance of payments will be as follows:

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[18]For a detailed presentation, please refer to Réjean Tremblay,*BP 2000, Calcul de positions et d'intérêt*, Statistique Canada, 25 août 1995.

	Q1	Q2	Q3	Q4	YEAR
Curr. Acc.-Income: coupon -amortization	-3, -1.50	-3 -1.50		-3 -1.50	-9 -4.50

Cap. Acc.-Bonds
     -Change in int. payable (+) (-)
     -Amortization (+) (-)
	+94
	 +3
	 +1.50
		-97
		 +3,-6
		 +1.50
			+98
			 +3
			
				-100
				 +3,-6
				 +1.50
					-5
					 -
					 +4.50

-Reserves	-94	+6,+97	-3,-98	+6,+100	+14.00

An income of $4.50 is shown to account for the accrual of coupon ($1 a month) and the monthly amortization of $0.50 between the issue price and the maturity price. The capital gain of $3 in the first transaction and of $2 in the second transaction is embodied in the sale price of $97 and of the $100 maturity value.

Summary of income calculation

The various ways of calculating income for Current Account purposes are illustrated in the following graph:

Income on Bonds
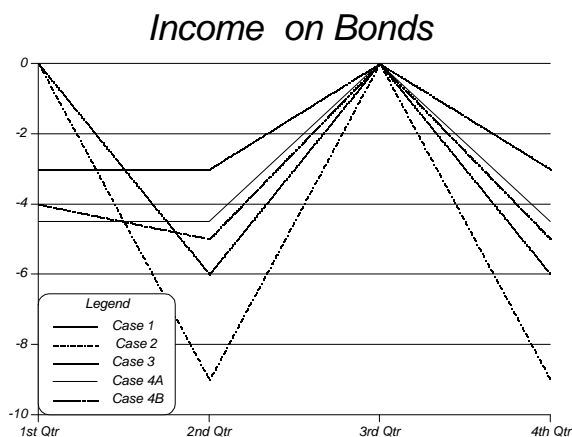
For the year as a whole, the various approaches would give the
following balances of payments entries

	Cash		Accrued		
			Coupon and Capital		
	Coupon (Case 1)	Coupon and Capital (Case 2)	Coupon (Case 3)	Holder (Case 4A)	Issuer (Case 4B)
Curr. Acc.-Income	-9	-14	-9	-14	-13.5

Cap. Acc.-Bonds
  -Change in int.
   payable
  -Amortization (+) (-)
	-5		-5	-5
				
				+5
					-5
					
					+4.5

-Reserves	+14	+14	+14	+14	+14

APPENDIX 3:   ILLUSTRATION OF CALCULATING HOLDING GAINS/LOSSES

Using the example presented in Appendix 1 on income, the reconciliation between capital transactions and positions at book value (BV) and at market value (MV) will be as follows:

		Cash				Accrual					
		Coupon (Case 1)		Coupon and Capital (Case 2)		Coupon (Case 3)		Coupon and Capital of holder (Case 4A)		Coupon and Capital of issuer (Case 4B)	
		BV	MV	BV	MV	BV	MV	BV	MV	BV	MV
IQ	Flow Valuation Position	+94 0 94	+94 3 97*	+94 0 94	+94 3 97*	+97 0 97	+97 -0 97*	+97 0 97	+97 0 97*	+98.5 0 98.5	+98.5 -1.5 97*
IIQ	Flow Valuation Position	-97 +3 0	-97 0	-94 0 0	-94 0 0	-100 +3 0	-100 +6 0	-97 0 0	-97 0 0	-98.5 0 0	-98.5 +15 0
IIIQ	Flow Valuation Position	+101 -3 98	+101 101*	+101 -3 98	+101 -0 101*	+101 -3 98	+101 - 101*	+101 0 101	+101 0 101*	+101.5 0 101.5	+101.5 -0.5 101*
IVQ	Flow Valuation Position	-100 +2 0	-100 +2 0	-101 +3 0	-101 +3 0	-103 +5 0	-103 +5 0	-101 0 0	-101 0 0	-101.5 0 0	-101.5 +0.5 0

*market value plus accrued interest on coupon.

Balance of Payments Division
Statistics Canada

APPENDIX 4:   COMMISSIONS ON CANADIAN BONDS

New issues

In principle, the information on commissions should be obtained from the issuers. In practice, however, commissions are estimated as a percentage of the gross value of new issues, on the basis of the currencies of issue (unfortunately, with no distinction made by sectors):

Commissions as percentage of new issues (%)

US$	0.875	DM	3.0	E-CDA	1.875
Pound sterling	3.0	SF	3.0	E-yen	2.0
Yen	4.0	E-US	1.875	Other	3.0

For foreign issues, the commissions are shown as being paid to the country of issues; for the euro-issues, the commissions show as being paid to the United Kingdom. As is, no commission is currently calculated on Canadian domestic bonds newly issued and sold to non-residents. These should be treated the same way as trade in outstanding securities and commissions should be derived as percentage of the sale of such issues.

Outstanding issues

Bond quotations read as follows:

Issue	Coupon rate	Maturity	Bid	Ask
ABC Company	11 1/2%	1 July/96	99.25	99.75

This quotation would mean that, at the time reported, an 11 1/2% coupon bond of ABC Company which matures on July 1, 1996 could be sold for $992.50 and bought at $997.50 per $1,000 maturity value.

If a client decides to sell a bond at a certain price, the trader will deduct a fraction of a point from this offering price as profit and make a firm bid for the bond. Should the client wish to buy bonds, the trader will add a fraction to the price and make a firm offering[19]

In the Canadian system statistical, half of the spread between the bid and ask price is treated as commissions with percentages being allocated according to the liquidity in trading the bonds.

" Half of the spread is applied to the purchase and the other half to the sale. The spread applied in Canada is estimated as a little more than 1/8 of a point for long-term Canada (i.e. over 3 years) and a rate of 1/20 of a point on short-term Canada's under 3 years....The spread is marked up somewhat for federal government enterprise bonds as well as for provincial government and their enterprises. For municipal and corporate bonds, the spread is estimated at 1/2 of one point. The rate on bonds is broken down according to the sector and the various countries, the Government of Canada bonds being the lowest at 0.48 of 1% and the sale of corporate bonds to all countries being the highest at .25 of 1%.[20]

The system generates commission earnings on both sales and purchases. For example, on sales of $9,000 in Canadian bonds to non-residents, commissions are calculated as a percentage of the amount of sales: the sales will be netted to $8,995 in the Capital Account and the commissions receipts will show as $5 in the Current Account. If a purchase of $9,000 is recorded, the system calculates $5 of commissions and gross up the capital outflow to $9,005 with a receipt of $5 in the Current Account. In other words, the Canadian intermediaries are deemed to earn commissions on both the sales and the purchases of bonds to and from non-residents.

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[19]Canadian Securities Course, 1993, page 154.

[20]Bruce Nichols

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