

RAPPORT D'EXPERT SUR LE COÛT DE LA DETTE

BANQUE DE MONTRÉAL

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LIQUIDITY OF CROSS-CURRENCY SWAPS BETWEEN CANADA AND THE UNITED STATES

The purpose of this paper is to discuss the availability in the mid '90's of long dated derivative instruments in the Canadian market. More specifically, it will discuss liquidity constraints that Canadian borrowers faced when addressing cross-border debt management issues on longer dated debt.

A cross-currency swap between the Canadian and American dollars actually involves three individual swaps rolled into one: i.e. a US dollar receiver swap to hedge the coupon on the new issue, a Canada-US basis swap to hedge the currency risk of the bond and a Canadian dollar payer swap. The net result of this operation is to transform a fixed rate US dollar bond into a synthetic fixed-rate Canadian dollar debt security. The liquidity of a long-term cross-currency swap is only as great as the most illiquid of its component parts. To the extent that we can safely assume that the American market is always and everywhere more liquid than the Canadian market, the viability of a long-term cross currency swap depends entirely on the liquidity of the Canada-US basis swap and the Canadian dollar interest rate swap.

In the context of the present note, I will attempt to analyze the liquidity of the Canadian swap market. Let me state at the outset that, above and beyond the empirical evidence, I can draw on my extensive experience in the swap and bond markets in Canada. In particular, I was a swap trader with UBS, CIBC Wood Gundy and JP Morgan between 1987 and 1996. Over the course of that period, working with three of the largest and most sophisticated swap counterparties in the world, I never once booked a cross-currency swap with a maturity longer than 10 years. The lack of liquidity in such maturities was a major obstacle. For example, the first issue of 30 year Government of Canada bonds took place in December 1990. It therefore would have been impossible to hedge the Canadian dollar interest rate risk resulting from a 30 year cross-currency swap prior to that date. It is also important to remember that Banks simply act as intermediaries in the swap market, matching buyers and sellers. To this day, one of the major obstacles to the existence of a liquid long-term cross-currency swap market in Canada is the complete lack of a two-way market. In particular, whereas there is no shortage of Canadian issuers interested in hedging their long-term foreign currency bond issues back into Canadian dollars, there is no corresponding market for foreign issuers in long-term bonds denominated in Canadian dollars. In all of my years of experience, I have never once heard of a large foreign bond issue in Canadian dollars with a maturity beyond 10 years.

The discussion is divided into two parts: liquidity and credit. The information sources used are: The Bank of Canada and the Investment Dealers Association (IDA) for bond liquidity; Bloomberg (a market-wide pricing and communication system), Bank of Montréal (BMO) internal swap data, International Swaps and Derivatives Association (ISDA) data and the BMO risk management group for swap liquidity.

1. Liquidity Considerations

Long-term Bond Issuance

As stated in the introduction, there was no issuance of 30 year Government of Canada bonds prior to December 1990. We can therefore safely assume that it would have been impossible to hedge a 30 year US dollar bond issue into a fixed rate Canadian dollar swap prior to that date. Moreover, as shown in the table below, net issuance of Government of Canada bonds since 1992 totals only 3 to 5 billion dollars per year. It is important to remember that in order to hedge a 30 year Canadian dollar payer swap, the financial intermediary must take a short bond position roughly equivalent to the notional amount of the swap. Keeping that in mind, the swapping of a long-term foreign bond issue into a 1 billion dollar fixed rate Canadian dollar liability in the 30 year maturity would force the swap counterparty to take a bond position equivalent to between 20% and 30% of total annual Government of Canada long-term bond issuance. I doubt that a swap of a new 30 year bond issue of that size could have been put in place prior to 2000. In fact, I doubt that a long-term hedge of that magnitude has ever occurred in Canada.

| | Net Government of Canada Bond Issuance | | |
|----------------|---|--|------------|
| | Total Bond Issuance (M C\$) | Long term Nominal Bond Issuance | |
| | | (M C\$) | (%) |
| 1992-93 | 37,600 | 4,000 | 11% |
| 1993-94 | 44,825 | 3,900 | 9% |
| 1994-95 | 43,350 | 5,100 | 12% |
| 1995-96 | 49,650 | 5,000 | 10% |
| 1996-97 | 55,700 | 5,800 | 10% |
| 1997-98 | 39,900 | 5,000 | 13% |
| 1998-99 | 37,900 | 3,300 | 9% |
| 1999-00 | 46,000 | 3,700 | 8% |
| 2000-01 | 39,900 | 3,800 | 10% |
| 2001-02 | 40,750 | 5,900 | 14% |
| 2002-03 | 31,900 | 3,600 | 11% |
| 2003-04 | 29,785 | 3,100 | 10% |

**Source: Bank of
Canada**

Long Dated Canadian Dollar and Basis Swaps

In addition to the liquidity of the 30 year bond market, the swapping of a 30 year foreign currency bond issue into Canadian dollars depends critically on the liquidity of the basis swap and Canadian dollar interest rate swap market. It is somewhat difficult to define, with any degree of precision, the liquidity of these markets. However, suffice it to say that clients seeking Canada-US cross-currency swaps beyond 10 years for a notional amount of more than 50 million dollars face a number of constraints. In particular, financial intermediaries will demand a significant premium relative to a 10 year swap. This premium will be a positive function of the size of the transaction. Furthermore, if the dealer/bank community senses a large need, the markets will move by an indeterminate amount. As I stated previously, the banking community is a financial intermediary whose role is to match swap payers with swap receivers. To the extent that there is no natural source of swap receivers in maturities beyond 10 years, the bank is obliged to incorporate into its price a potentially significant risk premium in advance of the flow.

The relative illiquidity of the long-term Canadian dollar swap market is also reflected in the lack of available historical data. In particular, Bloomberg Markets, which is one of the most commonly used Treasury information services in the world, provides historical data on all liquid, tradable, financial markets. For most swap maturities, historical data is available for at least 15 years. In the case of the 2 year US dollar interest rate swap, probably the most liquid swap market in the world, data is available since 1988. For 30 year interest rate swaps in the United States, data is available from 1994. By way of contrast, data for 30 year interest rate swaps in Canada are only available since 1999. Data on 10 year Canada-US basis swaps are available from only 2000. Moreover, data on 30 year Canada-US basis swaps are still unavailable.

It is also instructive to evaluate the liquidity of the swap market through an analysis of trading volumes. The table below presents the internal swap data from the Bank of Montreal. The table shows that in 1993, the Bank of Montreal negotiated only 3 swaps with a maturity exceeding 10 years for a total notional amount of 425 million dollars. Moreover, as recently as 1997, the total notional amount of swaps with a maturity beyond 10 years was less than 1 billion dollars. The lack of liquidity is illustrated in even dramatic fashion by the number of swaps with a maturity of 20 years or more. Prior to 1998, the Bank of Montreal had no swaps on its books with a maturity beyond 20 years. Since that time, there have only been 43 swaps with a notional amount of less than 1 billion dollars.

It is important to point out that this data will tend to overstate the liquidity of the market. The actual liquidity of the market will therefore tend to be even worse than the volume numbers indicate. In particular, recall that the Bank plays the role of a financial intermediary matching swap payers with swap receivers. If Hydro-Québec were to pay fixed on a 30 year cross-currency swap for a notional amount of 100 million dollars, the Bank of Montreal will seek actively to pay fixed on a swap of a similar duration with another counterparty in order to hedge its risk. The actual volume of swaps reported by the Bank would therefore be presented as twice the notional amount of the original swap. Furthermore, the Bank will very often hedge a single cross-currency swap by breaking the transaction up into its component parts (interest rate receiver swap in the US, a basis

swap and a Canadian dollar payer swap). In that case, the original 100 million dollar swap combined with the Bank's hedge could result in a swap volume totaling as much as 400 million dollars.

Bank of Montreal Internal Swap Data

| Year | Total Swaps | Total Swap Notional Amounts (M C\$) | Total Swap Deals (>=10 years) | Total Swap Notional Amounts (>=10 years) | Total Swap Deals (>=20 years) | Total Swap Notional Amounts (>=20 years) |
|------|-------------|-------------------------------------|-------------------------------|--|-------------------------------|--|
| 1989 | 27 | 901 | 2 | 37 | 0 | 0 |
| 1990 | 48 | 1,185 | 1 | 25 | 0 | 0 |
| 1991 | 126 | 3,490 | 4 | 320 | 0 | 0 |
| 1992 | 243 | 8,662 | 12 | 503 | 0 | 0 |
| 1993 | 309 | 9,188 | 3 | 425 | 0 | 0 |
| 1994 | 315 | 10,773 | 11 | 1,000 | 0 | 0 |
| 1995 | 382 | 16,897 | 12 | 1,175 | 0 | 0 |
| 1996 | 491 | 27,060 | 14 | 954 | 0 | 0 |
| 1997 | 613 | 40,154 | 44 | 2,349 | 0 | 0 |
| 1998 | 900 | 133,441 | 62 | 3,244 | 1 | 0 |
| 1999 | 1153 | 201,109 | 41 | 1,679 | 2 | 8 |
| 2000 | 1216 | 209,823 | 107 | 5,269 | 7 | 360 |
| 2001 | 2826 | 336,750 | 165 | 8,002 | 0 | 0 |
| 2002 | 1636 | 145,912 | 136 | 7,216 | 1 | 133 |
| 2003 | 1243 | 95,656 | 151 | 8,965 | 10 | 422 |

Source: Bank of Montreal

The Bank of Montreal risk management group is responsible for assigning liquidity measurements to all tradable products. The more illiquid the product, the more reserves have to be set aside. The following is their assessment of the liquidity of long-term swaps in Canada:

Given that there are really only five active participants in the long-term Canadian swap market (basically the major Schedule A Canadian banks), we have to assume that any swap transaction in that sector will be noticed in the market. Furthermore, since all market participants are well informed with respect to foreign issuance, it would be very difficult for a Canadian borrower to hedge a new foreign bond issue of more than 100 million dollars. Moreover, a client attempting to hedge a foreign issue exceeding 100 million dollars, would have to expect the market to move in a very significant manner against them. Given current market conditions, I cannot say with any degree of certainty that a client could hedge, in an efficient manner, a new 30 year foreign bond issue of 500 million to 1 billion Canadian dollars. In addition, I think that it is safe to say that, prior to the late 1990's, it would have been impossible for a

Canadian entity to hedge a foreign bond issue of that size back to fixed Canadian dollars.

2. Credit Considerations:

The availability of credit for long-term cross-currency swaps represents a constraint that is perhaps even more important than liquidity considerations. Prior to 1999, credit considerations at the Bank of Montreal would have precluded the possibility of negotiating cross-currency swaps with Hydro-Québec for maturities beyond 10 years. In fact, to this day, it would be impossible for the Bank of Montreal to book a 30 year cross-currency interest rate swap without certain credit mitigation clauses, the existence of which is very recent.

The Bank of Montreal currently has credit lines in place with all of its swap counterparties. The credit lines are defined by the size of the transaction and the term to maturity. Over the last few years, various methods have been developed to mitigate the credit risk involved with swap transactions. The most common solution involves the inclusion of clause allowing the mutual right to terminate the swap for credit reasons. For excellent credits such as Hydro-Québec, the mutual right to terminate the swap is typically at 10 years. Bank of Montreal has very few available credit lines beyond 10 years, even in the case of government entities

3. Conclusion:

In spite of a dramatic increase in the liquidity of the swap market and the introduction of new measures dealing with the management of credit risk, a Canadian issuer of long-term foreign bonds seeking to swap his bond into Canadian dollars at fixed rates would face a number of important obstacles. First, given the lack of liquidity in the market, an issue of 500 million dollars in the 30 year term would be subject to significant price uncertainty. Even in today's market, I would actively seek to discourage any issuer from attempting such a strategy because the market is not supported by sufficient liquidity. Moreover, in my view, the swap transaction could not be completed in Canada without the inclusion of credit mitigation clauses allowing a mutual right to terminate prior to the maturity of the swap. The risk associated with such clauses stems from the fact that the issuer could lose the protection of the hedge in the event of a deterioration of his credit quality. It is also true, in my opinion, that a 30 year cross-currency swap in Canada for amounts upwards of 500 million dollars could not have been achieved under any circumstances prior to late 1990's.

Qualifications of Mr.Filip Papich

Filip Papich has been working in the banking business for 17 years. He has worked in Toronto, New York, London and Montreal. He has spent most of his career trading interest rate derivatives for J P Morgan (87-89), CIBC (89-92), UBS (92-96). At UBS, he managed a trading team of four people who were in charge of all of UBS's global C\$ interest rate derivative needs. In 1996, Mr. Papich was hired by BMO NB Toronto to sell fixed income products to Canadian investors. In early 98, Mr. Papich was transferred to London, England to head up all capital markets institutional coverage for the firm outside of North America. In late 1999, Mr. Papich was transferred to Montreal to head up the Capital Markets (Sales and Trading) group in Montreal, which services Quebec and Eastern Canada. Mr. Papich has a Bachelor of Engineering (Mechanical) Degree from McGill '83 and an MBA from the University of Western Ontario (now called the Ivey Business School) in 1987.

FILIP PAPICH

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EMPLOYMENT HISTORY

Dec 199 – to present

BMO-NB (Montreal)

Managing Director, Quebec and Eastern Canada

- Integrated & Managed institutional sales for our international & corporate capital markets operations
- Created infrastructure and environment for cross selling
- Managed one provincial trader and one government trader
- Groups managed included:FX, money markets, fixed income, derivatives & debt origination
- Assigned account coverage of my own for all products- personally exceeded targets in 3 out of 4 product lines
- Groups productivity has increased dramatically over last two years

April 1998 – Dec 1999

BMO (London, UK)

Managing Director- international sales

- Integrated & Managed institutional sales for our international capital markets operations
 - Created infrastructure and environment for cross selling
- Groups managed included:FX, money markets, fixed income, derivatives
- Operational units were in London, Tokyo, Beijing and Singapore
- Implemented downsizing in operation and involved in re-hiring of new staff focussed on derivative initiatives

June 1996 – April 1998

NESBITT BURNS (Toronto)

Vice President, Institutional Fixed Income

- Advised institutional clients of the firm based in Canada and the United States on strategy concerning world fixed income markets
- Sold a variety of products which included governments bonds, corporates, strips, ABS, MBS, provincials, structured products, Euros & new issues

- Was the key liaison between the Bank of Montreal's Swap desk and the Nesbitt trading team. Advised our clients and our traders on Swap analysis and that impact on the market.
- Managed the team of 8 salespeople in Toronto, 3 in Montreal and 2 in Vancouver in the absence of the sales manager

1992 - May 1996

Trading

UNION BANK OF SWITZERLAND (Toronto)
Vice President & Manager, Derivative Fixed Income

- Created the fixed income trading operation in 1992 (including establishing human resources, front and back-office systems, infrastructure and compensation levels)
- Oversaw and managed three interest rate swap market makers and two proprietary traders
- Generated above average before tax return on capital of 24%
- Was promoted to Vice President in December 1992
- Was promoted to Senior Vice President in December 1993

1990 - 1992

CIBC - WOOD GUNDY (Toronto)
Swap Trader

- Managed short dated Canadian dollar interest rate exposure for capital markets group of the firm
- Established the Canadian FRA book
- Was a market maker for Bankers Acceptance futures on the Montreal Stock Exchange.
- Was very active in the foreign exchange arbitrage market
- Was a market maker for all Canadian swaps under two years (including basis swaps)
- Created current software used for pricing FRA's, swaps and arbitrage opportunities

1987 - 1990
1988 - 1990

MORGAN BANK OF CANADA (Toronto)
Asset and Liability Management

Contributed to day-to-day funding/investing decisions for the Eurodollar and Canadian books. Gained a solid understanding of interest rate swaps, financial futures and

forward rate agreements. Enhanced current software/technology capabilities of the group and kept aware of trends and liquidity.

- overseeing resolution of operational problems
- interacting with Accounting and Corporate Finance on a regular basis
- assisting the Trading Manager in training subordinates and running the department in his absence
- being a member of Morgan's Market Risk Committee and Weekly Strategy Committee

1987 - 1988

Client Advisory Salesperson

Marketed all short term treasury products including money market investment vehicles, foreign exchange spot, swap and option transactions. Managed treasury account relationships with MBC clients.

Summer 1983

**CANADA PACKERS INCORPORATED (Edible Oils)
*Project Engineer***

Performed design calculations, conducted ROI analyses, obtained competitive quotations, awarded contracts and supervised construction of plant and process improvement projects. Carried out standard costing and departmental efficiency studies which were used for budgeting and evaluation purposes. Also obtained Professional Engineer designation.

EDUCATIONAL BACKGROUND

INDUSTRY

1998 Series 63 US Securities Exam
1998 Series 37 US Securities Exam
1995 Conduct & Practices Exam
1995 Partners, Directors & Senior Officers Exam
1988 Canadian Securities Course

UNIVERSITY

1987 M.B.A., University of Western Ontario
1983 B.Eng. (Mechanical), McGill University

LANGUAGES

Fluent in English, French, Spanish, Serbo-Croatian

ACTIVITIES & INTERESTS

Alumni Representative, McGill Engineering, 1983 - Present
Director, Western School of Business Club of Toronto, 1987 - 1990
Director, Selwyn House School Old Boys Association, 1982 - 1985
Touch football, softball, hockey, home renovations