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THE THEORY OF LONG-TERM INTERNATIONAL CAPITAL FLOWS AND CANADIAN CORPORATE DEBT ISSUES IN THE UNITED STATES

by

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ABSTRACT

This study presents a new attempt to gain a better understanding of those forces that lead to the movement of funds from one country to another. Attention is restricted to the international market for long-term debt capital. The empirical analysis focuses on capital flows between Canada and the United States, particularly on Canadian corporate borrowing in the United States during the period from 1960 through May 1973.

A model of the international term structure of interest rates is developed. Differences in time preferences between nations, exchange rate expectations and exchange risk, and transaction costs are shown to determine interest rate differentials and to influence international capital flows.

The inflow of long-term debt capital into Canada is almost exclusively due to the sale of new bond issues abroad by borrowers other than the federal government. Activities of international investors in secondary markets are of only minor importance. Therefore we have to rely on an indirect test of the basic features of our theory. We concentrate on an analysis of decisions by Canadian corporations to float U.S.-pay bonds.

An examination of macro-economic data indicates that Canadians have a markedly higher demand for funds than Americans.

An analysis of bond markets in the two countries suggests that Canadian lenders prefer comparatively marketable securities. To further test for such differences in time preferences, it is hypothesized that the availability of a well-functioning private placement market, of long-term forward commitments, and of longer maturities should be factors attracting Canadian corporations to the U.S. bond market. Both discriminant analysis results and interviews with managers, underwriters, and life insurance officers provide strong support for our assertions, except that longer terms to maturity available in the U.S. are of lesser interest to Canadian firms.

An analysis of exchange risk suggests that long terms to maturity and evenly distributed sinking fund payments should be preferred. Firms active in export markets should regard foreign borrowing as a means to sell income denominated in a foreign currency forward. Only weak statistical support for the asserted corporate behaviour is found. Interviews revealed that exchange risk influences foreign borrowing, but its management is not well understood. Slightly lower nominal interest costs seem to be all the protection against exchange risk firms require. Factors other than lower borrowing costs have become increasingly important for the choice between Canadian-pay and U.S.-pay bonds.

In our model it is assumed that information and transaction costs are higher when two investors from different nations deal with each other than for purely domestic transactions. Causes of such differences and their impact on capital flows are

analyzed. Whereas the typical American private placement is small in size and issued by a smaller, less financially secure firm, Canadian U.S.-pay bonds are large in size and sold by larger corporations or those with international connections. Continuing relationships with American lenders have also proven very beneficial.

Finally, the individual results are drawn together. It is shown that the hypotheses derived from our model lead to the identification of variables that allow an almost perfect discrimination between Canadian-pay and U.S.-pay bonds issued by Canadian corporations.

PREFACE

International capital flows and their impact on the well-being of nations have gained wide attention in recent years not only among economic scholars but also among politicians and non-academic people. This study attempts to provide new insights into those factors that influence capital movements from one country to another. We restrict our attention to one particular component of international financial transactions, the flow of long-term debt capital. Corporations are a major group of transactors in international capital markets. The empirical analysis concentrates on their activities, in particular on Canadian corporate borrowing in the United States.

My interest in this subject arose because of the apparent difficulties encountered by economists in their attempts to explain observed long-term capital flows when using standard econometric techniques. Such studies have usually employed macro-economic data. I hope that this analysis of micro-economic behaviour will lead to a better understanding of the forces behind international capital movements and will prove useful for future research in this area.

My greatest indebtness is to Professor Whatarangi Winiata. Many a sunny afternoon was spent in his beautiful garden dis-

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I am particularly thankful to all those corporate financial managers, investment bankers and life insurance officers who provided data for this study and granted us interviews to discuss questions related to Canadian corporate borrowing in the United States. Their interest in this work and their cooperation far exceeded our expectations. A considerable part of the information gathered for this study is considered confidential by those who provided it. Consequently their names cannot be revealed. This we promised to them to protect their interests.

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Mrs. Lynne Durward expertly typed this report. Finally, I am most grateful to my wife Barbara, not only for her assistance in the preparation of the numerous tables and graphs included in this study but much more so for her moral support during my studies. I hope the future will make up for the many hours my family had to spend without me.

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CHAPTER 1

INTRODUCTION

1.1 SHORT REVIEW OF THE DEVELOPMENT OF THE THEORY OF INTERNATIONAL CAPITAL FLOWS

International capital flows have always been an important component of economic interchange between different countries. For more than one hundred years, up to 1914, London served as a marketplace for international funds. After World War I, New York emerged as the world's financial center. But in the aftermath of the Great Depression financial transactions among residents of different countries became tightly controlled and remained severely restricted till the late 'fifties,[1] when major industrialized nations allowed their currencies to become convertible again. Though balance of payments and foreign exchange theories sometimes attempted to take the influence of capital movements into account,[2] during those years problems of international trade and its influence on the domestic economy were of primary importance to scholars interested in international economics.[3]

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[1]This does not necessarily apply to foreign investment in United States equities or Canadian borrowing in the United States. Cf. Charles P. Kindleberger, International Economics (4th ed.; Homewood: Irwin, 1968), pp. 364-388.

[2]See, for example, the relevant papers in Howard S. Ellis and L. A. Metzler (eds.), Readings in the Theory of International Trade (Homewood: Irwin, 1950).

[3]In the last sentence of his paper "Towards a General

During the early 'sixties, capital flows again became a major element of international economic transactions. New York experienced a revival as the leading international capital market. Mainly in response to various U.S. capital restraint programmes and other strict controls like SEC regulations, the Eurodollar and the Eurobond markets developed.[4] Today there is a strong tendency towards one internationally integrated money and capital market, and the severe restrictions on international financial transactions recently imposed by many countries will temporarily hinder but probably not reverse this development.[5]

The appearance of free flows of funds posed new problems for the conduct of economic policies. The question of relative efficacy of fiscal and monetary policy in an open economy with capital mobility became a major target of theoretical probing.[6]

Theory of the Balance of Payments" Harry G. Johnson notes that "when capital account transactions are introduced into the analysis, the choice between policy alternatives requires reference to growth considerations not readily susceptible to economic analysis." See H. G. Johnson, International Trade and Economic Growth: Studies in Pure Theory (Cambridge, Mass.: Harvard University Press, 1961), pp. 153-168. Reprinted in Richard E. Caves and Harry G. Johnson (eds.), Readings in International Economics (Homewood: Irwin, 1968), pp. 374-388.

[4]Morris Mendelson, "The Eurobond and Capital Market Integration," Journal of Finance, XXVII (March, 1972), pp. 110-126. The implications of the American restraint programmes for Canada are discussed by Robert M. Dunn Jr. in Canada's Experience with Fixed and Flexible Exchange Rates in a North American Capital Market (Washington and Montreal: Canadian-American Committee, 1971), pp. 28-43.

[5]For an up-to-date account of such restrictions see the most recent issue of the International Monetary Fund's Annual Report on Exchange Restrictions (Washington, D.C.).

[6]Caves and Johnson note in Readings in International Economics, p. X: "Dollar shortage, dollar glut, the revival of international capital markets, and the problem of international liquidity have all led to significant new theoretical work aimed at identifying the essential elements of the policy problem involved or testing hypothetical solutions."

Models in this tradition usually assume that international capital flows are determined solely by interest rate differentials. The widely cited article by Krueger on "The Impact of Alternative Government Policies Under Varying Exchange Systems" provides an interesting analysis and critique of these theories.[7]

However, the assumption made in these models that interest rates in each country are determined independently of international capital flows and that these flows only react to interest rate differentials (instead of postulating a simultaneous relationship) is not very satisfactory except perhaps for a large country like the United States. Also, these theories cannot explain the simultaneous flow of capital into and out of the same country which we sometimes observe.

Partly in response to such criticism, a portfolio model of international capital movements has been developed. The perhaps best-known theoretical contributions are those by Grubel[8] and Floyd[9]. Many researchers have used portfolio theory as a basis for deriving empirically testable models of international capi-

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[7]Anne O. Krueger, "The Impact of Alternative Government Policies Under Varying Exchange Systems," Quarterly Journal of Economics, LXXIX (May, 1965), pp. 195-208. See also her article on "Balance of Payments Theory," Journal of Economic Literature, VII (March, 1969), pp. 1-26.

[8]Herbert G. Grubel, "Internationally Diversified Portfolios: Welfare Gains and Capital Flows," American Economic Review, LVIII (December, 1968), pp. 1301-14.

[9]John E. Floyd, "International Capital Movements and Monetary Equilibrium," American Economic Review, LIX (September, 1969), pp. 472-92.

tal flows.[10] By suggesting that investors will tend to reduce the riskiness of their portfolios by diversifying across national capital markets these models have made a significant contribution to the theory of international capital movements. However, the recent inclination of econometricians to use the portfolio model whenever estimating the determinants of short-term[11] and long-term capital flows has come under considerable attack.[12] Expecting that this model can explain all international capital flows quite probably overrates its general applicability. Further development of this theory along the lines undertaken by Solnik seems much more promising. He concentrates on international transactions in equities and derives "an equilibrium model of the world capital market" in the Capital Asset Pricing

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[10] A very useful summary and critique of such studies can be found in Richard D. Haas, "A Portfolio Model of International Capital Flows" (unpublished Ph.D. thesis, Department of Economics, Duke University, 1971). See also William H. Branson and Raymond D. Hill, Jr., "Capital Movements Among Major OECD Countries: Some Preliminary Results," Journal of Finance, XXVI (May, 1971), pp. 269-86.

[11] For a recent study of short-term capital flows see Norman C. Miller and Marina V. N. Whitman, "Alternative Theories and Tests of U.S. Short-Term Foreign Investment," Journal of Finance, XXVIII (December, 1973), pp. 1131-1150.

[12] Robert M. Stern, when discussing Branson and Hill's paper, criticizes their results and offers the following suggestions: "How then can the results be improved upon? . . . The most crucial problems are conceptual rather than factual. What I would urge the authors to do therefore is to seek to identify the major groups of transactors according to their different behavioral characteristics and to formulate empirical specifications that will capture the variations in these characteristics. . . . My suggestion then is to close the computer momentarily down and think more about what it is that we are trying to explain." See his "Discussion," Journal of Finance, XXVI (May, 1971), pp.308-309. Cf. also Erich Spitaller, "A Survey of Recent Quantitative Studies of Long-Term Capital Movements," IMF Staff Papers, XVIII (March, 1971), pp. 189-220.

Model (CAPM) spirit.[13] Theories of the determinants of direct foreign investment, on the other hand, have increasingly focused on factors other than differences in rates of return on capital or those related to risk diversification.[14]

1.2 PURPOSE AND SCOPE OF THESIS

This study concentrates on an analysis of the international market for long-term debt capital. The purpose of our research is (1) to extend the theory of the term structure of interest rates to open economies with free capital movements and changing exchange rates; (2) to allow for differences in transaction and information costs between trading in the domestic and trading in foreign capital markets; (3) to elucidate the results obtained by deriving their implications for Canadian corporate borrowing in the United States bond market; and (4) to test the theory by comparing the financing behaviour of Canadian corporations approaching the United States bond market with their financing activities in the Canadian market and with financing activities of those Canadian firms that issue bonds only in Canada.

Corporate borrowers are one of the major groups of transactors in international capital markets. By concentrating only on their activities and looking at their international financing efforts from a managerial point of view we expect to gain a

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[13] Bruno H. Solnik, European Capital Markets (Lexington, Mass.: Lexington Books, 1973), p. XI.

[14] Giorgio Ragazzi, "Theories of the Determinants of Direct Foreign Investment," IMF Staff Papers, XX (July, 1973), pp. 471-498.

better understanding of those capital flows that are mainly initiated by firms which have ready access to bond markets abroad.

In addition, by extending the theory of the term structure of interest rates to open economies we hope to shed new light on the determinants of international long-term capital flows in general and on the relationship between the Canadian and the United States capital markets in particular. Research on these questions seems especially relevant and timely in view of the continuing dependence of the Canadian economy on free international trade and free international capital movements and in view of the unsettled international monetary scene.

Several empirical studies have been undertaken to explain aggregate capital flows between Canada and the United States.[15] Usually they have concentrated on long-term capital movements. In 1962 Helleiner[16] was the first researcher to use data disaggregated by type of borrower - federal government, provincial governments, municipal governments and corporations - in an attempt to analyze factors influencing the issuance of foreign-pay bonds.[17] He found only a marginal response of the percentage of total corporate issues floated in the United States to

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[15]For a review of these studies see the literature cited in footnotes 10 and 12 above and Dunn, pp. 22-27.

[16]Gerald K. Helleiner, "Connections Between United States' and Canadian Capital Markets, 1952-1960," Yale Economic Essays, II (Fall, 1962), pp. 350-400.

[17]Traditionally the vast majority of Canadian bonds sold to foreign investors have been denominated in U.S. dollars and recently in other foreign currencies. For a fuller discussion of this point, see Chapter 3 below.

changes in the yield differential on federal government bonds. Ripley, in 1969, regressed the quarterly amount of corporate flotations of foreign currency bonds, a flow variable, on Canadian and U.S. corporate bond yield indexes, term structure variables and total corporate bond issues.[18] This last variable is extremely significant and explains most of the variation in the dependent variable. Unfortunately it contains the dependent variable and thereby introduces a severe bias into the estimates. One year later Freedman[19] uses an almost identical approach but discards it in favour of a stock-adjustment model.[20] Using this latter approach his results for the 'fifties when the Canadian dollar floated are very encouraging. For the fixed exchange rate period till 1966 he notes problems with detecting a significant influence of the interest rate differential and a lenthening in the response lag to changes in it.[21] The Bank of Canada research staff estimated a similar model for the period from 1955 through 1968. Besides quarterly dummies and binary variables for the flexible exchange rate period and for the introduction

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[18]Eleanor D. Ripley, "United States Investment in Canadian Securities 1958-1965" (unpublished Ph.D. thesis, Department of Economics, Harvard University, 1969).

[19]Charles Freedman, "Long-Term Capital Flows Between the United States and Canada" (unpublished Ph.D. thesis, Massachusetts Institute of Technology, 1970).

[20]For a concise discussion of stock versus flow models and a rejection of the latter because it does not take into account adjustments of existing portfolios see John F. Helliwell et al., The Structure of RDX2 (Bank of Canada Research Studies No. 7; Ottawa: Bank of Canada, 1971), Part 1, pp. 196-99.

[21]Freedman, p. 156. As an index for the U.S. interest rate he uses the yield on two public U.S.-pay bonds issued by Canadian corporations. He also tries to incorporate the anticipated costs of expected exchange rate changes into the yield differential.

of the interest equalization tax in the United States it contains a weighted moving average over five quarters of a Canadian bank liquidity variable and a measure of U.S. lender response.[22] Experiments with interest rate differentials were not successful.

Judging from these extensive efforts to detect those variables that influence Canadian corporate borrowing in the United States, it has become increasingly difficult in recent years to explain observed variations in corporate flotations of foreign-pay bonds. Particularly the obviously limited response of corporate financing to changes in the interest rate differential which has been measured by these researchers in almost every conceivable way is surprising. We think five factors are probably responsible for the limited success of these research efforts:

1. Official statistics record capital movements only on the date the funds are actually transferred into Canada. As Canadian corporations have increasingly entered into long-term forward contracts with U.S. investors, the time lag between the offering of a bond issue and the take-down of some or all of the funds is up to four years, particularly on large issues.[23] Incomplete information available to us indicates, for example, that at least half of the corporate foreign-pay bonds de-

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[22]See Helliwell et al., Part 1, pp. 210-212 and Part 2, p. 120.

[23]Both Helleiner, p. 387, and Richard E. Caves and Grant L. Reuber, Capital Transfers and Economic Policy: Canada, 1951-1962 (Cambridge, Mass.: Harvard University Press, 1971), pp. 249-50, noted this problem already during the 'fifties but did not regard it as serious enough to distort their results.

livered in 1970 were offered six to twenty-eight months earlier. The contract for a sizeable part of the bond issues recorded for 1973 was signed in 1969. Between the start of negotiations with U.S. lenders and the signing of a final contract sometimes several months elapse as well. Consequently it is almost impossible to detect by means of regression analysis whether capital flows observed during a particular quarter are a function of capital market and other conditions prevailing during the same or the preceding quarter or those prevailing many quarters earlier.

2. The portfolio model on which the more successful studies by Freedman and the Bank of Canada are based is normative in nature. If borrowers and lenders do not behave in a manner prescribed by this model than it cannot fully explain observed financial transactions. For example, financial non-call clauses in bond indentures and long-term forward contracts make a "realignment of existing [debt] portfolios in response to a change in the international rate-of-return differential"[24] virtually impossible.

3. Measuring the interest rate differential as the difference between Canadian and United States bond yield indices may not be appropriate.[25] Because of the

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[24]Helliwell et al., p. 196.

[25]But note Freedman's efforts to construct a yield index for Canadian U.S.-pay bonds, see footnote 21 above.

"political risk" involved in lending to foreigners, American investors can be expected to demand a higher yield on Canadian U.S.-pay bonds than on otherwise comparable domestic securities. Aliber has recently shown the bias that can be introduced into the computation of interest differentials if such differences in political risk are not taken into account.[26]

4. Capital flows do not only react to interest rate differentials; they also influence the money supply and thereby interest rates. The neglect of such simultaneous relationships may partly explain the limited significance of variables measuring the interest rate differential in studies applying single equation ordinary least squares methods to capital flow data.

5. Other factors like information and transaction costs may have a considerable influence on corporate borrowing behaviour. Using macro-data regression analysis may not be able to detect the influence of such variables.

Because of the problems noted above, particularly the first point, and because our interest is in gaining a better understanding of micro-behaviour that leads to international capital flows, this study will employ discriminant analysis and interviews as its main empirical techniques.

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[26]Robert Z. Aliber, "The Interest Parity Theorem: A Reinterpretation," Journal of Political Economy, LXXXI (November/December, 1973), pp. 1451-59.

In Chapter 2, Roll's theory of equilibrium interest rates in an efficient bond market will be extended to open economies.[27] Bierwag and Grove have shown that a portfolio model of the term structure of interest rates can be developed.[28] However, because of its less restrictive assumptions Roll's theory is more general and better suited for an adaptation to international capital markets.[29] We demonstrate that in a world dominated by risk-averse investors and with changing exchange rates, international differences in interest rates do not only reflect exchange rate expectations but also risk premia necessary to reimburse international lenders and borrowers for accepting exchange rate risk. The persistence of such interest rate differentials is compatible with the assumption that the international market for long-term capital is perfect. Countries whose residents have relatively high time preferences will be net borrowers in international capital markets. If information and transaction costs are higher when two traders deal with each other who are from different nations than when residents from the same country transact business with each other, then international interest differentials will, in addition, be a function of such differences in transaction costs.

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[27] Richard Roll, The Behavior of Interest Rates (New York: Basic Books, 1970), Chapter III.

[28] G.O. Bierwag and M.A. Grove, "A Model of the Term Structure of Interest Rates," Review of Economics and Statistics, IL (February, 1967), pp. 50-62.

[29] In Appendix 1 we show how under rather restrictive assumptions a portfolio model of the international term structure of interest rates can be developed.

In Chapter 3 the three conditions that are crucial to our conclusion that the persistence of interest rate differentials between national long-term capital markets is consistent with equilibrium in the international capital market are discussed in more detail. These conditions are that (1) because of differences in time preferences between nations and resulting differences in the demand for funds interest rate levels tend to differ among countries, that (2) expectations of exchange rate changes and exchange risk cause interest rate differentials to persist, even if the international capital market is perfect, and that (3) differences in transaction and information costs between operating in the domestic and a foreign market will further reduce the interest-equilibrating influence of international long-term capital flows. Data taken from Canadian-United States experience will be presented as preliminary evidence in support of these assumptions. Their implications for corporate borrowing in foreign capital markets, in particular for Canadian corporate debt issues in the United States, will be discussed. Hypotheses will be derived that allow us to test the theory developed.

Guided by our theoretical conclusions certain data on Canadian-pay and U.S.pay bonds and data on the issuing Canadian corporations have been collected. Chapter 4 discusses the data collection process and provides comparative statistics about the bond issues which have been included in the empirical analysis. Information on the Canadian corporate bond market and the financial behaviour of Canadian corporations was also obtained

through personal interviews with financial managers, Canadian underwriters and investment officers of Canadian life insurance companies.

Chapter 5 presents statistical tests of the hyptheses developed in Chapter 3 and summarizes the information obtained through interviews. Discriminant analysis is used to isolate those factors that lead to foreign currency borrowing for domestic purposes.[30] Supporting evidence for most of our hypotheses has been found. In addition, the interviews revealed that factors not incorporated into our theory like moral suasion by the Bank of Canada and the Federal Government and growing nationalism in Canada have exerted a surprisingly strong influence on Canadian corporate borrowing behaviour.

Finally, Chapter 6 summarizes our results and points out areas in need of further research.

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[30]Ripley has used this technique to differentiate between Canadian-pay and U.S.-pay bonds issued by Canadian provinces and municipalities. His three discriminating variables, size of issue, maturity, and a serial bond dummy were selected because this information was readily available rather than because of a theoretical model postulating the relevance of these measures. See Duncan M. Ripley, "Some Determinants of Canadian Municipal and Provincial Bond Flotations in the United States," Review of Economics and Statistics, LII (November, 1970), pp. 417-26.

CHAPTER 2

EXCHANGE RATE RISK, TRANSACTION COSTS AND EQUILIBRIUM INTEREST RATES IN AN INTERNATIONAL LONG-TERM CAPITAL MARKET

2.1 INTRODUCTION

Traditionally, models employed in international economic theory postulate that international capital flows are mainly or solely a function of interest rate differentials observed between a particular country and the rest of the world. Often theories differ, however, with regard to assumptions made about the interest elasticity of such capital flows.

Mundell, for example, when discussing the effects of fiscal and monetary policies under fixed and flexible exchange rates, assumes perfect capital mobility.[1] This infinitely interest elastic mobility of international capital implies that interest rate differentials cannot exist; only one world interest rate prevails.[2]

Other writers have attempted to draw their models closer to the real world by asserting that international funds are only

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[1]Robert A. Mundell, International Economics (New York: MacMillan, 1968), pp. 250-251. But see also p. 234 where it is only assumed that "capital flows are responsive to interest-rate differentials."

[2]Of course, this holds only if securities are perfect substitutes for each other. Not only differences in default risk but also differences in political risk between bonds originating in different countries will lead to different prices even if the promised income stream is identical. See Aliber, "The Interest Parity Theorem: A Reinterpretation," on this. Here we will always assume that bonds are free of default risk.

imperfectly mobile so that interest rate differentials are narrowed but not eliminated among open economies.[3,4] However, the precise conditions are never fully spelled out under which only a partial but not total equalization of interest rates across national financial markets will come about, even if these markets are perfect, and the factors determining a country's relative level of interest rates vis-à-vis the rest of the world.

Clearly, interest rates observed at a given point in time on comparable capital market instruments like government bonds do vary internationally, and though a tendency of interest rates in national markets to follow international yield trends has been noted such comovements are rather imperfect.[5] It would appear, therefore, that the assumption of perfect capital mobility with only one world interest rate prevailing does not approximate real world phenomena to any reasonable extent.[6]

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[3]Cf., e.g. Lloyd A. Metzler, "The Process of International Adjustment under Conditions of Full Employment: A Keynesian View", in Caves and Johnson, pp. 474-76.

[4]A concise discussion of the assumption of perfect versus imperfect capital mobility and extensive references to the literature can be found in Akira Takayama, International Trade (New York: Holt, Rinehart and Winston, 1972), pp. 330-31.

[5]For evidence, see Sidney Homer and Richard I. Johannesen, The Price of Money, An Analytical Study of U.S. and Foreign Interest Rates (New Brunswick, N.J.: Rutgers University Press, 1969), or Douglas R. Bohi, "The International Interdependence of Interest Rates", Kyklos, XXV(November, 1972), pp. 597-600. Extensive data on the relationships between Canadian and U.S. interest rates can be found in Helleiner, pp. 362-76 or Ripley, "United States Investment in Canadian Securities 1958-1965", pp. 41-44.

[6]For certain scientific purposes the realism of a particular assumption may be only of minor importance. Our goal here is to develop a model that can explain observed international long-term interest rate differentials and the resulting flows of debt capital. For a recent review of the ongoing epistemological discussion amongst economists concerning "Theory and Realism" see Stanley Wong, "The 'F-Twist' and the Methodology of Paul Samuelson", American Economic Review, LXIII (June, 1973), pp. 312-325.

In this chapter, our efforts will be directed towards the development of a model of the international market for long-term debt capital that takes into account lender and borrower behaviour. The term structure of interest rates in countries whose residents engage in international financial transactions will be shown to be a function of domestic and foreign traders' expectations of future domestic and foreign spot interest rates and of future rates of change in exchange rates.[7] Furthermore, their degree of risk aversion, differences in time preferences, and differences in costs incurred when transacting business with a foreign investor rather than with an investor of identical nationality will be demonstrated to affect interest rates and capital flows.[8]

We will start our discussion by briefly outlining Roll's theory of the term structure of interest rates in a closed economy. Then a perfect international capital market with fixed and unchangeable exchange rates will be considered. Given such a market, interest rates will indeed be equalized across national sub-markets. When allowing exchange rates to change, a perfect international capital market will no longer lead to interest equalization. Rather, assuming investors to be risk-neutral,

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[7]Note that our theory will not address the question of what determines the national or international level of interest rates but rather how national term structures of interest rates are interrelated through capital movements from one currency area to another. Our model is a static partial equilibrium model that does not consider the influence of real and monetary forces on the level of interest rates.

[8]Throughout, the terms trader and investor are used interchangeably and refer to any participant in the capital market whether he is a borrower or a lender. International trading in commodities or services will not be considered in this study.

interest differentials reflect expected exchange rate changes. If traders are risk-averse this conclusion has to be qualified. Risk-averse investors will move their funds abroad only if they can expect a gain larger than is necessary to cover expected exchange rate losses. They will not accept the higher risk inherent in foreign investment due to exchange rate risk unless they expect to earn a risk premium abroad. By extending Roll's approach to open economies it will be shown how from excess supply functions for funds in domestic and foreign forward markets an approximate solution for the equilibrium international term structure of interest rates can be derived. In the final section our theory will be extended by introducing imperfections into the model. It will be assumed that information and transaction costs are higher when two traders deal with each other who are from different nations than when residents from the same country transact business with each other. This leads to the conclusion that observed interest rate differentials do not only reflect exchange rate expectations and exchange risk premia but also differences in transaction costs between trading in a domestic and a foreign capital market.

2.2 THE TERM STRUCTURE OF INTEREST RATES IN A CLOSED ECONOMY

The theory of the term structure of interest rates is concerned with analyzing those factors that determine the yield to maturity on default-free bonds of different maturities. Yield to maturity is defined as that rate of interest at which the future income stream of a bond has to be discounted to equal the present market price. However, analytically it is often more

convenient to concentrate on a study of forward or "futures" interest rates implied by the term structure of interest rates observed in the market. As Hicks has shown, "if we decide upon some minimum period of time, loans for less than which time we shall be prepared to disregard, every loan of every duration can be reduced to a standard pattern - a loan for the mi imum period, combined with a given number of renewals for subsequent periods of the same length, contracted forward."[9] Let R_n be the yield to maturity on an n-period bond expressed as (per cent per period)/100. Then, assuming interest to be compounded at the end of each period,

$$(1 + R_n)^n = (1 + r_1)(1 + r_2) \ldots (1 + r_n)$$

where the r_n's are forward rates for a one-period loan outstanding during the nth period. Market forward rates for any future period n can be derived from observed yields as follows:

$$1 + r_n = (1 + R_n)^n/(1 + R_{n-1})^{n-1}.$$

It follows that an analysis of variables determining forward rates is equivalent to a study of the term structure of interest rates.

The mathematical formulation can be simplified by assuming interest to be compounded continually. If bonds carry no coupons and are issued at a discount, then the current price of an n-period bond, P_n, equals

$$P_n = (\text{face value})\exp(-nR_n)$$

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[9] J. R. Hicks, Value and Capital, (2nd ed.; London: Oxford University Press, 1946), pp. 144-45.

and

$$nR_n = (r_1 + r_2 + \ldots + r_n). \qquad (2\text{-}1)$$

The nth forward rate is given by

$$r_n = nR_n - (n-1)R_{n-1}.$$

Identical results can be derived by assuming that a bond is quoted (or issued) at par and pays a continuous coupon which can be reinvested at the contracted rate.

Two major theories of the determinants of the term structure have been developed. According to the pure expectations hypothesis forward rates represent unbiased estimates of future one-period spot rates. Adherents of the liquidity preference theory[10] claim that the risk aversion of lenders makes them value the stability of principal more than the stability of income and that therefore forward rates overestimate future spot rates. But this latter conclusion does not necessarily hold if universal risk aversion of both lenders <u>and</u> borrowers is assumed. Telser has pointed out that such a premise imples that <u>all</u> traders in the market "will attempt to hedge against the risk of changes in interest rates by financial transactions intended to approximately match the timing of payments and receipts. However, it does not follow that such hedging results in a bias that can be deduced a priori."[11] For example, if investors plan to lend during some future periods, they may decide to already commit

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[10]As Roll, Chapter IV, notes, the liquidity preference theory can be regarded as a special variant of a more general market segmentation hypothesis.

[11]See pp. 546-47 of the paper by L. G. Telser, "A Critique of Some Recent Empirical Research on the Explanation of the Term Structure of Interest Rates", <u>Journal of Political Economy</u>, LXXV (Supplement; August, 1967), pp. 546-561.

their funds now at prevailing forward rates even if they expect to earn more money by investing later at the then ruling spot rates. Whereas future spot rates are uncertain, forward rates are known with certainty, and the reduction in risk may compensate lenders for the lower return. Similarly, if a trader plans to borrow during some future period, he may be prepared to borrow already now in the forward market rather than wait to obtain those funds later at a lower expected spot rate.[12] Forward rates may therefore be biased upwards or downwards depending on the demand and supply for funds in each forward market.

2.21 ROLL'S APPROACH

Roll has presented a comprehensive model of the determinants of the term structure of interest rates which makes no a priori assumption about possible biases in forward rates.[13] In this section a short exposition of his theory will be provided because later his model will be used to extend the term structure theory to open economies.

Most of our later theoretical discussions are based on the premise that capital markets are perfect. Therefore let us first state the assumptions made with regard to such markets and to the investors operating in them:

1. Relevant information is a free good, that is, it is costless and available at the same time to every trader in the market.

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[12]Note that, e.g., issuing an n-period bond and buying an n-1 period bond of equal par value is equivalent to borrowing the same amount forward for the nth period. For a mathematical proof that demand functions for forward loans are equivalent to demand functions for bonds see Roll, p. 26.

[13]Roll, Chapter III.

2. Transaction costs and taxes are zero,

3. Buyers and sellers of securities
   a) take the prices of securities as given;
   b) act rationally (that is, prefer more wealth to less and use all relevant information available) and believe that other traders do likewise;[14]
   c) possess subjective probability distributions on future one-period spot interest rates expected to prevail at the start of each period up to and including period N;
   d) have an investment horizon of N periods or less, that is, what happens beyond period N is of no concern to anybody.

These assumptions are similar to those usually made when defining a perfect capital market in a closed economy.[15]

As future interest rates are not known with certainty, traders have to form subjective beliefs about these rates in order to arrive at rational investment decisions. Such beliefs are conveniently expressed by subjective probability distributions.[16] The assumption that investors' time horizons do not extend beyond N periods is an expedient used in term structure of interest rates theory. However, this does not impose any real limitations to the theory because the length of a period and N are not defined in specific terms.

Market rates are a function of individual investor behaviour. Therefore Roll starts the development of his model by

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[14]This concept of "symmetric market rationality" is due to Merton H. Miller and Franco Modigliani, "Dividend Policy, Growth and the Valuation of Shares", Journal of Business, XXXIV (October, 1961), pp. 427-28.

[15]Cf., e.g., Eugene F. Fama and Merton H. Miller, The Theory of Finance (New York: Holt, Rinehart and Winston, 1972), p. 21. See also Roll, pp. 9, 19.

[16]See Kenneth J. Arrow, Aspects of the Theory of Risk-Bearing (Helsinki: Yrjö Jahnssonin Säätiö, 1965), Lecture 1.

assuming that each trader i has N excess supply functions for forward loans for every one of the N future periods.[17] To simplify the exposition, let us use a two-period framework, that is, N = 2. Then these supply functions are given by

$$ {}_iq_j = {}_if_j(r_1 - {}_ir_1;\ r_2 - {}_ir_2) \qquad \text{for } j = 1,\ 2. \qquad (2\text{-}2) $$

Here ${}_iq_j$ is the ith investor's supply of one-period forward loans to be outstanding during period j.[18] If ${}_iq_j$ is positive, the investor lends in the forward market for period j, and he borrows if it is negative. r_n is the market forward rate on loans during period n, and the personal forward rates of trader i, ${}_ir_n$, are chosen such that

$$ {}_iq_j = {}_if_j(0,\ 0) = 0. $$

If market forward rates equal the trader's respective personal rates he will not enter forward markets.[19]

Each trader's personal forward rates are assumed to depend on four quantities:

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[17]Roll's discussion is in terms of excess demand functions. However, as positive excess "demand" implies lending or a supply of funds during a certain period (cf. Roll, p. 20), we prefer to use the term excess supply functions.

[18]The additional subscript t customarily used in term structure literature as a reference to the date on which the interest rate is fixed is being dropped here whenever t would refer to the start of the "current" period.

[19]Roll adds an additional subscript j to personal forward rates. As both j and n can vary from 1 to N this seems to imply that investors may have not one but N different forward rates for each distinctive future period. As was pointed out to me by Professors M. Brennan and A. Kraus, in this case Roll's system does not have a unique solution. Here we assume that, at a given point in time, every investor has only one personal forward rate for each future period.

1. His current expectation about the one-period spot rate at the start of period n.

2. The degree of confidence he has in his expectation.

3. His degree of risk aversion.

4. The time preference he has with respect to period n, that is, his current assessment of the amount of spot lending or borrowing he would undertake at the start of period n if his expectation of the future spot rate $R_{1,n}$ were realized.

Roll assumes that these four quantities can be expressed in an additive form by the typical equation

$$ {}_iR_n = E_i(\tilde{R}_{1,n}) + {}_iL_n \qquad (2\text{-}3) $$

where n = 1, 2 in our case. Here $E_i(\tilde{R}_{1,n})$ is the one-period spot rate expected by the ith trader to rule at the start of period n and ${}_iL_n$ is his risk and time premium with respect to period n.

In order to elucidate the characteristics of the individual excess supply functions, let us assume that $r_1 = {}_ir_1$ and consider the case where n = 2. The risk and time premium,

$$ {}_iL_2 = {}_ir_2 - E_i(\tilde{R}_{1,2}) $$

will be positive for a risk-averse investor who, if the expected future spot rate were to be realized, that is, if $R_{1,2} = E_i(\tilde{R}_{1,2})$, would be a spot borrower during period 2. This follows because as a risk-averter he is willing to pay a slightly higher rate now to be certain about the rate at which funds can be obtained during period 2 rather than to run the risk of paying perhaps even more later in the spot market. Conversely, the premium will be negative if the trader, given that his expectation were realized, would be a spot lender during period 2.

This idea that the forward supply of funds is derived from the supply function for corresponding future spot loans, which is basic to Roll's theory, may be illustrated by Figure 2-1.[20] Two supply curves, one (${}_iS_s$ ${}_iS_s$) for spot loans and one (${}_iS_f$ ${}_iS_f$) for forward loans are drawn. They cross at $E_i(\tilde{R}_{1,2})$, the one-period spot rate expected by the ith investor to prevail at the start of period 2, because (1) at a <u>higher</u> forward rate, say r_x, he will supply forward funds of at least q_{x1} since he would make spot loans of this amount during period 2 if the spot rate, $R_{1,2}$, were indeed equal to r_x. It follows that his supply curve for forward funds cannot be above his supply curve for future spot funds whenever $r_2 > E_i(\tilde{R}_{1,2})$. Indeed, the supply curve for forward funds will be below the supply curve for spot funds at a rate like r_x because the investor will also loan $q_{x2} - q_{x1}$ forward for speculative reasons. This speculative forward loan will be liquidated in the spot market at the start of period 2, and the expected rate of return on this speculative engagement is $r_x - E_i(\tilde{R}_{1,2})$. (2) At a forward rate <u>lower</u> than $E_i(\tilde{R}_{1,2})$, say r_y, an investor will lend only q_{y2} since he expects a higher return on future spot loans for the same period, that is, at this rate his supply curve for forward funds will be above his spot supply curve. At a forward rate below ${}_ir_2$ he will even begin borrowing forward. Whenever the forward rate equals the trader's expected future spot rate he will lend or borrow forward just what he plans to supply at the given rate. By definition, he will not enter the forward market when the market rate

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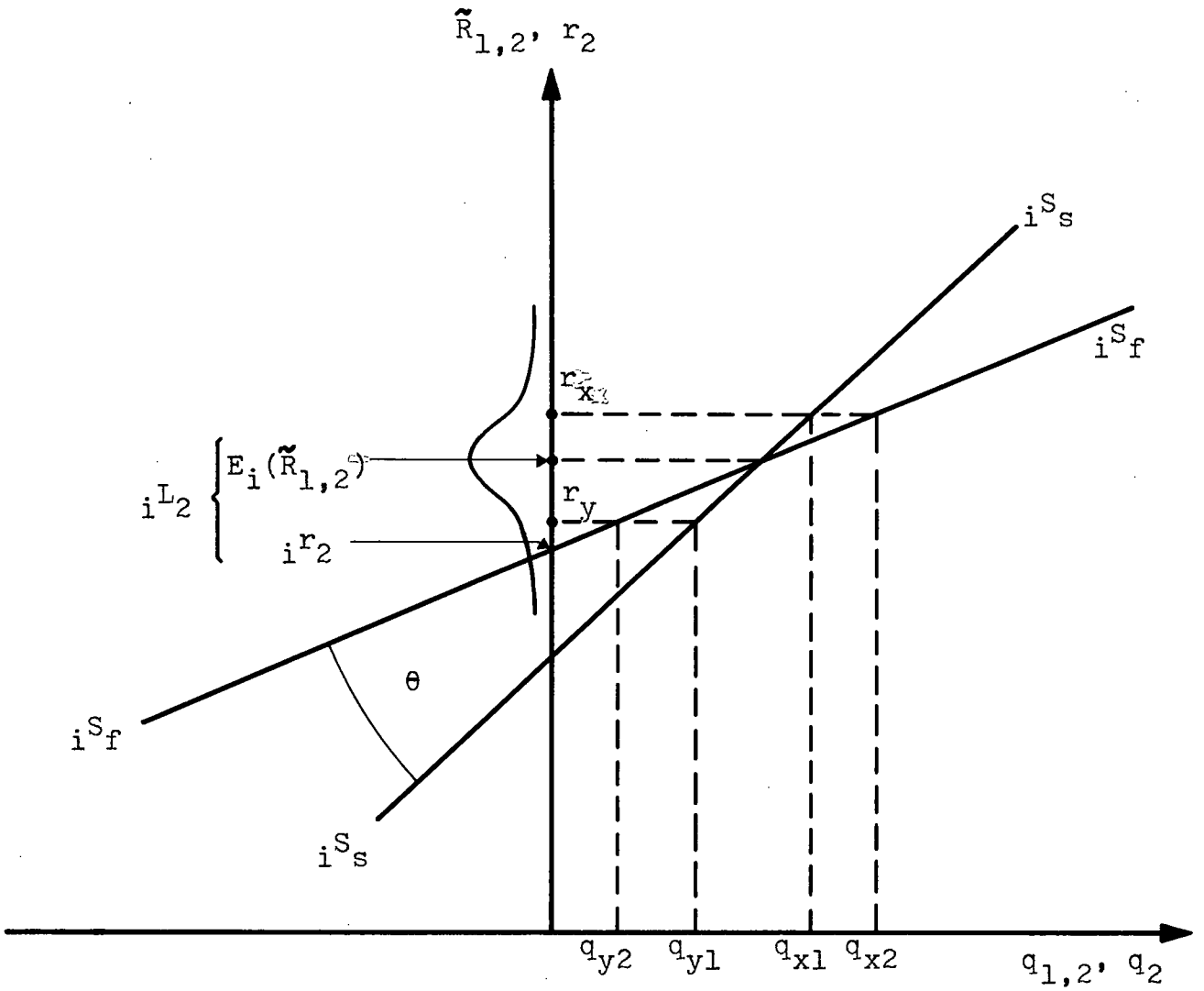
[20]See Roll's Figure 3-1, p. 22. Roll also assumes that the trader "is certain about all future income earned outside the capital markets."

FIGURE 2-1

EXCESS SUPPLY FUNCTIONS FOR SPOT AND FORWARD LOANS



equals his personal forward rate.

The angle θ between the spot and forward supply functions will be influenced by two factors, (1) the investor's confidence about his forecast of the future spot rate and (2) his degree of risk aversion. The more confident he is about his forecast the wider will the angle θ be because the more he is prepared to speculate, and the more risk-averse he is the less he will speculate and the smaller the angle will be.

In addition, as Roll has pointed out, two factors exogenous to this theory will also influence ${}_iL_n$ and ${}_ir_n$ indirectly by their effect on the spot supply function:[21] (1) the trader's wealth and (2) his savings-consumption plan for period n. The greater the investor's wealth, ceteris paribus, the flatter will be his demand function. That is, the higher will be his demand for or supply of loans at any given rate compared to a trader with fewer resources. And his time-preferences will determine whether he borrows or lends at a given rate, that is, they will influence the level of the demand function for spot funds. For example, a trader who values consumption during a certain period very highly may intend to borrow spot at a given interest rate level whereas another investor identical in every respect except that he values consumption during the same period less may plan to be a spot lender at the same interest rate.

In order to derive an approximate solution for the equilibrium term structure of interest rates, Roll expands individual excess supply functions in a Maclaurin series and adds them up

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[21] Roll, p. 24.

for each period. Market equilibrium is achieved if the set of forward rates is such that total excess supply is zero. Dropping higher order terms, a solution for equilibrium forward rates can be obtained. Details will not be reported here as our derivation of a solution for the equilibrium international term structure will proceed along similar lines.

2.3 THE TERM STRUCTURE OF INTEREST RATES IN A PERFECT INTERNATIONAL CAPITAL MARKET WITH FIXED EXCHANGE RATES

As mentioned earlier,[22] certain models used in international economic theory postulate that interest rates are equalized internationally and cannot change because capital moves "frictionless" from one country to another. Besides the assumptions made at the beginning of the preceding section with regard to perfect capital markets, the following assumption is necessary to arrive at such a conclusion:

> 4. Exchange rates between all currencies have been fixed and remain unchanged, and governments do not interfere in the free market mechanism by introducing exchange controls or discriminatory taxes against foreigners, or by any other means.

In other words, currencies are freely convertible into each other at fixed rates. This implies that the world is one single currency area with, in effect, only a single money. The currency in which a security is denominated is irrelevant for its value and only of interest for accounting purposes.

Given these idealized conditions, international interest arbitrage will assure that the yield on assets identical with respect to risk and other characteristics is equalized inter-

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[22] See p.14 above.

nationally. Should ever a yield differential occur, arbitrageurs could make a sure profit by selling bonds short in one country and buying identical bonds in another country. In other words, borrowing or lending in a foreign capital market cannot, in equilibrium, benefit any market participant and he will be indifferent between trading in the domestic or a foreign capital market. From a purely financial point of view, the world can be regarded as a closed economy, and conventional term structure of interest rate theory may be used to explain observed relationships between spot and forward interest rates.

It would appear that this and similar models of a perfect international capital market do not approximate real-world phenomena to any reasonable extent. Particularly assumption 4., that exchange rates are fixed and unchangeable, is open to criticism. Under the classical gold standard exchange rates were indeed extremely stable and fluctuated only within a very narrow band determined by the so-called gold export and gold import points. However, the Articles of Agreement of the International Monetary Fund as laid down at the Bretton Woods conference in 1944 explicitly provide for changes in exchange rates. And experience with the international monetary system that has developed since 1945 has shown that such changes may be quite drastic. The purpose of the next section is to show that, if we allow exchange rates to change, international interest rate differentials and differences in the term structures of interest rates between different countries are compatible with the assumption that there exists only one perfect international capital market.

2.4 THE TERM STRUCTURE OF INTEREST RATES IN A PERFECT INTERNATIONAL CAPITAL MARKET WITH CHANGING EXCHANGE RATES

In this section, assumption 4. which stated that exchange rates are fixed and do not change will be dropped. Instead, it will be assumed henceforth that

> 4a. Exchange rates between all currencies may change at any point in time.

The implications of this assumption for international capital flows may be illustrated by the following example. Let us assume that a Canadian investor has a choice between investing in a one-year Canadian bond yielding 7 per cent and a one-year American bond yielding 9 per cent. Being a rational investor, he chooses to buy a U.S. bond. However, when liquidating his investment one year later and transfering his wealth back into Canada for consumption purposes, he discovers that the United States dollar has decreased in value by 5 per cent. If he payed originally one Canadian dollar for one U.S. dollar, he now pays U.S. $1.05 for Can. $1.00, or U.S. $1.00 = Can. $1.00/1.05 = Can. $.9524. In other words, for every one hundred Canadian dollars invested in the United States our investor receives U.S. $109.00 = Can. $(109.00 x .9524) = Can. $103.81. His return on this foreign investment, when expressed in Canadian dollars, is a mere 3.81 per cent, not the 9 per cent as he had expected.

When choosing between domestic and foreign investment opportunities, an investor must therefore form subjective beliefs about future exchange rate changes in order to be able to act rationally. Such beliefs are assumed to be expressable by sub-

jective probability distributions, and assumption 4a. makes it necessary to add the following assumption to our characteristics of a perfect international capital market:

> 3. e) Buyers and sellers of securities possess subjective probability distributions on rates of change of exchange rates during every period from the present period up to and including period N.

It should be noted that assumption 4a. does not specify under what kind of exchange rate regime a country or the world is operating. It is immaterial for our considerations whether the exchange rate is pegged but adjustable as it was stipulated in the IMF Articles of Agreement, whether the exchange rate is allowed to be determined solely by market forces as under "a clean float", or whether a crawling peg system prevails. Important is only that the rate of return realizable on foreign investments is potentially influenced by exchange rate changes. Exchange rate risk seems also not to be a function of the particular exchange rate system; at least there is no scientific basis for such a claim. As Katz points out, "within the profession as a whole, there is no evidence of a consensus that aggregate exchange-risk would be less under either fixed or under flexible rates."[23]

In a less than perfect world, additional factors not encountered when investing in domestic securities will influence the return realizable on foreign investments. Discriminatory taxes on interest accruing to foreigners, exchange controls or moratoria will all tend to decrease the yield on foreign in-

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[23]Samuel I. Katz, "Exchange-Risk Under Fixed and Flexible Exchange Rates", The Bulletin of the Institute of Finance, Graduate School of Business Administration, New York University, Nos. 83-84 (June, 1972), p. 11.

vestments. On the other hand, it may be easier to evade domestic levies when wealth is held abroad. All such additional factors influencing the return and risk of foreign investment will be excluded from our analysis.

To simplify the following analysis, it will be assumed that the world consists of two countries only which will be called domestic country D and foreign country F.[24] Bonds are assumed to be free of default risk and to have fixed maturities. Domestic securities are usually denominated in local money, the numéraire "commodity" in the domestic country. In an international capital market securities will also be denominated in other numéraires which are generally foreign currencies. In our case we will be concerned with only two currencies and one exchange rate determining the value relationship between country D's and country F's numéraire.

2.41 RISK-NEUTRAL INVESTORS

If investors have utility functions which are linear in wealth, they are indifferent between holding domestic bonds and bonds denominated in the foreign currency as long as the expected <u>effective</u> rate of return, that is, the rate of return after taking expected exchange rate changes into account, is the same on both investment opportunities. In a perfect international capital market interest arbitrage will ensure that indeed the expected effective yield on both types of bonds will be identi-

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[24]The assumption of two countries only is solely made for analytical convenience. The later analysis can easily be extended to n countries but this would not lead to conclusions fundamentally different from those presented here.

cal.[25] This effective rate of return on securities denominated in different currencies may be measured in a "world numéraire", e.g. the U.S. dollar, any other freely convertible currency or a commodity like gold if this commodity is traded in a perfect international goods market. Independently of the particular common denominator chosen, the expected yield on identical assets will be equal when expressed in this common numéraire. It follows that expected nominal interest rates on securities denominated in terms of different numéraires will differ as long as exchange rates are expected to change. Interest equalization between different countries implies that either the international capital market is imperfect or that exchange rates are not expected to change.

Let R_1^d be the spot one-period interest rate in country D, R_1^f the one-period interest rate in country F, a_o the spot price of country F's currency in terms of D's currency, and $E(\tilde{a}_1)$ the expected spot exchange rate at the start of the next period. Expressed in mathematical terms, a trader will be indifferent between investing X units of domestic money now in the domestic market and receiving $(1 + R_1^d)X$ units after one period, and exchanging domestic currency for $(1/a_o)X$ units of foreign currency and receiving $(1/a_o)X(1 + R_1^f)E(\tilde{a}_1)$ units of domestic currency after one period if

$$(1 + R_1^d)X = (1/a_o)X(1 + R_1^f)E(\tilde{a}_1).$$

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[25] If investors are risk-neutral, in the event of divergent expectations market equilibrium will be determinate only if it is assumed that the command over resources by any individual trader is limited by, e.g., a ceiling on the amount he can borrow.

Recognizing that $E(\tilde{a}_1)/a_o = 1 + [E(\tilde{a}_1) - a_o]/a_o$ and defining the relative rate of change of the exchange rate expected to occur during period one as $E(\tilde{C}_1) = [E(\tilde{a}_1) - a_o]/a_o$, we obtain

$$(1 + R_1^d) = (1 + R_1^f)\left[1 + E(\tilde{C}_1)\right]. \qquad (2\text{-}4)$$

Expression (2-4) is very similar to formal statements of the interest parity theorem familiar from the theory of forward exchange except that the expected future spot rate is substituted for the forward exchange rate.[26]

Before generalizing formula (2-4) it seems worthwhile to pause for a moment to take a closer look at this expression. First of all, it is important to remember that the foreign exchange rate expected to prevail at the start of period n, $E(\tilde{a}_n)$, is defined as the price of one unit of the foreign country's currency in terms of the domestic numéraire. If one wants to express the value of one unit of domestic currency in terms of foreign money, one simply divides 1 by $E(\tilde{a}_n)$.[27] For example,

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[26]See, e.g., Robert M. Stern, The Balance of Payments Chicago: Aldine, 1973), pp. 42-44, on the interest parity theorem. For an interesting discussion of the empirical validity of this theorem see Robert Z. Aliber, "The Interest Parity Theorem: A Reinterpretation".

[27]Note that in general $E(1/\tilde{a}_n) \neq 1/E(\tilde{a}_n)$. This problem is discussed in Jeremy J. Spiegel's paper on "Risk, Interest Rates and the Forward Exchange", Quarterly Journal of Economics, LXXXVI (May, 1972), pp. 303-09. Spiegel encounters this mathematical problem when attempting to derive an expression similar to our expression (2-4) for bonds where the coupon is reinvested continually at the contracted rate. Though defining the exchange rate as "the spot price of the foreign currency in terms of the domestic currency", his expression (1), in our notation, states that $\exp(R_1^d) = \exp(R_1^f)E(a_o/\tilde{a}_1)$ which is clearly wrong. When making correct use of the exchange rate definition the last term in Spiegel's expression is $E(\tilde{a}_1/a_o)$ in which case the mathemati-

if the currency unit in both country D and country F is the dollar and if the exchange rate is F\$1 = D\$1.10, then an investor owning D\$100 could exchange these for (1/1.10)100 = 90.91 F dollars. Investing these F dollars in one-period bonds yielding 10 per cent, he will own F\$100.00 one period hence. If during this period an appreciation in the value of the D dollar by 5 per cent is anticipated, the expected exchange rate one period hence is F\$1 = D\$1.045, and our investor can expect to finally realize 100(1.045) = 104.50 D dollars from this foreign investment opportunity. Consequently he will be indifferent between investing his funds in domestic bonds yielding a rate of return of 4.5 per cent and investing in foreign bonds yielding 10 per cent if he expects the domestic currency to appreciate in value by 5 per cent. Using (2-4) to express this in formal terms we obtain

$$(1 + .045) = (1 + .100)[1 + (-.05)] .$$

Thus if the expected change in the exchange rate is negative the foreign currency is assumed to lose in value vis-à-vis the domestic currency. Note that a 5 per cent appreciation of the D dollar is equivalent to a $[(1/1.045 - 1/1.100)/(1/1.10)]100 =$ 5.263 per cent devaluation of the F dollar. This difference between the appreciation and depreciation values becomes more pronounced as the relative magnitude of the exchange rate change increases. Thus a 15 per cent appreciation of one cur-

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cal problem disappears. Spiegel provides also an example which indicates that for all practical purposes the difference between $E(1/\tilde{a}_n)$ and $1/E(\tilde{a}_n)$ is negligible. This problem can be avoided completely by conducting the analysis in terms of expected relative rates of changes in exchange rates rather than in terms of expected exchange rates.

rency is equivalent to a 17.65 per cent devaluation of the other currency.

Another interesting result can be derived by solving expression (2-4) for R_1^d,

$$R_1^d = R_1^f + E(\tilde{C}_1) + R_1^f E(\tilde{C}_1) \qquad (2\text{-}5)$$

and, assuming $E(\tilde{C}_1)$ to be constant, by differentiating equation (2-5) with respect to R_1^f,

$$dR_1^d/dR_1^f = 1 + E(\tilde{C}_1).$$

This shows that, for a given expected rate of change of the exchange rate, the interest rate differential will increase as the general interest rate level increases. For example, if $R_1^d = .05$ and $R_1^f = .02$, the implied expected exchange rate change is .0291. If R_1^f increases to .07 and exchange rate expectations remain unchanged, R_1^d will increase by (1.0291)(.05) = .0515 to .1015 and the interest rate differential will increase from .0300 to .0315. For low interest rate levels and small expected exchange rate changes, equation (2-5) can reasonably be approximated by

$$R_1^d = R_1^f + E(\tilde{C}_1) \qquad (2\text{-}5a)$$

because $R_1^f E(C_1)$ will be a negligible amount. However, as our earlier example has shown, this does no longer hold for today's interest rate levels.[28] Later in Chapter 3 it will be demonstrated that, for a given expected rate of change of the exchange rate, the interest rate differential will increase very considerably as the interest rate level increases once long-term

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[28]See pp. 33-34 above.

bonds rather than one-period bonds are considered.

The preceding analysis can easily be generalized to n periods. To simplify the algebra, let R_n^d be the continually compounded yield to maturity on an n-period domestic bond and R_n^f the yield on a foreign bond. A risk-neutral investor will be indifferent between holding a domestic or a foreign bond if

$$\exp(nR_n^d) = \left[E(\tilde{a}_n)\exp(nR_n^f)\right]/a_o$$

where $E(\tilde{a}_n)$ is the exchange rate expected to prevail at the end of the nth period. Taking logarithms on both sides and dividing by n we obtain

$$R_n^d = R_n^f + \ln\left[E(\tilde{a}_n)/a_o\right]/n.$$

The last term in this equation is the expected instantaneous relative rate of change in the exchange rate measured in units of (percentage per period)/100.[29] Let us denote this rate by $E(C_n)$. It follows immediately that, given risk-neutral investors and perfect international capital markets, the interest rate differential observed between two countries is an unbiased estimate of the average relative rate of change in the exchange rate expected by the market. Denote this differential by C_n.

From our earlier discussion we know that

$$nR_n^d = r_1^d + r_2^d + \ldots + r_n^d.$$

Let

$$nC_n = c_1 + c_2 + \ldots c_n$$

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[29] If $a_t = a_o\exp(tC_t)$, then $(da_t/dt)/a_t = C_t = \ln(a_t/a_o)/t$.

where c_n stands for the rate of change in the exchange rate during period n. We showed that $nR_n^d = n(R_n^f + C_n)$. It follows that

$$r_1^d + r_2^d + \ldots + r_n^d = r_1^f + r_2^f + \ldots + r_n^f + c_1 + c_2 + \ldots + c_n.$$

Dividing both sides of this equation by $(n-1)R_{n-1}^d = (n-1)(R_{n-1}^f + C_{n-1})$ we obtain $r_n^d = r_n^f + c_n$ or

$$r_n^d - r_n^f = c_n = E(\tilde{C}_{1,n}). \qquad (2\text{-}6)$$

This fundamental relationship demonstrates that in a perfect international capital market with risk-neutral investors the interest rate differential between domestic and foreign forward interest rates for any period as derivable from the term structure of interest rates in the respective country is equal to the market's expectation regarding the rate of change in the exchange rate during the same future period. This generalizes equations (2-4) and (2-5a) derived earlier for one-period spot rates.[30]

This analysis can easily be extended to one domestic and two or more foreign capital markets. Let us introduce a third country, G, and let c_n^{fd}, c_n^{gd} and c_n^{gf} designate the rate of change in the exchange rate between countries D and F, D and G,

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[30]If coupon payments are made on a discontinuous basis, (2-6) becomes $(1 + r_n^d) = (1 + r_n^f)(1 + c_n)$. A derivation of this result can be found in Michael G. Porter, "A Theoretical and Empirical Framework for Analysing the Term Structure of Exchange Rate Expectations", IMF Staff Papers, XVIII (November, 1971), pp.613-642.

and G and F, respectively, during period n as implied by the term structure of interest rates in these countries.[31] Then, from (2-6), it will hold that

$$r_n^d - r_n^f = c_n^{fd} , \tag{2-6a}$$

$$r_n^d - r_n^g = c_n^{gd} , \tag{2-6b}$$

$$r_n^f - r_n^g = c_n^{gf} . \tag{2-6c}$$

Subtracting (2-6a) from (2-6b) we obtain $r_n^d - r_n^g - (r_n^d - r_n^f) = r_n^f - r_n^g = c_n^{gd} - c_n^{fd}$. Substituting from (2-6c), it is seen that

$$c_n^{gf} = c_n^{gd} - c_n^{fd}. \tag{2-7}$$

Thus the difference in the expected rate of change in the exchange rate between countries D and G and countries D and F is equal to the expected rate of change in the exchange rate between countries F and G and also equal to the interest rate differential between these two countries.[32] In a perfect international capital market interest arbitrage will always assure that similar relationships hold between any number of countries.

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[31]Note that whether the exchange rate is defined in terms of the domestic (c_n^{fd},c_n^{gd}) or a foreign currency (c_n^{df}, c_n^{dg}) is only relevant for the sign of the rate of change (positive: devaluation; negative: revaluation) but no longer for the absolute value of the rate because it is defined as an instantaneous rate of change. For example, a 10% devaluation of D's currency is equivalent to a 10% revaluation of F's currency.

[32]For the discontinuous case, equation (2-7) becomes

$$c_n^{gf} = c_n^{gd} - \left[c_n^{fd}(1 + r_n^f)\right]/(1 + r_n^g).$$

2.42 RISK-AVERSE INVESTORS

In our analysis of the international capital market it has been assumed up to now that either exchange rates are fixed (Section 2.3 above) or that investors are risk-neutral (Section 2.41 above) so that exchange risk considerations could be neglected in our analysis. However, in order to derive a capital market model more closely reflecting actual relationships between national sub-markets both the possibility of changes in exchange rates and of risk-averse investor behaviour should be allowed for.

In our two-country international capital market, any investor is faced by uncertainties concerning three different variables, future domestic interest rates, future foreign interest rates and future rates of change in the exchange rates. If there existed fully developed forward exchange markets for all future time periods up to period N, the risk due to uncertainties about future exchange rates could be completely eliminated. Whether this would be at a cost comparable to an insurance premium or whether the forward exchange market should be compared to a zero-sum game in that one participant's loss is another participant's gain is an unsolved issue.[33] However, this need not concern us because the best-developed forward markets are the 30-day and 90-day markets, and for maturities of two years or more quotations are very rare.[34]

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[33] See Katz, pp. 38-42.

[34] Cf. Egon Sohmen, The Theory of Forward Exchange (Princeton Studies in International Finance No. 17; Princeton, N.J.: International Finance Section, Department of Economics, Princeton University, 1966), p. 32, or Herbert G. Grubel, Forward Exchange Speculation and the International Flow of Capital (Stanford University Press, 1966), pp. 52, 116.

The theory of forward exchange is only concerned with short-term phenomena and analyses, inter alia, the influence a given term structure of interest rates has on the forward exchange rates established in the market. Here, by concentrating on long-term phenomena and assuming that no forward exchange markets exist it will be shown how an expression for the equilibrium international term structure of interest rates can be derived as determined by individual traders' expectations about interest rates and exchange rate changes, and by their degree of risk aversion. If we assume that investors only consume goods for which they have to pay in their own currency, then any lending or borrowing activity in the other country's capital market does not only involve interest arbitrage but also an element of speculation because the foreign exchange risk involved in such transactions cannot be covered.

Firstly, the measurement of exchange rate risk will be discussed. This is followed by an extension of Roll's model of equilibrium interest rates to open economies. Finally, the basic ideas of our international capital market theory will be elucidated by graphical means.

2.421 THE MEASUREMENT OF EXCHANGE RISK

It is usually argued that financial transactions involving foreign currencies are more risky than purely domestic transactions.[35] However, depending on how foreign exchange risk is measured, this need not necessarily be the case. As pointed out earlier, the riskiness perceived by a trader speculating in the forward market depends on the uncertainties surrounding his expectations of future spot interest rates. When speculating in a foreign forward market, the expected return in terms of the trader's home currency will depend on uncertainties surrounding his expectations of future spot interest rates and uncertainties about exchange rate changes. If one were to measure risk by the variance in the expected effective rate of return[36], $E(\tilde{R}^{f'}_{1,n}) = E(\tilde{R}^{f}_{1,n}) + E(\tilde{C}_{1,n})$, then

$$\mathrm{var}(\tilde{R}^{f'}_{1,n}) = \mathrm{var}(\tilde{R}^{f}_{1,n}) + \mathrm{var}(\tilde{C}_{1,n}) + 2\mathrm{cov}(\tilde{R}^{f}_{1,n},\tilde{C}_{1,n}).$$

Assuming that the amount and kind of information available to each investor is similar for both capital markets,[37] it is

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[35]For example, see David K. Eiteman and A. I. Stonehill, Multinational Business Finance, (Reading, Mass.: Addison-Wesley), 1973, Chapter 11.

[36]If we accepted the capital asset pricing model as an empirically valid description of how investors value fixed income securities, then the covariance between the effective rate of return on foreign investment and the "market" return would be the correct risk measure. However, the question of whether the CAPM constitutes an appropriate theory of bond valuation is beyond the scope of this study. For some analytical work extending the CAPM to the valuation of equities in an international capital market see Solnik.

[37]In a less than perfect world, we may expect information on foreign economies and their capital markets to be more difficult to obtain than information on the domestic economy, to be more costly and to be more difficult to interpret leading to more uncertainty with regard to foreign markets and/or to higher information costs.

reasonable to expect the uncertainty surrounding expected interest rates in both markets to be equal, or $var(\tilde{R}^d_{1,n}) = var(\tilde{R}^f_{1,n})$. Whether foreign investment is perceived as more risky than domestic investment or not will then depend on whether

$$var(\tilde{C}_{1,n}) \gtrless - 2cov(\tilde{R}^f_{1,n}, \tilde{C}_{1,n}).$$

It follows that if investors perceive a negative relationship between foreign interest rates and exchange rate changes this could mean that foreign investments are regarded as less risky.[38] But only if the negative covariance is sufficiently large to offset the increase in variance due to $var(\tilde{C}_{1,n})$ will the total variance on foreign investments be less.

However, it seems questionable whether foreign exchange risk should be measured by the variance of the rate of change in the exchange rate or by its covariance with a "market" rate of return. Subjective probability density functions of this variable are often highly skewed so that semi-variance or skewness would constitute better measures of risk because international traders seem to be preoccupied with potential <u>losses</u> due to unfavourable exchange rate changes. Discussions in the literature as well as the information gained from our interviews with Canadian corporations and underwriters indicate that borrowers as well as lenders in international capital markets regard

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[38] A priori we might expect the covariance to be negative. During times of balance of payments problems countries tend to increase interest rates to attract foreign capital and to exert a deflationary pressure on the economy. But at the same time the uncertainty about the exchange rate usually increases considerably. Note that a devaluation of a foreign currency is equivalent to an appreciation of the domestic currency, i.e., $C_{1,n}$ will be negative.

foreign exchange risk as an additive risk, not as a risk that can be diversified away.[39]

This is a major methodological justification for our using Roll's model as a basis for extending term structure theory to open economies rather than Bierwag and Grove's portfolio model. Though Roll has shown that a special solution to his model "is exactly the same as the results derived by Bierwag and Grove (1967) under a stricter set of assumptions"[40] within a two-period framework, the two theories are fundamentally different. Portfolio theory is normative in character and prescribes how investors should select their portfolios, given that their utility increases with return and decreases with risk as measured by the portfolio's variance. Clearly, these are appealing characteristics. On the other hand, models based on portfolio theory may not be able to explain observed investor behaviour if investors do not behave as prescribed by such models. Roll also assumes that investors prefer more wealth to less and are risk-averse, but he leaves open the questions of how

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[39]For a comprehensive treatment of exchange risk see Katz. Sidney M. Robbins and Robert B. Stobaugh in their book Money in the Multinational Enterprise (New York: Basic Books, 1973), p. 27, observe that, "anxious to avoid incurring losses through changes in exchange rates, some financial managers simply ignore the possibility of exploiting interest-rate differentials by moving money across boundaries." Our discussions with Canadian managers often revealed similar attitudes. Likewise, an American underwriter remarked that U.S. financial institutions, which predominantly invest in Canadian U.S.-pay bonds, "find it inappropriate to assume exchange risk."

[40]Roll, p. 29.

to measure portfolio risk and how investors should arrange their (bond) portfolios. Therefore his model must be regarded as more general and as positive in character. Another attractive feature of his theory is that all interest rates are determined simultaneously as a function of borrowers' demand for and lenders' supply of funds. In a portfolio model it is necessary to assume that the risk-free interest rate is exogenously determined. This is not a very satisfying assumption in an international context because of the interrelationship between interest rates and capital flows.

In our theoretical discussions that follow we shall always regard foreign investments as more risky than transactions involving securities denominated in the traders' home currency only.[41] It will not be necessary for our purposes to be specific about how to measure foreign exchange risk. However, in Appendix 1 it will be demonstrated how under very restrictive assumptions a mean-variance approach could be employed to develop a model of the determinants of the international term structure of interest rates.

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[41] Inefficient or non-existing domestic capital markets and political factors may lead people to regard foreign securities as safer than domestic investments. Our assumptions with regard to a perfect international capital market exclude these possibilities from the theoretical analysis.

2.422 AN EXTENSION OF ROLL'S MODEL TO OPEN ECONOMIES WITH EXCHANGE RATE RISK

In our two-country model world every trader is faced with borrowing and lending opportunities in the two national submarkets of the international capital market. For every one of the N periods there will be two forward markets, one for funds denominated in country D's currency and one for funds denominated in country F's currency. Consequently every trader is assumed to have no longer N but 2N excess supply functions for forward loans. Again restricting our analysis to a two-period framework, these supply functions will be given by

$$ {}_iq_j^h = {}_if_j^h(r_1^d - {}_ir_1^d;\ r_1^f - {}_ir_1^f;\ r_2^d - {}_ir_2^d;\ r_2^f - {}_ir_2^f) \qquad (2\text{-}8) $$

for $j = 1, 2$ and $h = d, f$. Assuming that the ith investor is a resident of country D, trading in bonds denominated in his country's numéraire does not involve any risk different from that discussed earlier for a closed economy. Investments in foreign bonds, on the other hand, will be more risky because of the exchange rate risk involved.

The personal forward rates ${}_ir_n^d$ and ${}_ir_n^f$ of any trader i are again chosen such that

$$ {}_iq_j^h = {}_if_j^h(0,\ 0,\ 0,\ 0) = 0. $$

The personal domestic forward rates ${}_ir_n^d$ will be given by expression (2-3) if trader i is a resident of country D.[42] His foreign forward rates ${}_ir_n^f$ will also depend on the four quantities

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[42]See p.23 above.

mentioned above plus an additional fifth factor:

5. The additional uncertainty surrounding his expectation of the rate of return realizable in the foreign market due to exchange risk.

It is assumed that these five quantities can be expressed in an additive form by the typical equation

$$ {}_{i}r_{n}^{f} = E_{i}(\tilde{R}_{1,n}^{f}) + {}_{i}L_{n}^{f} + {}_{i}M_{n}^{f} $$

where ${}_{i}M_{n}^{f}$ is trader i's additional risk premium due to foreign exchange risk when trading in country F's forward market.

In general, any trader's forward rate can be written as

$$ {}_{i}r_{n}^{h} = E_{i}(\tilde{R}_{1,n}^{h}) + {}_{i}L_{n}^{h'} $$

where ${}_{i}L_{n}^{h'} = {}_{i}L_{n}^{h} + {}_{i}M_{n}^{h}$. The foreign exchange risk premium, ${}_{i}M_{n}^{h}$, will be equal to zero if trader i invests in his home market. It will be positive if he intends to borrow abroad at the expected foreign spot rate, and it will be negative if he expects to lend at that rate. It must be remembered that the absolute value of ${}_{i}L_{n}^{h'}$ will be larger the less confidence a trader has in his expectation with regard to a future (effective) spot rate.

The basic characteristics of the supply functions represented by (2-8) are the same as those discussed earlier for a closed economy. However, the ith investor's forward supply function in a market foreign to him will be steeper than his supply function in his home market for the same period for two reasons: (1) The forward supply function is derived from the supply function for corresponding future spot loans, and this foreign spot supply curve will have a steeper slope than the

comparable domestic supply curve because of exchange risk. Whereas the yield on an investment in the domestic spot market is certain after a tâtonnement process has determined the equilibrium spot rate at the beginning of the period, the yield on a foreign spot investment is also influenced by the rate of change in the exchange rate during the period. (2) Because the investor is assumed to be less confident about his expectation of the future effective yield on a foreign investment than on a domestic one, the angle θ between his foreign spot and forward demand functions will also be smaller than that between his domestic demand curves for the same period, making the forward function even steeper.

Looking at the second period, it will be interesting to consider under what conditions the ith investor, who may be a resident of country D, does neither enter the domestic nor the foreign forward market. To simplify the analysis, let us assume that the first-period rates are such that he does not invest in the domestic nor the foreign capital market, that is, we can neglect the influence trading in the first period would have on investment plans during the second period. Furthermore, at the expected domestic second period spot rate he will be a borrower. By definition, he will not trade in country D's market if $r_2^d = {}_ir_2^d = E_i(\tilde{R}_{1,2}^d) + {}_iL_2^{d'}$. Likewise, he will not enter the foreign forward market if $r_2^f = {}_ir_2^f = E_i(\tilde{R}_{1,2}^f) + {}_iL_2^{f'}$. Note that ${}_ir_2^d - {}_ir_2^f = E_i(\tilde{C}_{1,2})$; that is, the trader's two personal forward rates imply his expectation about the anticipated rate of change in the exchange rate during period two. If this did

not hold, he would have an incentive to speculate in at least one of the two forward markets.

A small example will help to illustrate this very important point.[43] Given the investor's expectations concerning future spot rates and his risk premia by, say, $E(\tilde{R}_{1,2}) = .05$, $L_2^d = L_2^f = .01$, $M_2^d = .00$, $E(\tilde{R}_{1,2}^f) = .03$, $M_2^f = .01$, then $\tilde{E}(C_{1,2}) = .01$ because[44]

$$E(\tilde{R}_{1,2}^d) + L_2^d + M_2^d = E(\tilde{R}_{1,2}^f) + L_2^f + M_2^f + E(\tilde{C}_{1,2})$$

or

$$(.05 + .01 + .00) = (.03 + .01 + .01) + .01.$$

Consider the domestic forward market first. Our investor expects the future spot rate to be .05. At this rate, he plans to borrow in his home spot market, and whenever the forward rate is below .06 he will start borrowing part of these funds in the forward market in order to reduce risk. At a forward rate r = .06 the expected gain in utility from borrowing spot at a lower rate and the loss in utility due to risk inherent in borrowing later rather than now just balance so that he will not participate in the domestic forward market. Similarly, he expects the foreign spot rate to equal .03 and, because of an

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[43] To simplify the notation, reference to the ith investor will be dropped whenever possible without causing ambiguity.

[44] As we have assumed that complete information on all markets is available to all investors, we also assume that ${}_iL_n^d = {}_iL_n^f$.

expected devaluation of his home currency by one per cent or .01, he anticipates an effective borrowing rate of .04 in the foreign country. As this is below the expected domestic borrowing rate, he will have an incentive to borrow part of his funds abroad in spite of the risk of foreign borrowing. Indeed, given a domestic forward rate of .06, he will start borrowing in the foreign forward market whenever the foreign forward rate is less than .05 or whenever his perceived effective borrowing rate is less than .06. Only if the foreign forward rate is .05 and therefore the investor's expected effective borrowing rate abroad .06 will he have no incentive to enter the foreign forward market. If, on the other hand, our investor expected no change in the exchange rate, he would have a strong incentive to borrow in the foreign forward market even if his personal and the actual forward rate were both equal to .05. But this is inconsistent with our assumption that, when all personal forward rates equal actual forward rates, no supply or demand for forward funds will materialize. This shows that an investor's personal forward rates imply his expectations about rates of change in the exchange rate during respective periods and therefore need not be taken into account explicitly in his excess demand functions.

In order to obtain an intuitive notion of how interest rates are determined in our model, let us continue with our example and assume that a second investor, a resident of country F, operates in the market whose expectations are identical to those held by the resident of country D. Note that what

is a positive expected rate of change in the exchange rate from country D's point of view is a negative change from the other country's point of view. But the absolute value of the relative rate of change is the same if measured as an instantaneous rate. Assume also that the second investor does not plan to borrow or lend at his country's expected spot rate of .03, that is, his time and risk premium, ${}_fL_2^f$ equals .00 implying that his time preference differs from that of the first investor who planned to borrow at this rate.[45] As the expected spot rate in country D is .05, country F's resident plans to lend abroad because this is equivalent to an expected effective yield of .04 $\left[E_f(\tilde{R}_{1,2}^d) + E_f(\tilde{C}_{1,2}) = .05 - .01\right]$, a rate at which he would lend at home too. Of course, because of the higher risk involved he will invest a smaller amount abroad than he would at home at a rate of .04 if he is risk-averse. Assuming his time and risk premium with respect to the foreign market, ${}_fL_2^d$, to equal ${}_fL_2^f = .00$, his exchange risk premium, ${}_fM_2^d$ equals -.01 because

$$E_f(\tilde{R}_{1,2}^d) + {}_fL_2^d + {}_fM_2^d + E_f(\tilde{C}_{1,2}) = E_f(\tilde{R}_{1,2}^f) + {}_fL_2^f + {}_fM_2^f$$

or

$$(.05 + .00 - .01) - .01 = (.03 + .00 + .00).$$

When regarding our two investors as representative of the "average" trader of the respective countries, some interesting observations can be made. In <u>closed</u> economies, the domestic

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[45]The subscript f refers to the resident of country F, the subscript d to the resident of country D.

forward rate for the second period, r_2^d, will equal .06 because at this rate no excess supply of loanable funds would be forthcoming, and the foreign forward rate, r_2^f, will equal .03. In open economies, the supply of funds by traders from country F in country D's forward market tends to drive r_2^d below .06, and similarly the demand for funds by borrowers from country D in country F's market forces r_2^f up. The new interest rate differential will lie somewhere in the interval

$$.01 < r^d - r^f < .03$$

depending on the exchange risk perceived, the traders' risk aversion, and their wealth. The higher the foreign exchange risk perceived and the more risk-averse they are, the fewer funds will be lent or borrowed internationally; the wealthier a person the more funds he will move between national capital markets. The interest rate differential cannot be equal to the expected rate of change in the exchange rate because then it would not pay to invest internationally as exchange risk would have to be accepted at no expected gain. In other words, as long as capital moves between two countries, the interest rate differential will not only reflect exchange rate expectations but will be larger by a certain risk premium. In a world dominated by risk-averse traders, expression (2-6) will no longer hold and must be replaced by

$$r_n^d - r_n^f = c_n = E(\tilde{C}_{1,n}) + m_n \qquad (2\text{-}9)$$

where m_n denotes a foreign exchange risk premium. From country D's point of view, if the interest rate differential is positive,

the domestic currency is expected to lose in value vis-à-vis the foreign currency, and both the expected rate of change in the exchange rate and the exchange risk premium are positive. Unless this holds residents in country D will have no incentive to borrow abroad. Similarly, if the interest rate differential is negative, both the expected exchange rate change and the exchange risk premium are negative. Otherwise investors in country D will not lend in country F. More generally, from country D's point of view, the exchange risk premium will always be

$$ {}_d m_n = r_n^d - r_n^f - E_d(\tilde{C}_{1,n}) \tag{2-9a} $$

and from the foreign country's viewpoint

$$ {}_f m_n = r_n^f - r_n^d - E_f(\tilde{C}_{1,n}) \tag{2-9b} $$

where ${}_d m_n = -{}_f m_n$ and $E_d(\tilde{C}_{1,n}) = -E_f(\tilde{C}_{1,n})$. Expression (2-9a) and (2-9b) allow for the fact that the effective interest rate differential, that is, the interest rate differential after taking exchange rate expectations into account, may be positive even if the nominal differential is negative and vice versa.

In our example it was assumed that for both investors $E(\tilde{R}_{1,2}^d) - E(\tilde{R}_{1,2}^f) \neq E(\tilde{C}_{1,2})$. If there exist systematic differences in time preferences between two countries, this is a reasonable assumption. Clearly, our model does not presuppose that international capital will only flow in one direction. For example, a resident of country D with a set of expectations different from those mentioned earlier may well lend abroad at the same time as other domestic traders borrow in F.

We are now ready to derive an approximate solution for the equilibrium international term structure of interest rates.[46] Each trader's excess supply functions as given by expression (2-8) will be expanded around the points where there is zero excess supply of funds, that is, where $r_n^h - {}_ir_n^h = 0$ for all n and h. This results in the Maclaurin series

$$ {}_iq_j^h = \sum_{n=1}^{2} \sum_{h=d}^{f} (r_n^h - {}_ir_n^h)\partial_i f_j^h/\partial r_n^h + \text{higher order terms in r.} \quad (2\text{-}9) $$

With two countries, each trader will have 2N or four excess supply functions. International capital market equilibrium will be obtained if all forward rates are such that total excess supply by all traders for all periods and all countries is zero, or[47]

$$ \sum_i \sum_j \sum_h {}_iq_j^h = 0. $$

Denote by

$$ \underline{q}_i = ({}_iq_1^d, {}_iq_1^f, {}_iq_2^d, {}_iq_2^f)' $$

the column vector of excess supply of funds by the ith investor in each forward market;

$$ \underline{r} = (r_1^d, r_1^f, r_2^d, r_2^f)' $$

the column vector of forward rates in each market;

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[46] As mentioned earlier (see p.27 above), our derivation proceeds along similar lines to that of Roll. However, because we dropped the subscript j from individual forward rates (see footnote 19 above), the algebra is less involved.

[47] By letting j vary over 1, 2, ..., n periods and h over 1, 2, ..., k countries our results can easily be generalized to more than two periods and more than two countries.

$$\underline{r}_i = ({}_ir_1^d, {}_ir_1^f, {}_ir_2^d, {}_ir_2^f)'$$

the column vector of the ith investor's personal forward rates and by

$$\underline{F}_i = \begin{bmatrix} \partial_i f_1^d/\partial r_1^d & \cdot & \cdot & \cdot & \cdot & \partial_i f_1^d/\partial r_2^f \\ & \cdot & & & & \\ & & \cdot & & & \\ & & & \cdot & & \\ & & & & \cdot & \\ \partial_i f_2^f/\partial r_1^d & \cdot & \cdot & \cdot & \cdot & \partial_i f_2^f/\partial r_2^f \end{bmatrix}$$

his matrix of partial derivatives.

Then the system of supply functions (2-9) may be written in matrix notation as

$$\underline{q}_i = \underline{F}_i\underline{r} - \underline{F}_i\underline{r}_i + \text{higher-order terms.}$$

Summing over all traders, international capital market equilibrium will be obtained if total excess supply is zero, that is, if

$$\sum_i \underline{q}_i = \underline{0}.$$

Neglecting higher-order terms, the set of equilibrium forward rates can be derived by solving

$$\sum_i \underline{q}_i = \sum_i (\underline{F}_i\underline{r} - \underline{F}_i\underline{r}_i) = \underline{0}$$

for

$$\underline{r} = (\sum_i \underline{F}_i)^{-1} \sum_i \underline{F}_i\underline{r}_i. \qquad (2\text{-}10)$$

This important result indicates that, as a first approximation, interest rates in open economies depend on each trader's matrix of own and cross elasticities of supply, his expectations concerning future one-period spot rates at home and abroad, his

risk premia and, implicitly, his exchange rate expectations. A relatively simple solution for, say, the second period domestic forward rate can be derived if we assume that (1) all intertemporal cross elasticities are zero, that is, that the $\underline{F}_i$ matrices are block-diagonal (only the cross elasticities between the domestic and foreign forward market for the <u>same</u> period may differ from zero), and that (2) the sum of the own elasticities in the domestic market equals the sum of the own elasticities in the foreign market and that the same holds for the cross elasticities.[48] Then

$$r_2^d \doteq \sum_i \left[\frac{\partial_i f_2^d / \partial r_2^d}{\sum_i (\partial_i f_2^d / \partial r_2^d + \partial_i f_2^d / \partial r_2^f)} (E_i(\tilde{R}_{1,2}^d) + {}_iL_{1,2}^d + {}_iM_{1,2}^d) \right.$$
$$\left. + \frac{\partial_i f_2^d / \partial r_2^f}{\sum_i (\partial_i f_2^d / \partial r_2^d + \partial_i f_2^d / \partial r_2^f)} (E_i(\tilde{R}_{1,2}^f) + {}_iL_{1,2}^f + {}_iM_{1,2}^f) \right] .$$

Under these special conditions which may hold approximately if two countries are quite similar, the <u>domestic</u> forward rate is seen to be a weighted-average of expectations of interest rates in country D <u>and</u> F over both domestic and foreign traders active in the market. The weights with respect to each investor's

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[48] For example, the second block of $\underline{F}_i$ will be

$$\begin{bmatrix} \sum_i (\partial_i f_2^d / r_2^d) = a & \sum_i (\partial_i f_2^d / r_2^f) = b \\ \sum_i (\partial_i f_2^f / r_2^d) = c & \sum_i (\partial_i f_2^f / r_2^f) = d \end{bmatrix} .$$

If a = d and b = c, the inverse of this block is

$$\frac{1}{ad-bc} \begin{bmatrix} d & -c \\ -b & a \end{bmatrix} = \frac{1}{a^2-b^2} \begin{bmatrix} a & -b \\ -b & a \end{bmatrix}$$

This then leads to the special solution given in the text. Note that a block-diagonal matrix can be inverted by inverting each block separately.

expectation of the domestic interest rate depend on his inclination to change his investment in domestic bonds as the domestic rate changes which is related to his wealth and his confidence in his expectation of the (effective) yield realizable in the future spot market in country D coupled with his degree of risk aversion and his time preference. The weights with respect to each investor's expectation of the foreign spot rate for the same period are a function of his marginal propensity to shift funds from or to country D as the rate in country F changes which is again related to his resources and his confidence in his expectation of the (effective) future spot rate in country F. Because of exchange risk, one should expect cross elasticities to be relatively small compared to the aggregate own elasticities so that r_2^d will be influenced by $E(\tilde{R}_{1,2}^d)$ much more than by $E(\tilde{R}_{1,2}^f)$.

However, in general intertemporal elasticities will not equal zero though we may suppose that they approach zero as we move away from the main diagonal. Also, elasticities of aggregate market excess supply functions will differ if there are differences in wealth, risk aversion, and so on between nations. A more general solution for, say, r_2^d can be derived from (2-10) by extracting an individual equation for this rate. The system of equations (2-10) can be rewritten as

$$\underline{r} = \sum_i \underline{V}_i(\underline{E}_i + \underline{L}_i) \qquad \text{(2-10a)}$$

where the matrix $\underline{V}_i = (\sum_i \underline{F}_i)^{-1}\underline{F}_i$ and $\underline{E}_i$ and $\underline{L}_i$ are column vectors of the ith trader's expected spot rates and his (exchange) risk and time premia. Denoting the jth row of $\underline{V}_i$ by ${}_i\underline{v}_j$ and ${}_i\underline{v}_j$'s

kth element by ${}_i\underline{v}_{jk}$, and remembering that r_2^d is the (2n-1)th or third element in $\underline{r}$, we obtain

$$r_2^d = \sum_i {}_i\underline{v}_3\underline{E}_i + \sum_i {}_i\underline{v}_3\underline{L}_i \quad \text{or}$$

$$r_2^d = \sum_i {}_i\underline{v}_{33}E_i(\tilde{R}_{1,2}^d) + L_2^{d'}$$

where $L_2^{d'} = L_2^d + M_2^d = \sum_i \left[{}_i\underline{v}_3\underline{L}_i + {}_i\underline{v}_3\underline{E}_i - {}_i\underline{v}_{33}E_i(\tilde{R}_{1,2}^d)\right]$.

Thus any forward rate

$$r_n^h = E(\tilde{R}_{1,n}^h) + L_n^{h'} \tag{2-12}$$

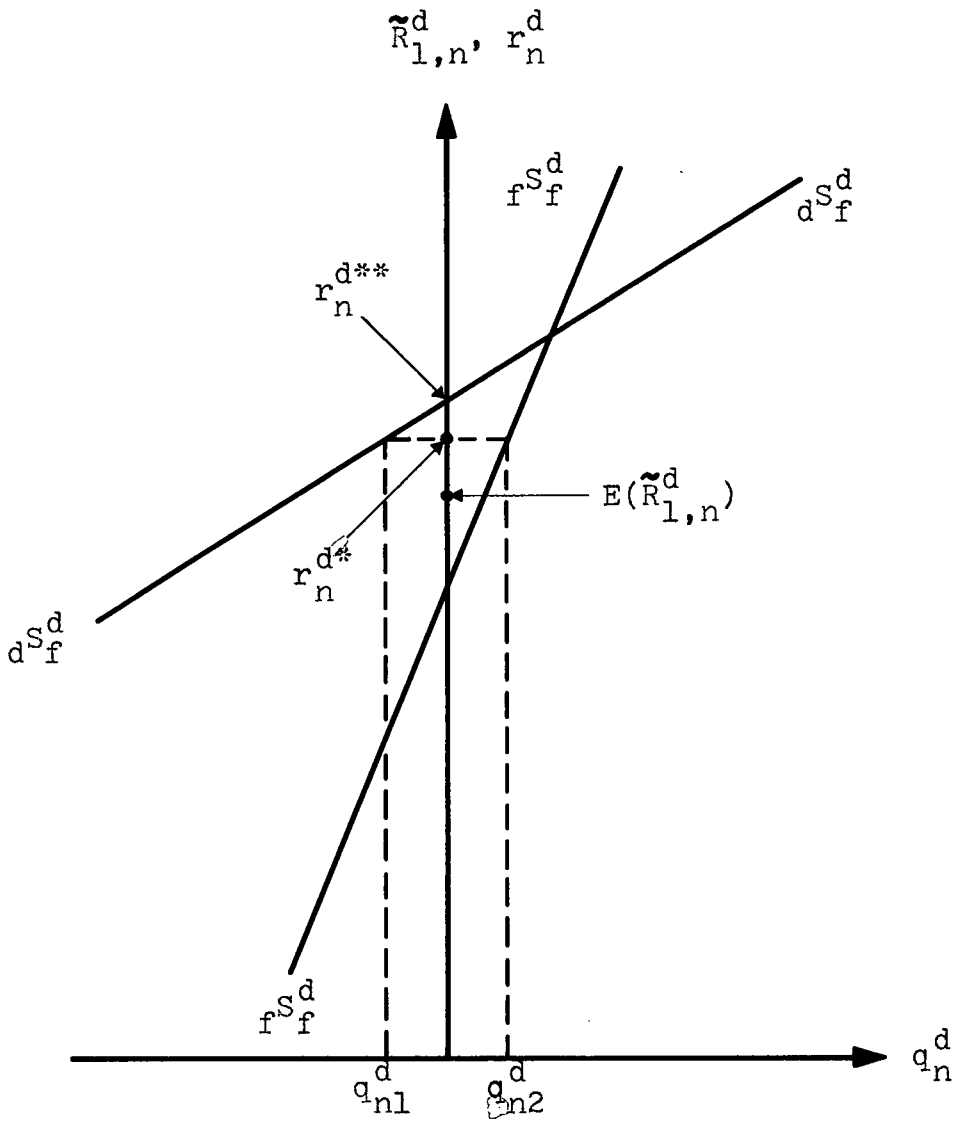
can be seen to be a weighted average expectation of the future spot rate over all traders in all capital markets plus a function of their expectations of all other future one-period rates in all markets, their degree of risk aversion, their wealth, their time preferences and, implicitly, their exchange rate expectations.

2.423 A GRAPHICAL ANALYSIS

The basic ideas of our international capital market theory may be best elucidated by graphical means. Let us aggregate the domestic excess forward supply functions of all residents of country D into one function for each period, and do the same with those functions of country F's investors. Also, the same holds for country F's markets. That is, there will be only two excess supply functions for each one-period forward market in each country, one by residents of country D and one by traders from country F. Assuming all forward interest rates except those for the market under study as given, that is, the other

FIGURE 2-2a

INTERNATIONAL CAPITAL MARKET EQUILIBRIUM FOR FORWARD LOANS: MARKET IN COUNTRY D

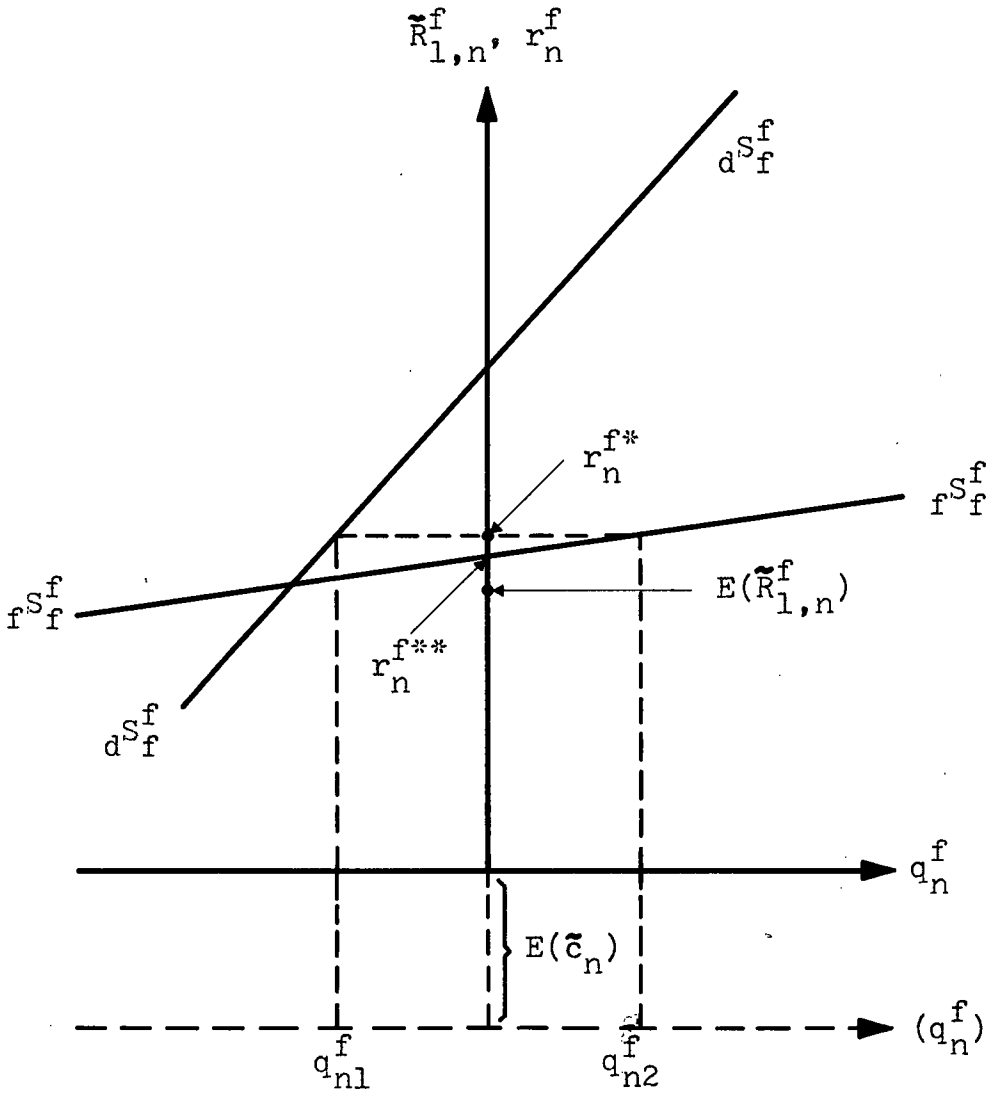


2N-1 markets are in equilibrium, such excess supply functions for the nth period are drawn in Figures 2-2a and 2-2b for both the domestic and the foreign markets. To simplify the graphs, it is assumed that, in the aggregate, all traders have identical expectations with regard to exchange rate changes and future one-period spot rates. Looking first at the market in country D, Figure 2-2a, the excess forward supply function of domestic traders (${}_dS_f^d$ ${}_dS_f^d$) crosses the vertical axis at r_n^{d**}. If D were a closed economy this would be the equilibrium forward rate because excess supply is zero at this point. However, in an open economy, foreigners will enter the market. They are assumed to have a lower time preference than local traders, and therefore they would supply funds in country D at r_n^{d**}. Their supply function (${}_fS_f^d$ ${}_fS_f^d$) is drawn with a steeper slope as an indication of the additional uncertainty about the exchange rate on their part. It can be seen from the graph that due to the supply of funds by foreigners the new equilibrium forward rate, r_n^{d*}, will be lower and be established where the excess supply of funds by foreigners, q_{n2}^d equals the excess demand for funds by local traders, q_{n1}^d.

The expected spot rate for period n in country F is lower than the spot rate expected for the same period in country D even if effective rates, that is, rates taking into account the expected rate of change in the exchange rate are considered. This follows from our assumption that investors in country D have a higher time preference for period n. Looking at Figure 2-2b, and supposing that traders in both countries are similar

FIGURE 2-2b

INTERNATIONAL CAPITAL MARKET EQUILIBRIUM FOR FORWARD LOANS: MARKET IN COUNTRY F



in their degree of risk-aversion and that uncertainties perceived with respect to future spot rates are also the same, the relatively flat excess supply curve of residents in country F in their home market (${}_fS_f^f$ ${}_fS_f^f$) indicates that their aggregate wealth is greater than that of traders living in country D whose domestic excess supply curve is drawn with a steeper slope. The excess supply curve of country D's residents in the foreign market (${}_dS_f^f$ ${}_dS_f^f$) is drawn less steep than (${}_fS_f^d$ ${}_fS_f^d$) in Figure 2-2a as an indication that country D's traders are less uncertain about the expected exchange rate change than investors from country F, that is, we assume that there are systematic differences in the exchange risk perceived between the two groups of investors.[49] The equilibrium forward rate in country F, r_n^{f*}, is higher than r_n^{f**}, the closed-economy equilibrium rate. Only at the higher rate does excess demand for funds by country D residents, q_{n1}^f, equal excess supply of funds by country F residents, q_{n2}^f.

2.5 INFORMATION COSTS, TRANSACTION COSTS, AND EQUILIBRIUM INTEREST RATES IN AN INTERNATIONAL CAPITAL MARKET

One of the assumptions made when developing our model of an international capital market for long-term debt instruments was that information is costless and that transaction costs are

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[49]This assumption is not crucial to our argument. Rather it has been introduced because, for example, American institutional investors, the main suppliers of funds to foreigners in the U.S. market, seem to shy away from exchange risk to a much higher extent than foreign borrowers.

zero. Now this assumption[50] will be relaxed and replaced by the following assertions:

2a. Information and transaction costs in a trader's home market are zero.

2b. When trading in a market foreign to him, an investor incurs variable information and transaction costs. They are measured as a percentage of the gross amount involved in a transaction, are a decreasing function of traders' present wealth positions, and are known for each period with certainty.

These assumptions allow us to concentrate on the <u>difference</u> in transaction costs between trading in the home market and trading in a foreign market.[51] Transacting business in a foreign environment usually involves legal, taxation, language, and other problems not encountered at home. Longer communication channels, higher travel expenses, a relative scarcity of information on foreign markets and difficulties in interpreting foreign data all will contribute to this difference in transaction costs. Many of these costs will be fixed rather than variable. However, within a reasonable range, total costs may be regarded as a constant percentage of the amount involved in a transaction though, more generally, they will decrease relatively as transaction size increases. An investor's wealth and the average size of his transactions are usually highly correlated which justifies our assumption made. Implicitly it is also assumed that, for example, a domestic resident borrowing in a foreign market has to reimburse the foreigner for the extra costs incurred by the foreigner as a result of lending to

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[50]See assumption 2, p.21 above.

[51]Henceforth, the term transaction costs will be understood to include information costs as well.

him rather than to local borrowers. Usually it will be more difficult to obtain information on a foreign borrower and to establish his credit-worthiness than that of a local fund seeker.[52]

Let ${}_iZ_n^h$ be the ith investor's transaction costs for transactions in country h in the nth period forward market. They are measured in units of (percentage per period)/100, and are zero if h is the trader's home country. These transaction costs enter each investor's excess supply function as an argument, that is

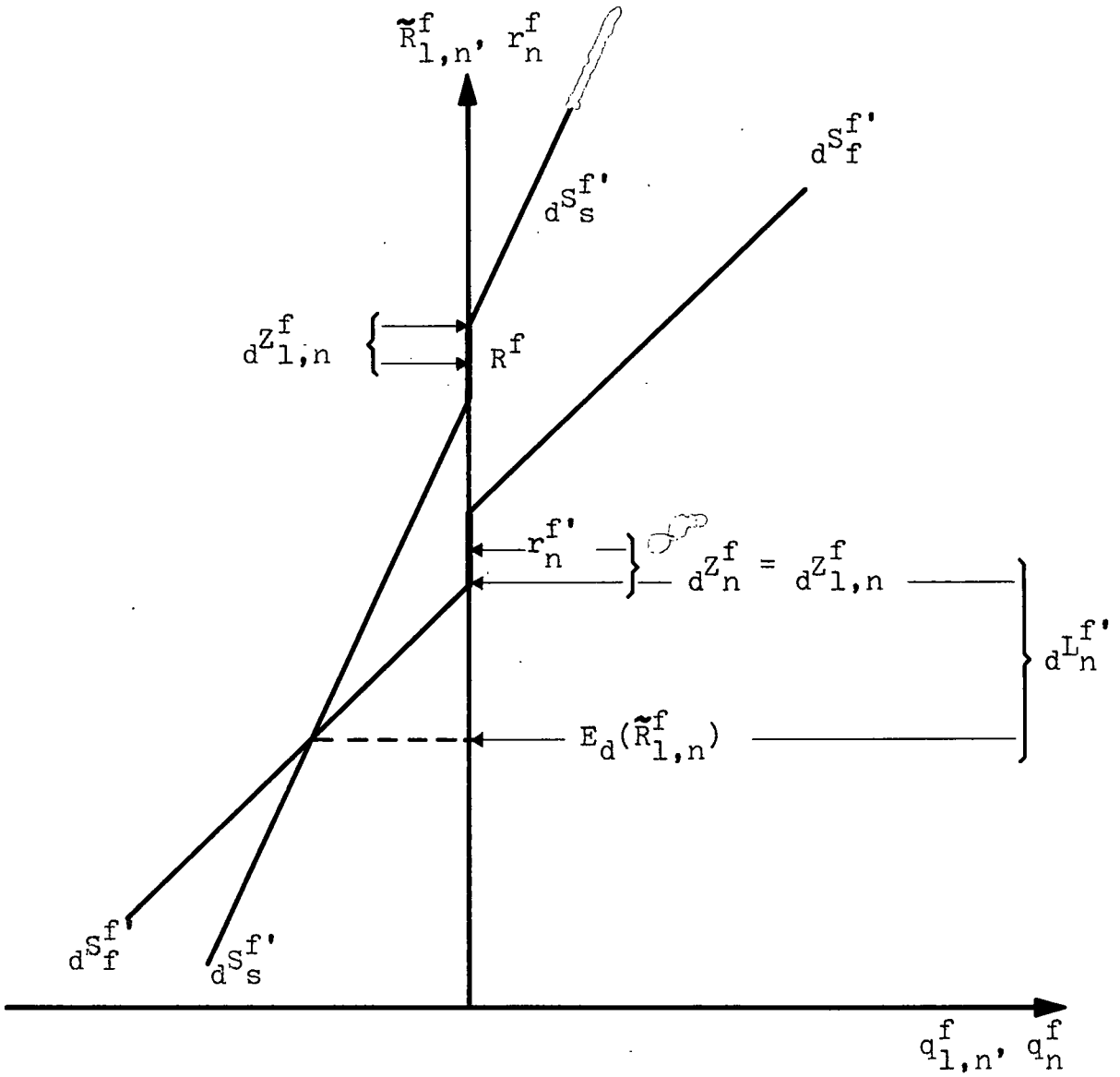
$$ {}_iq_j^h = {}_if_j^h(r_1^d - {}_ir_1^d; {}_iZ_1^d; r_1^f - {}_ir_1^f; {}_iZ_1^f; r_2^d - {}_ir_2^d; {}_iZ_2^d; r_2^f - {}_ir_2^f; {}_iZ_2^f). \tag{2-11} $$

The nature of these modified excess supply functions can be best elucidated by deriving the excess forward supply of foreign funds by a typical domestic trader for period n from his corresponding planned spot supply of funds in country F at the start of period n. In Figure 2-3, these two supply functions are graphed. If the future spot rate in the foreign market were R^f, the domestic trader would neither borrow nor lend abroad. Only at a rate $R^f + Z_{1,n}^f$ would he start lending in the foreign market. <u>If the rate at which he can lend does not make up for the extra transaction costs incurred by trading in the foreign market, he is better off by not participating in that market</u>. It follows that there is a discontinuity in his supply function

[52]In Chapter 3 such transaction and information costs differentials will be discussed in more detail.

FIGURE 2-3

A DOMESTIC INVESTOR'S EXCESS SUPPLY FUNCTIONS FOR SPOT AND FORWARD FUNDS IN A FOREIGN CAPITAL MARKET WITH VARIABLE TRANSACTION COSTS DIFFERENTIALS



$({}_dS_s^{f'}\ {}_dS_s^{f'})$ for future spot loans around R^f. Similarly, his supply function for forward funds $({}_dS_f^{f'}\ {}_dS_f^{f'})$ will have two kinks. These discontinuities occur where the investor changes from being a borrower in the forward market to being a lender in the forward market, that is, his forward supply function will also shift upwards by $2Z_{1,n}^f$ at the point where it crosses the vertical axis.

Because of these discontinuities in the supply functions, no straightforward mathematical solution for the international equilibrium term structure of interest rates can be derived. But the jumps in the forward supply functions will be smaller the wealthier an investor is and in all probability will approach zero for very large transactions.[53] Also, because of differences in expectations and time preferences, discontinuities in individual traders' curves will occur at different interest rate levels. By aggregating individual excess supply functions across all traders of a particular country a continuous supply function will be obtained and at least a graphical demonstration of the effects transaction costs differentials have on international interest rate differentials can be given.

Consider Figure 2-4. The same assumptions as those made earlier with regard to Figures 2-2a and 2-2b apply.[54] In addition, transaction costs differentials due to trading in a for-

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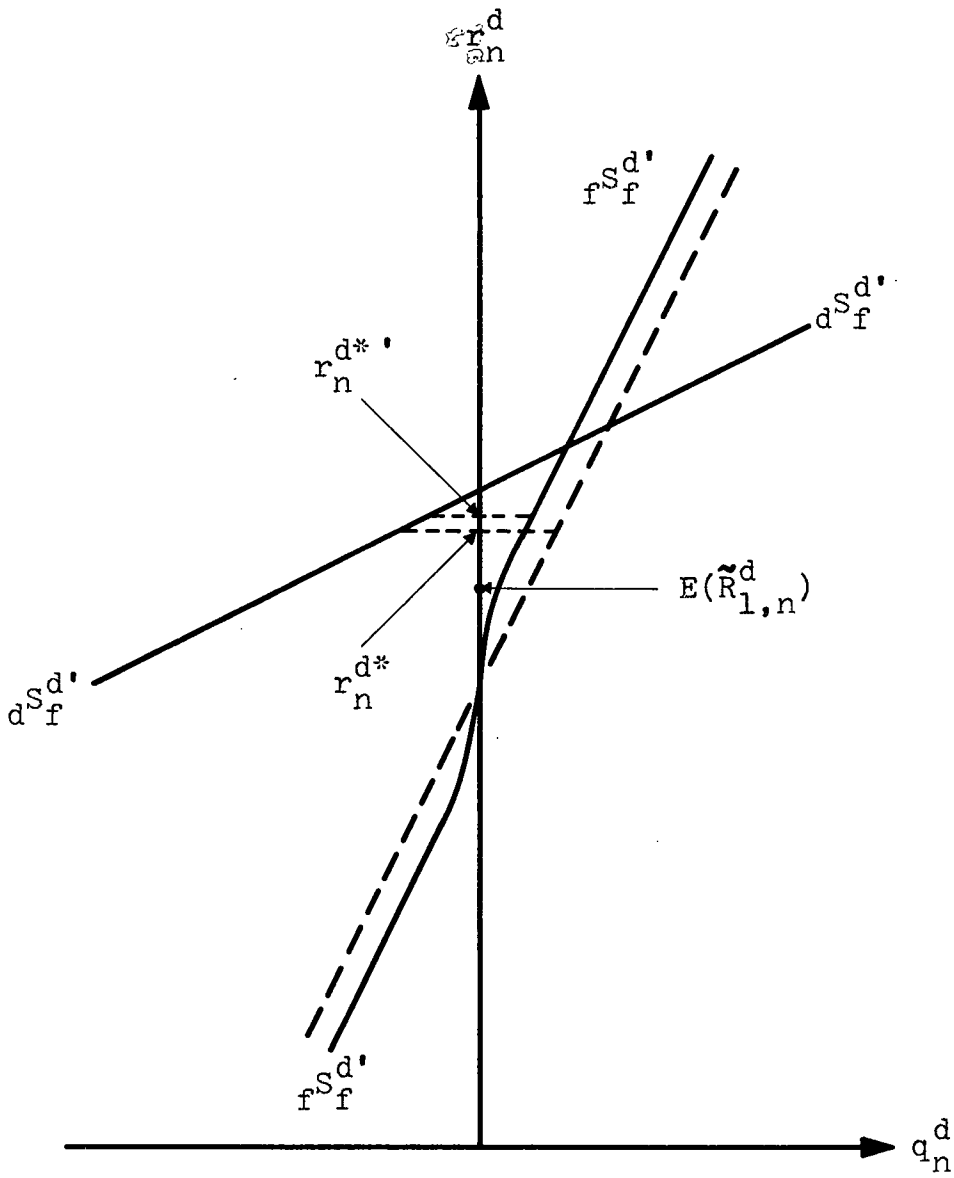
[53]Indeed, when considering total transaction costs rather than only cost differentials, total costs in a foreign market <u>may</u> be lower if the foreign market is very efficient with regard to huge transactions.

[54]See pages 57 - 59 above.

FIGURE 2-4

INTERNATIONAL CAPITAL MARKET EQUILIBRIUM FOR FORWARD LOANS WITH VARIABLE TRANSACTION COSTS DIFFERENTIALS: MARKET IN COUNTRY D



eign market are taken into account. Whenever foreign investors would be lenders at a given interest rate, their aggregate forward supply function in country D's market (${}_fS_f^{d'}$ ${}_fS_f^{d'}$) lies to the left of the excess demand function which would prevail if there were no differential in transaction costs. The new function will be to the right of the former demand curve whenever foreigners would borrow in D at a given rate. This follows from the fact that the aggregate excess supply function of foreigners becomes very inelastic around the point where it crosses the vertical axis. The same considerations would apply to the excess supply function of domestic traders in country F. Note that the equilibrium one-period forward rate in the domestic market, $r_n^{d*'}$, is higher than in an international capital market without differentials in transaction costs between trading in the home and trading in a foreign market. The foreign forward rate is lower than it would be otherwise.

It follows that the size and direction of international interest rate differentials does not only reflect exchange rate expectations and differences in time preferences but is also influenced by imperfections due to transaction costs which, for a given amount, are assumed to be higher when a domestic and a foreign trader deal with each other than when two traders of the same nationality are involved in a transaction. Our model also shows that, even if no changes in exchange rates are expected and if time preferences are identical in two countries, a Central Bank's monetary policy may cause slight interest rate differentials without inducing considerable international capital flows because of these differences in trans-

action costs. But a Central Bank's continuing attempts to shift a country's aggregate excess supply functions for forward funds in the domestic market upward will meet increasing resistance as foreigners shift their funds in increasing amounts from their home market to the country in question, given that foreign interest rates do not increase as well, and domestic residents will be tempted to borrow abroad rather than at home.

Of course, other imperfections like discriminatory taxes against foreigners,[55] special reserve requirements for deposits by foreigners as introduced by some European Central Banks in 1972,[56] or other exchange controls all will impede the free market mechanism and lead to distorted international interest rate differentials. Indeed, the Eurobond market, which is regarded by many as a truly international capital market, and in which foreign investors deal with each other in a third currency, owes its existence mainly to such imperfections.[57] After the recent abolition of U.S. capital restraint programmes we may see a re-emergence of New York as a leading international capital market.

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[55]Witness the Canadian withholding tax, American interest equalization tax or German coupon tax.

[56]See, e.g., the London Economist, January 27, 1973, "International Banking Survey", p. 14 on exchange controls introduced by European countries in 1972.

[57]See Mendelson.

2.6 SUMMARY

In summary, several crucial conclusions can be derived from our analysis:

1. In a world dominated by risk-averse investors, international differences in interest rates do not only reflect exchange rate expectations but also risk premia necessary to reimburse international borrowers and lenders for accepting exchange risk.

2. The persistence of such interest differentials is compatible with the assumption that the international capital market for long-term debt capital is perfect.

3. In countries whose residents have a relatively high time preference for a certain period and where therefore the interest rate level is relatively high compared to the "world" level of interest rates for that period, the respective domestic forward interest rate will be lower after the country opens up for international capital investment. Similarly, interest rates will rise in countries whose residents have a relatively low time preference.[58]

4. On a net basis, there will be a one-way long-term debt capital flow from the country with the relatively low interest rate level for a given period to the country

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[58] In a world with growing economies, the direction of interest rate differentials will also reflect differences in the return on real capital and differences in the demand for funds resulting herefrom.

with a higher interest rate level. This net one-way capital flow will be due to

a) residents of the high-interest level country borrowing abroad in the low-interest market, and

b) residents of the low-interest level country lending abroad in the high-interest market.

On a gross basis, two-way capital flows may be caused by differences in expectations among investors. As there does not exist a world currency, the international capital market actually consists of national submarkets in which domestic residents transact with foreigners.[59]

5. The amount lent or borrowed in a foreign capital market will not only depend on a country's wealth position but also on its residents' degree of risk aversion and the exchange risk perceived.

6. If information and transaction costs are higher when a domestic and a foreign trader deal with each other than when two traders of the same nationality are involved in a transaction, then interest rate differentials are larger than they would be if the international capital market were perfect.

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[59]The fact that foreigners transact with foreigners in a third capital market can be explained by political uncertainties at home, inefficient domestic capital markets and other imperfections not considered in our theory.

CHAPTER 3

CORPORATE BORROWING IN INTERNATIONAL CAPITAL MARKETS: THE CANADIAN - UNITED STATES CASE

3.1 INTRODUCTION

Canada is a net importer of long-term debt capital. The data in Table 3-1 show that this inflow of funds is almost exclusively due to the sale of new issues abroad by Candian borrowers. Besides corporations, provincial and municipal governments obtain considerable amounts of funds in foreign bond markets. The policy of the Canadian federal goverment is to approach foreign capital markets only during exchange crises like those in 1962 and 1968 in order to replenish foreign exchange reserves.[1]

As the data on outstanding bonds indicate, activities of international investors in secondary markets are of only minor importance. Since 1966, this has resulted in an outflow of funds from Canada.

Both the fact that the inflow of long-term debt capital is predominantly due to the sale of new bonds abroad by borrowers other than the federal government and the absence of an active

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[1]See Bank of Canada, Annual Report for the years 1962 and 1968.

TABLE 3-1

PORTFOLIO TRANSACTIONS IN CANADIAN AND UNITED STATES BONDS BETWEEN CANADA AND THE UNITED STATES, 1960 - 1972
(In millions of dollars)

Item	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
Canadian Bonds													
Corporate bonds													
New issues	143	350	323	382	410	803	746	306	537	526	519		
Trade in outstanding bonds	-25	10	5	2	2	-12	-15	-17	-14	-3	-9		
Retirements	-94	-119	-127	-94	-114	-208	-127	-135	-229	-169	-127		
Net flow	24	241	201	290	298	583	604	154	294	354	383		
(Memo: New issues Can.-pay)	(67)	(46)	(54)	(75)	(123)	(172)	(93)	(80)	(94)	(80)	(27)	(48)	(132)
(sold abroad foreign-pay)	(87)	(308)	(277)	(317)	(291)	(635)	(658)	(235)	(492)	(517)	(513)	(315)	(263)
All Canadian bonds													
New issues	370	455	676	922	1028	1200	1409	1239	1391	1502	1024	868	1023
Trade in outstanding bonds	-9	74	84	35	38	21	-72	-63	-67	-27	-69	-72	-4
Retirements	-206	-189	-228	-268	-259	-324	-458	-300	-371	-382	-325	-581	-410
Net flow	155	440	532	689	807	897	879	876	953	1093	630	215	609
(Memo: New issues Can.-pay)	(123)	(135)	(126)	(148)	(226)	(242)	(168)	(137)	(135)	(110)	(77)	(114)	(225)
(sold abroad foreign-pay)	(299)	(369)	(583)	(822)	(852)	(974)	(1240)	(1333)	(1715)	(1767)	(1078)	(1029)	(1546)
United States Bonds													
New issues	-6	-13	-10	-32	-8	-9	-18	-17	-22	-9	-10		
Trade in outstanding bonds	-8	10	1	23	-5	12	-35	-39	-18	1	-86	9	-2
Retirements	12	5	17	17	5	5	6	8	11	7	5		
Net flow	-2	2	8	8	-8	8	-47	-48	-29	-1	-91		

Source:
Statistics Canada, Quarterly Estimates of the Canadian Balance of International Payments (Catalogue No. 67-001), various issues; Security Transactions with Non-Residents (Catalogue No. 67-002), various issues; The Canadian Balance of International Payments, 1946-1965 (Catalogue No. 67-505). Missing data for 1971 and 1972 are not yet available

international trade in outstanding issues make a direct test of our model through regression analysis rather difficult. Furthermore, the Bank of Canada has attempted to interfere with the free play of economic forces by manipulating interest rate differentials and through moral suasion.[2] Therefore we shall rely on an indirect test of the basic features of our theory.

In the preceding chapter it was shown that the persistence of interest rate differentials between national long-term capital markets may be consistent with equilibrium in the international capital market, given that certain conditions hold. The three conditions which are crucial for the derivation of our results are that (1) because of differences in time preferences between nations and resulting differences in the demand for funds interest rate levels tend to differ among countries, that (2) expectations of exchange rate changes and exchange risk cause interest rate differentials to persist, even if the international capital market is perfect, and that (3) differences in transaction and information costs between operating in the domestic and a foreign market will further reduce the interest-equilibrating influence of international long-term capital flows.

Now we will turn to a more detailed discussion of these three points. Data taken from Canadian-United States experience will be presented as preliminary evidence in support of

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[2]See our discussion in Sections 3.24 and 5.7 below.

our assertions. Their implications for corporate borrowing in foreign capital markets, in particular for Canadian corporate debt issues in the United States, will be discussed. Hypotheses will be derived that allow us to test the theory developed. Information on Canadian corporate bonds sold to United States investors will be used in the empirical tests to follow in Chapter 5. We believe that corporations are more sensitive to economic forces than provincial or municipal governments which borrow heavily in foreign capital markets as well. Political priorities and budget requirements may have a considerable influence on the borrowing behaviour of the two latter groups.

In this chapter, we shall first present some evidence on the relationship between interest differentials and exchange rate expectations and on the relatively higher demand for funds in Canada. The implications of differences in time preferences between the two countries for corporate borrowing in the United States are discussed. It will be shown that, at times, the Bank of Canada has exerted considerable influence on Canadian-United States interest differentials. Next, ways to reduce exchange risk in international long-term borrowing are analyzed. Finally, the impact of information and transaction costs on international capital flows will be explored.

3.2 THE CANADIAN-UNITED STATES INTEREST RATE DIFFERENTIAL, EXCHANGE RATE EXPECTATIONS AND DIFFERENCES IN THE AGGREGATE DEMAND FOR FUNDS BETWEEN CANADA AND THE UNITED STATES

3.21 CANADIAN-UNITED STATES INTEREST RATE DIFFERENTIALS AND EXCHANGE RATE BEHAVIOUR

In Chapter 2 it was shown that observed interest rate differentials between two countries should reflect exchange rate expectations held by market participants. Porter, in his article on "The Term Structure of Exchange Rate Expectations" reports empirical tests of this hypothesis which were not very successful.[3] He regressed exchange rate ratios on yield ratios of Canadian and U.S. government securities for the period 1953 to 1960. We experimented with similar data for the period 1962 to 1973 and also obtained insignificant estimates or coefficients with wrong signs.

One explanation for these discouraging results could be that observed exchange rate changes do not truly reflect expected exchange rate changes. As is well known, exchange rate movements often reflect political factors rather than purely economic forces. Another reason could be that the interest rate differential on federal government securities is not a good indicator of the yield differential to which capital flows respond. The data in Table 3-1 showed that long-term debt capital flows between Canada and the United States are almost exclusively due to the sale of <u>new</u> issues to Americans, and the yield

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[3]Porter, pp. 633-636.

differential on new issues rather than that on seasoned bonds may be the relevant variable.

For the United States, Moody's Investors' Service computes a composite average of yields on newly issued corporate bonds.[4] For Canada, no directly comparable index is available. But, as Peters reports, there seems not to exist any systematic factor influencing the interest differential between newly issued and seasoned Canadian corporate bonds.[5] Consequently the differential between Moody's index and McLeod, Young, Weir and Co.'s "10 Industrial Bonds Yield Average"[6] should provide us with an adequate proxy for the relevant interest differential. We regressed quarterly rates of change in the exchange rate, C_t, on past values of this yield differential, D_{t-j}, and obtained the following result for the period fourth quarter 1963 to second quarter 1973:[7]

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[4]See Moody's Industrial Manual or Moody's Bond Survey.

[5]J. Ross Peters, Economics of the Canadian Corporate Bond Market (Montreal: McGill-Queen's University Press, 1971), pp. 88-95.

[6]See McLeod, Young, Weir & Co., 40 Bond Monthly Average or the Bank of Canada Review.

[7]The quarterly yield differential is an average of month-end yield differentials. When using monthly data almost identical results are obtained but estimates of the distributed lag structure are less precise. The time period was chosen such that none of the lagged observations falls into the second quarter of 1962 or earlier when the Canadian government forced a devaluation of the Canadian dollar. Values in brackets are standard errors.

$$C_t = \underset{(0.62)}{-1.20} + \sum_{j=1}^{5} b_j D_{t-j} \qquad R^2 = 0.215$$

$$DWS = 2.060$$

$$SER = 1.012$$

$$\sum_{j=1}^{5} b_j = \underset{(0.68)}{1.12} \qquad b_1 = \underset{(0.61)}{1.83} \quad b_2 = \underset{(0.20)}{0.59}$$

$$b_3 = \underset{(0.24)}{-0.21} \quad b_4 = \underset{(0.32)}{-0.58}$$

$$b_5 = \underset{(0.25)}{-0.51}$$

The distributed lag structure was constrained to a second degree polynomial and we imposed the restriction that it assume a zero value at a lag of six periods. Experiments with higher degree polynomials and longer lags did not lead to improved estimates. Estimates covering the period from 1951 to 1973 or only those periods when the Canadian dollar was free to float, that is, 1951 to 1962 and 1970 to 1973, were not very significant though the signs on the coefficients were as expected.[8] For the most recent period of a floating exchange rate, third quarter 1970 to second quarter 1973, the following result was obtained:

$$C_t = \underset{(0.90)}{-1.75} + \underset{(1.62)}{4.17} D_{t-1} - \underset{(1.63)}{1.87} D_{t-2} \qquad R^2 = 0.434$$

$$DWS = 1.547$$

$$SER = 1.070$$

These results are surprisingly good and may be taken as evidence that the international capital market has become more efficient and sophisticated since the early 'sixties. The nega-

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[8]For the period third quarter 1951 to second quarter 1973, the only result significant by usual standards was as follows: $C_t = \underset{(0.63)}{-1.40} + \underset{(0.73)}{1.58} D_{t-1}$, $R^2 = 0.051$ DWS = 1.730 SER = 1.624.

tive constant reflects the exchange risk premium required by international investors. Even if the dependent variable, the (expected) exchange rate change, is zero the interest rate differential is positive.

Our statistical results indicate that interest differentials on long-term bonds reflect short-term and medium-term exchange rate expectations rather than long-run anticipations. This is not very surprising because (1) the impact which a given exchange rate change has on the profitability of an international long-term capital transaction is the greater the earlier it occurs;[9] (2) predicting exchange rate changes, say, fifteen years hence is extremely difficult; and (3) it is widely believed that in the long run the Canadian-U.S. dollar exchange rate will fluctuate around an equilibrium value of parity.[10] Historical exchange rate data as shown in Table 3-2 for the period 1927 to 1972 lend strong support to such a belief.

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[9]Cf. our discussion in Section 3.3 below.

[10]Fullerton remarks that "when the Canadian dollar was worth substantially more than the U.S. dollar, some U.S. buyers used par as a basis for exchange reserve calculations, with the general idea that parity is a long term average for the rate". Douglas H. Fullerton, The Bond Market in Canada (Toronto: Carswell Co., 1962), p. 53. And Kindleberger notes that long-term investors "held the view that the Canadian dollar could not get very far from the United States dollar over the lifetime of a 15- to 20-year investment, so that a one per cent differential in interest rates could not be discouraged by exchange risk". Charles P. Kindleberger, Balance-of-Payments Deficits and the International Market for Liquidity (Essays in International Finance, No. 46; Princeton, New Jersey: International Finance Section, Department of Economics, Princeton University, May 1965), p. 18. See also the discussion in Freedman, pp. 117-118.

TABLE 3-2

UNITED STATES DOLLAR EXCHANGE RATE IN CANADA, 1927-1972

Year	High	Low	Average
1927	100 3/16%	99 13/16	100 1/8
1928	100 7/16%	99 3/4	100 5/64
1929	103 %	100 1/8	100 47/64
1930	101 9/32%	99 27/32	100 5/32
1931	124 7/8 %	99 31/32	104 13/64
1932	119 1/2 %	106 5/8	113 33/64
1933	123 %	95 1/2	109 27/64
1934	101 5/8 %	96 7/16	98 31/32
1935	102 5/8 %	99	100 31/64
1936	100 11/16%	99 1/2	100 1/16
1937	100 5/16%	99 3/4	99 63/64
1938	103 1/2 %	99 59/64	103 7/64
1939	112 %	99 63/64	--
1940-45	111 %	110	--
1946	110 1/2 %	100	--
1947	100 1/2 %	100	--
1948	100 1/2 %	100	--
1949	110 1/2 %	100	--
1950	110 1/2 %	103 1/4	--
1951	107 5/16%	101 3/16	105 1/4
1952	101 1/8 %	95 7/8	97 7/8
1953	99 25/32%	96 3/4	98 5/16
1954	98 3/4 %	96 11/32	97 5/16
1955	100 1/16%	96 15/32	98 5/8
1956	99 31/32%	95 21/32	98 13/32
1957	98 5/8 %	94 7/32	95 7/8
1958	99 5/32%	95 3/4	97 1/16
1959	98 3/16%	94 9/16	95 29/32
1960	99 13/16%	94 15/16	96 31/32
1961	104 3/8 %	98 1/4	101 5/16
1962	109 %	104 11/32	106 7/8
1963	108 9/16%	107 19/32	107 27/32
1964	108 1/4 %	107 1/4	107 7/8
1965	108 1/2 %	107 5/16	107 13/16
1966	108 13/32%	107 11/32	107 3/4
1967	108 11/32%	107 1/4	107 7/8
1968	109 %	107 1/4	107 3/4
1969	108 7/32%	107 1/4	107 11/16
1970	107 15/32%	100 5/16	104 13/32
1971	102 17/32%	99 5/16	100 31/32
1972	100 15/16%	97 13/32	99 1/32

Note:
From September 16th, 1939, to September 30th, 1950, fixed rates set by the Foreign Exchange Control Board were in effect in Canada. Free market trading was resumed on October 2nd, 1950.

Source:
Bank of Montreal, Foreign Exchange Rates 1972 (Montreal, 1973).

TABLE 3-3

EXCHANGE RATE CHANGES AND MEAN ANNUAL YIELD SPREADS BETWEEN CANADA AND THE UNITED STATES, 1960 - 1972

YEAR	ANNUAL EXCHANGE RATE CHANGE IN PER CENT	MEAN OF MONTH-END YIELD SPREADS		
		GOVERNMENT SECURITIES		LONG-TERM CORPORATE BONDS
		3-MONTH BILLS	LONG-TERM BONDS	
1960	4.47	0.32	1.28	0.84
1961	4.75	0.42	1.18	0.84
1962	3.33	1.25	1.20	0.99
1963	0.29	0.35	1.08	0.96
1964	-0.63	0.14	1.03	0.95
1965	0.09	-0.04	1.00	1.00
1966	0.82	0.08	1.04	0.84
1967	-0.26	0.23	1.09	1.12
1968	-0.75	0.84	1.49	1.21
1969	0.03	0.35	1.47	0.87
1970	-5.96	-0.38	1.33	0.34
1971	-0.78	-0.89	1.25	0.58
1972	-0.60	-0.68	1.18	0.84

Note:

The yield spread on long-term corporate bonds is computed as the difference between McLeod, Young, Weir & Co.'s ten industrial bond series and Moody's composite average of yields on newly issued corporate bonds.

Sources:

Bank of Canada, Bank of Canada Review, and Bank of Canada Statistical Summary, various issues; Moody's Investors' Service, Municipal & Government Manual 1973, and Industrial Manual 1973.

Particularly because of this last point one might expect yield differentials on long-term securities to reflect a general exchange risk premium rather than specific expectations about exchange rate changes many years hence.

This leads us to the question of what is the basic cause for the continuous flow of long-term capital into Canada[11] (cf. Table 3-1) and a positive interest rate differential (cf. Table 3-3) independent of whether the Canadian dollar is generally expected to appreciate or depreciate. From 1962 to 1968, when the American dollar was at a considerable premium in Canada, the interest rate differential should have been smaller than during earlier or later years or even negative if it were solely a function of exchange rate expectations.

3.22 DIFFERENCES IN THE RELATIVE DEMAND FOR FUNDS BETWEEN CANADA AND THE UNITED STATES

In Chapter 2 it was shown that a trader's time preference determines whether he plans to borrow or lend at a given future one-period spot interest rate. The higher an investor's time preference for a particular period, the more he will tend to be a debtor rather than a creditor during that period and the more his excess supply functions for both spot and forward loans as drawn in Figure 2-1 will move upwards.[12] Similarly, if one

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[11]Complete data on long-term debt capital flows between Canada and the United States are only available for 1952 and later years. 1955 was the only year when there was a slight outflow of long-term debt capital into the United States. For data sources see Table 3-1.

[12]See Section 2.21 above, pp. 24-26.

country's time preference is higher than that of another country, this will cause her aggregate supply functions to be at a higher level than those of the other country as demonstrated in Figures 2-2a and 2-2b. The reason for this is that at any given interest rate the former country's (relative) excess demand for funds is higher (her excess supply of funds is lower) than that of the latter.[13] If investors are risk-averse and exchange rates can change, then effective interest rates in one country will consistently be higher than in the other, and long-term capital will tend to flow in only one direction even if the international capital market is in equilibrium. In growing economies, differences in effective interest rates will not only reflect differences in liquidity preferences but also differences in the expected return on new capital investments.[14] The total demand for funds in a country will then be determined by both these factors. Assuming that individual investors' time preferences for funds are a function of both their consumption plans and the expected return on investment in real assets, it is not necessary in our theoretical model to introduce corporations as separate traders in the capital market. In perfect capital markets, because optimal production decisions

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[13]See Section 2.423 above, pp. 57 - 61 .

[14]Differences in the efficiency of financial intermediaries may also be of influence. We shall not pursue this point here because Neufeld has quite forcefully argued that the Canadian capital market is as efficient as the American market. See Edward P. Neufeld, "The Relative Efficiency of the Canadian Capital Market: The Consequences for Canadian-United States Financial Relations", in Canadian-United States Financial Relationships (The Federal Reserve Bank of Boston Conference Series No. 6; Boston, Mass.: Federal Reserve Bank of Boston, 1971), pp. 100-115.

are independent of owner tastes, corporate demand for funds can be regarded as demand for funds by individual owners even though they may not be actively involved in the decision-making process.[15]

Kindleberger is perhaps the best-known proponent of the view that interest rate differentials and international capital movements are caused by differences in liquidity preferences. He has asserted that "much, perhaps most, of the lending by the United States to Europe, and perhaps a third to a half of United States lending to Canada and Japan, serve . . . in an overall economic sense to provide liquidity."[16] Aliber has criticized this view because it neglects the influence anticipated exchange rate changes have on the rate of return investors expect to realize on securities denominated in different numéraires. He suggests that "the spread between yield curves denominated in various currencies reflects the market's appraisal of exchange risk".[17] As our theoretical analysis of the determinants of the international term structure of interest rates has demonstrated, both these factors are important for an explanation of yield differentials and international capital flows.

In 1961 the Bank of Canada has argued that "the basic reason why interest rates are lower in the United States than

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[15]On the separation of production decisions and ownership see Fama and Miller, Chapters 2 and 4.

[16]Charles P. Kindleberger, "Balance-of-Payments Deficits and the International Market for Liquidity", p. 7. See also Emile Despres, Charles P. Kindleberger, and Walter S. Salant, "The Dollar and World Liquidity", The Economist, February 5, 1966, pp. 526-529.

[17]Robert Z. Aliber, "Exchange Risk, Yield Curves, and the Pattern of Capital Flows", Journal of Finance, XXIV (May, 1969), pp. 361-70. See also his paper on "Uncertainty, Currency Areas

in Canada is that the total level of borrowing, the aggregate demand for funds by governments, business and individuals combined, is less (proportionately) in the United States than in Canada."[18] To check on this claim we calculated the total amount of funds[19] raised by non-financial sectors[20] as a percentage of gross national product in Canada and the United States for the period 1962 to 1972. These data are presented in Table 3-4. They show that the relative demand for funds has indeed been consistently higher in Canada than in the United States. Whereas the mean value for Canada was 13.95 during those eleven years, it was only 10.85 for the United States. In other words, the relative demand for funds was, on average, almost 30 per cent higher in Canada. We also calculated the net amount of Canadian bonds acquired by American investors as a percentage of the total funds raised by Canadian non-financial sectors during the same period. These figures are shown in Table 3-5. On average, inflows of long-term debt capital from the United States accounted for approximately ten per cent of the total amount of funds raised by Canadians during most of this period though a clear tendency towards lower values devel-

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and the Exchange System", Economica, XXIX (N.S.) (November, 1972), pp. 432-441.

[18] Bank of Canada, Annual Report 1960, p. 19.

[19] Consumer credit, bank and other loans, short-term paper, mortgages, bonds, and stocks.

[20] Households, non-financial business, federal, provincial (state) and municipal governments, and rest of the world. Because the United States is a net lender to the rest of the world, the U.S. data slightly overstate the demand for funds by domestic sectors. But interest rates are a function of the total demand for funds, not domestic demand.

TABLE 3-4

TOTAL FUNDS RAISED BY NON-FINANCIAL SECTORS AS A PERCENTAGE OF GROSS NATIONAL PRODUCT IN CANADA AND THE UNITED STATES, 1962 - 1972

	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
Canada	11.9	12.3	13.5	13.7	13.8	15.2	15.1	13.0	11.2	17.0	16.8
United States	9.7	9.9	10.7	10.3	9.2	10.5	11.0	9.8	10.0	13.9	14.4

Source:
Based on data in Statistics Canada, Financial Flow Accounts (Catalogue No. 13-002) and Income and Expenditure Accounts (Catalogue No. 13-001), various issues; Board of Governors, Federal Reserve System, Federal Reserve Bulletin, various issues. The Canadian data for 1969-1972 are taken directly from Financial Flow Accounts. For 1961 and earlier years, no Canadian data were available.

TABLE 3-5

NET AMOUNT OF CANADIAN BONDS ACQUIRED BY U.S. INVESTORS AS A PERCENTAGE OF TOTAL FUNDS RAISED BY CANADIAN NON-FINANCIAL SECTORS, 1962-1972

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
10.5	12.5	12.1	11.9	10.4	8.8	8.8	10.5	6.6	1.25	3.5

Source:

See Tables 3-1 and 3-5.

oped in recent years. Only the future can tell whether this is a fundamental trend indicating a diminished reliance by Canadians on American funds or whether it is only a temporary phenomenon that will reverse itself once the United States has solved its balance of payments problems.

These data strongly support our assertion that differences in time preferences between nations and resulting differences in the demand for funds have a considerable influence on international capital flows. However, whereas our theory predicts that, for example, capital inflows into Canada should be due to both Americans acquiring Canadian-pay bonds in Canada and Canadians selling U.S.-pay bonds in the United States, the data in Table 3-1 suggest that long-term debt capital inflows are mostly due to Canadians borrowing abroad by issuing foreign-pay bonds.[21] Several factors which have not been incorporated into our model can explain this. (1) Prior to 1961, U.S.-pay issues were not subject to withholding taxes. This made them more appealing to United States investors and may have established a pattern.[22,23] (2) Canadian-pay issues "do not qualify

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[21]Data on the amount of foreign-pay bonds acquired by American investors are not available. However, whereas Canadian provinces have borrowed recently large amounts in Europe and also in Japan, we were unable to identify a single corporate issue that was denominated in a foreign currency other than U.S. dollars or a U.S.-pay issue that was sold outside North America. Consequently it is highly probable that the foreign-pay corporate bonds mentioned in Table 3-1 as sold abroad were indeed placed almost exclusively in the United States.

[22]Investment Dealers' Association of Canada, Brief to Royal Commission on Banking and Finance (Toronto: Investment Dealers' Association of Canada, June 1962), Appendix M, "Non-Resident Investment".

[23]A usually excellent discussion of American and Canadian

as legal investments under the investment laws of many of the states"[24]. This makes them less attractive to American investors and reduces their marketability at any point in time. (3) A given interest rate differential provides Canadian companies paying income tax with a higher protection against unfavourable exchange rate changes when issuing U.S.-pay bonds than tax-free American institutional investors investing in Canadian-pay bonds.[25] (4) Canadian issuers receiving revenues denominated in U.S. dollars can hedge the exchange rate risk whereas most United States investors have no debts denominated in Canadian dollars. (5) United States insurance companies have to revalue foreign-pay bonds annually and must write off any exchange losses immediately against surplus or other profits[26] whereas Canadian companies can write off exchange losses as they are realized over the life of the bonds.

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tax regulations and United States investment guidelines as they apply to U.S. investment in Canadian bonds can be found in any public prospectus for a Canadian U.S.-pay issue. American investors can usually offset payments of Canadian withholding taxes against U.S. income tax liabilities, and tax-free institutions can request to be exempted from the Canadian withholding tax.

[24] Douglas H. Fullerton, The Bond Market in Canada (Toronto: Carswell, 1962), p. 133. A summary of regulations of American financial institutions can be found in U.S., 88th Congress, House of Representatives, Committee on Banking and Currency, Comparative Regulations of Financial Institutions (Washington, D.C.: U.S. Government Printing Office, 1963). Regulations concerning life insurance companies' investments in Canadian securities can be found on pp. 336-37, concerning investments in other foreign countries on pp. 338-39. U.S. life insurance companies are the main foreign investors in Canadian corporate bonds.

[25] See our discussion in Section 3.3 below.

[26] Fullerton, p. 133.

In addition, there may exist systematic differences in the evaluation of exchange rate risk between Canadian and American traders,[27] a phenomenon which can be incorporated into our model.[28] For example, if U.S. investors' expectations of future exchange rate changes are more diffuse and uncertain than those of Canadians, the American aggregate excess supply function in the Canadian market will be steeper than the Canadian supply function in the U.S. market indicating a relatively higher demand by Canadians for U.S. dollar loans than supply of Canadian dollar loans by Americans.

3.23 DIFFERENCES IN TIME PREFERENCES AND CORPORATE BOND ISSUES IN THE UNITED STATES

Hicks has reasoned that lenders, because of liquidity preference, prefer to invest in shorter-term securities thereby causing a "constitutional weakness" on the long side of the capital market.[29] Following him it is sometimes argued that differences in terms to maturity available on bonds in two countries can be taken as an indication of differences in time preferences. For Canada and the United States Neufeld has compared the average term to maturity of interest-bearing market-

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[27]For example, Aliber argues that "the explanation for an international bond market - why firms based in one country issue debt denominated in a foreign currency (why Canadian firms issue debt denominated in the U.S. dollar) is that these firms believe that lenders have over-priced exchange risk." Robert Z. Aliber, "The Multinational Enterprise in a Multiple Currency World", in John H. Dunning (ed.), The Multinational Enterprise (London: Allen & Unwin, 1971), p. 52.

[28]See our discussion in Section 2.42 above, p.46 and p.61 .

[29]Hicks, Chapters 11 and 13.

able federal government debt outstanding.[30] From 1946 to 1970 the average term to maturity has always been higher in Canada with an average difference of about two years. However, such a comparison overlooks two things: (1) In Canada, federal government debt includes long-term obligations of government companies like Canadian National Railway and thereby increases the average maturity from what it would be otherwise. (2) In the United States, the term to maturity of federal bond issues has been artificially restricted by a legal ceiling on interest rates the government is allowed to pay and thus reflects market forces at most very indirectly. Consequently Neufeld's results may not truly reflect investors' preferences.

A comparison of terms to maturity on corporate bonds in the Financial Post's Record of New Issues and in Moody's Bond Survey indeed strongly suggests that terms to maturity available in the United States are longer than those in Canada.[31] This may, however, reflect differences in business characteristics particularly with regard to risk rather than differences in time preferences.[32] A more meaningful comparison would be

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[30]Neufeld, pp. 105-106.

[31]Soldofsky reports that in 1955 the term to maturity on private placements in the United States varied from eight to twenty-seven years on most issues but that maturities of twenty-eight to thirty-two years were not uncommon, and maturities of up to forty-nine years were available. A few issues had terms of one hundred years. Robert M. Soldofsky, "The Size and Maturity of Direct Placement Loans", Journal of Finance, XV (March, 1960), pp. 32-44. More recent data or comparable Canadian data are not available.

[32]The riskier an enterprise is the less likely lenders will concede long terms to maturity.

to compare the longest maturities obtainable by a Canadian firm in the Canadian capital market with those available to the same firm in the United States market. However, it is difficult to make such a comparison because most firms do not approach both markets at the same time and firm characteristics and market conditions change over time. Still, if differences in time preferences between the two markets exemplify themselves in differences in terms to maturity, then we should expect that the following hypothesis holds:

H_1: Consider only long-term bonds which may be defined as bonds having terms to maturity of more than twelve years. And compare only bonds that have been issued by Canadian corporations that have borrowed in both Canada and the United States. Then the term to maturity of U.S.-pay bonds will be, on average, longer than the term to maturity of Canadian-pay bonds.

Here H stands as an abbreviation for hypothesis. Hypotheses designated in this manner will be employed for additional empirical tests of our international capital market model. The results of these tests will be reported in Chapter 5.

Companies presumably prefer longer to shorter maturities at least on part of their debt if long-term liabilities are regarded as a permanent component of the capital structure because long maturities will tend to minimize fixed transaction costs and also the possibility of a "crisis at maturity".[33]

[33]For a discussion of this phenomenon see Ramon E. Johnson, "Term Structure of Corporate Bond Yields as a Function of Risk of Default", Journal of Finance, XXII (May, 1967), pp. 313-45.

In general, long-term debt is considered as less risky than short-term debt because the necessity to roll over large amounts of funds can put enormous strains on a firm's cash flow. As Gordon observes this becomes especially important during times of financial distress: "When if ever a firm in financial distress goes into receivership depends in part on the maturity structure of its debt..."[34] Consequently one would expect Canadian corporations to make some use of the longest terms to maturity available to them in the American bond market if these terms are indeed longer than the longest ones obtainable in Canada.

The availability of a private placement market may also provide us with some indication as to whether Canadian investors have higher time preferences than American investors. Direct placements have certain advantages over public issues for corporate borrowers because terms and provisions of the loan agreement can be tailored to meet the firm's particular needs, because they provide considerably more flexibility in case trust deed or other changes become necessary in later years, and because they can often be arranged very fast and without any public exposure. In addition, transaction costs are usually significantly lower. On the other hand, lenders may shy away from private placements as their marketability is usually very limited. A comparison of the percentage of new corporate

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[34] M. J. Gordon, "Towards a Theory of Financial Distress", Journal of Finance, XXVI (May, 1971), pp. 347-56.

bonds placed directly in Canada and the United States shows that in both countries this figure declined from about fifty per cent and more during 1961 to 1966 to about thirty per cent or less during the late 'sixties.[35] These data would not suggest any basic differences between the two markets. However, whereas Peters traces the decreased market share of private placements in Canada to the increased "interest of institutional investors in the more marketable public offerings"[36] Shapiro and Wolf argue that in the United States "the percentage of corporate debt sold in the private market has declined during periods of rapid growth in corporate borrowing and increased during periods of modest growth" because the supply of funds to the private market has grown at a relatively steady rate without reacting to changes on the demand side.[37] In fact, large American life insurance corporations, the dominant buyers in the direct placement market, have progressively concentrated their bond purchases in this market, but they had to curtail their acquisitions of new bonds because of sharp increases in policy loans during the late 'sixties.[38] To further inquire into such potential differences between the investment behaviour of Canadian and United States financial institutions

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[35]Peters, p. 16 and Eli Shapiro and Charles R. Wolf, The Role of Private Placements in Corporate Finance (Boston: Harvard University, 1972), p. 112.

[36]Peters, p. 38. The efforts of Canadian institutions to increase their profit through bond trading and their resulting interest in liquid bonds should also be noted. Cf. Fullerton, pp. 218-219, and Peters, pp. 100-101.

[37]Shapiro and Wolf, p. 157.

[38]Ibid., p. 54.

it is therefore hypothesized that

H_2: The comparative preference of Canadian versus American financial institutions for bonds with a high degree of marketability has induced Canadian corporations to sell securities in the U.S. direct placement market.

The availability of forward commitments can be a major factor attracting corporate borrowers to the private placement market.[39] A forward commitment is a firm agreement by a financial institution to provide a specified amount of funds at a specified future date. Sometimes such agreements involve several closings that extend over many years. The interest rate is usually agreed upon at the date the contract is signed "and reflects prevailing rather than anticipated future market conditions."[40] In fact, forward funds are sometimes cheaper than funds for immediate delivery.[41] Forward commitments allow corporations to formulate investment plans with greater certainty and to arrange for funds to be available when they are actually needed. U.S. life insurance corporations usually commit more than fifty per cent and sometimes up to almost ninety per cent of their expected cash flows in advance. About two-thirds

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[39] However, since the middle 'sixties a few public offerings in the United States have also contained delayed delivery provisions. Ibid., p. 20

[40] Ibid., pp. 20-21. This is not surprising in view of the problems involved in accurately forecasting interest rates. See Telser, pp. 562-564, or Michael J. Prell, "How Well do Experts Forecast Interest Rates?", Federal Reserve Bank of Kansas City Monthly Review, September-October, 1973, pp. 3-13.

[41] Shapiro and Wolf, p. 25. See also Lawrence D. Jones, Investment Policies of Life Insurance Companies (Boston: Harvard University, 1968), p. 328.

of the funds commited forward are taken down one to six months later, but time lags of up to twenty months and more have been observed.[42] For the Canadian market similar data are not available. Peters only notes that "the delayed take-down is not a characteristic of the majority of private placements."[43] If indeed Canadian investors are very liquidity-conscious and prefer stability of principal to stability of income, then it is not surprising that forward commitments are less prevalent in the Canadian than in the American bond market, and it is therefore hypothesized that

H_3: The availability of forward commitments has been a major factor attracting Canadian corporations to borrow in the United States.

3.24 THE BANK OF CANADA'S INFLUENCE ON INTEREST RATE DIFFERENTIALS

When we developed our theory of the determinants of the international term structure of interest rates, it was assumed that all traders are price takers. However, at least one trader in the Canadian market, the Bank of Canada, can influence "prices" to a significant extent. Therefore its activities and its influence on interest rate levels in Canada and on the time preferences of Canadians as expressed by their term structure of interest rates should not be overlooked. During the 'fifties when the Canadian exchange rate was allowed to fluctuate freely

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[42] Ibid., pp. 356, 380 and Shapiro and Wolf, pp. 24, 168-170.

[43] Peters, p. 31. For only one year, 1966, he estimates that 15% of all private placements accounting for 37.8% of the volume of such issues involved delayed take-downs.

there did not exist any particular need to influence the differential between Canadian and U.S. interest rates for balance-of-payments purposes. In 1962 the Canadian dollar was devalued and pegged. This caused an exchange crisis which was accompanied by huge outflows of capital. In order to restore confidence in the Canadian dollar, "central bank operations were accordingly directed toward promoting and maintaining a level of interest rates in Canadian financial markets which would help in establishing a net inflow of capital large enough to cover the current account deficit in the balance of international payments and rebuild the depleted foreign exchange reserves."[44] In later years the Bank of Canada commented also on the need "to ensure that the differential of bond yields between Canada and the United States was adequate".[45] Only in 1970, after the current account had shifted to a position of substantial surplus and the Canadian dollar was again floating, did "the need which had existed for many years to maintain interest rate levels high enough to attract a net inflow of capital to cover the current account deficit" cease to exist.[46] Clearly then the higher interest rate differentials prevailing during the middle sixties were at least partly due to the Bank of Canada's policy to maintain interest rate differentials adequate for balance-of-payments equilibrium.

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[44] Bank of Canada, Annual Report 1962, p. 4.

[45] Bank of Canada, Annual Report 1966, p. 43. See also Bank of Canada, Annual Report 1968, pp. 35-37.

[46] Bank of Canada, Annual Report 1970, p. 6.

3.3 EXCHANGE RATE CHANGES AND THE COST OF FOREIGN BORROWING

A unique characteristic of international financial transactions is that at least one of the two traders involved is dealing with securities denominated in a currency different from the one in use in his country. In order to evaluate the profitability of such a deal it is therefore necessary for him to take the effect of potential exchange rate changes into account. On the following pages we shall analyze the influence an adverse change in the exchange rate will have on the cost of foreign borrowing. This allows us to derive hypotheses concerning the financial behaviour of Canadian corporations when selling bonds in the American capital market.

3.31 HEDGING EXPORT EARNINGS THROUGH INTERNATIONAL BORROWING

Before embarking on such a discussion, it is important to realize that foreign borrowing does not entail an increase in financial risk for all corporations. Whenever a firm sells part or all of its production abroad for foreign currencies in a market where it has no appreciable influence on the price, then liabilities denominated in these currencies will decrease the company's exposure to exchange risk. Though interest and sinking fund payments occur only semi-annually,[47] short-term investments of foreign currency revenue or swap agreements could bring about an almost complete elimination of exchange risk on part or all export income. It is therefore hypothesized that

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[47]These are the usual terms. There exist cases where such payments are made on a monthly basis.

H_4: Canadian corporations with U.S. dollar revenue will exhibit a higher tendency to issue U.S.-pay bonds than those firms not engaged in export activities.

Indeed, one might expect that firms which obtain a relatively large and stable proportion of their total revenue from exports borrow abroad even if the expected effective cost of debt capital is slightly higher in the foreign capital market. The reduction in exchange risk should be a big enough incentive for such a transaction. In a sense the company would provide itself with a forward exchange market extending over the life of the loan if we regard the semi-annual debt payments as forward sales of anticipated export income.

3.32 EXCHANGE RATE RISK AND THE COST ADVANTAGE OF LOWER INTEREST RATES ABROAD

When comparing a domestic with a foreign borrowing opportunity, a firm is faced with the problem of how to evaluate two future payment streams which are denominated in different currencies, that is, which cannot be compared directly. To arrive at a rational decision, it is necessary to form expectations about future exchange rates, to translate foreign currency debt payments into domestic currency at these rates and to compare the present value of all future payments to domestic and foreign lenders.

For example, let us assume that a domestic firm needs X^d domestic dollars for N periods. At a domestic interest rate of R_N^d the firm can sell enough bonds to raise the required a-

mount. To obtain the same amount abroad, $X^d = a_o X^f$, it would have to pay a periodic coupon of R_N^f. Here a_o is the present spot exchange rate, the value of one unit of foreign currency expressed in terms of domestic money. Letting $E(\tilde{a}_n)$ denote the exchange rate expected to prevail at the end of the nth period when the nth coupon becomes due, the present value of the foreign loan in terms of domestic currency is

$$PV^f = R_N^f X^f \sum_{n=1}^{N} E(\tilde{a}_n)/(1 + R_N^d)^n + \left[E(\tilde{a}_N)X^f\right]/(1 + R_N^d)^N \qquad (3\text{-}1)$$

Payments denominated in foreign currency are converted into domestic money at the expected exchange rate and discounted at the domestic cost of debt capital.[48] Assuming for the moment the firm to be risk-neutral, it should borrow abroad whenever $a_o X^f > PV^f$, that is, when the present value of the payments to be made to foreign creditors is lower than the value of the amount of domestic currency received.

Clearly, to actually perform such an analysis would be extremely difficult. For example, if the foreign-pay bond has a term to maturity of twenty years and carries a semi-annual coupon, forty future exchange rates would have to be estimated. A considerable simplification can be achieved by assuming that

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[48]Whether foreign payments are converted into domestic money and discounted at the domestic interest rate or whether domestic payments are translated into foreign currency and discounted at the foreign interest rate is immaterial for the outcome of the analysis. One must not discount cash flows denominated in one currency at a discount rate applicable to capital denominated in another currency.

the exchange rate changes only once during the life time of the loan.[49] Furthermore, rather than forming expectations about exchange rates directly, it seems to be customary to evaluate the protection a given interest rate differential provides against unfavourable exchange rate changes.[50]

If the exchange rate remains unchanged from the present till the end of the (M-1)th period and assumes a new value, a_M, thereafter, then expression (3-1) becomes[51]

$$PV^f = a_o R^f X^f \sum_{n=1}^{M-1} (1 + R^d)^{-n} + a_M R^f X^f \sum_{n=M}^{N} (1 + R^d)^{-n} + a_M X^f (1 + R^d)^{-N} \tag{3-2}$$

Setting PV^f equal to $X^d = a_o X^f$, equation (3-2) can be solved for a_M, the new exchange rate necessary to eliminate the cost advantage of borrowing abroad at a lower interest rate. The most unfavourable case would be a depreciation of the domestic currency

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[49]At the other extreme, one may expect a more or less continuous change in the exchange rate in the same direction by X per cent per period. In this case a comparison of domestic and foreign interest rates is rather simple. Taking exchange losses (or gains) on interest payments and principal into account, a foreign interest rate R^f is equivalent to a domestic interest rate of $R^f + (1 + R^f)E(C_t)$ where $E(C_t)$ is the (same) expected rate of change in the exchange rate during each future period. This is similar to expression (2-4) in Section 2.41 above. Obviously, it is not very realistic to assume a continuous appreciation or depreciation of the Canadian dollar vis-à-vis the U.S. dollar.

[50]See footnote 10 above. As noted earlier in Section 2.421, international investors seem to be preoccupied with potential exchange losses. Caves and Reuber, p. 40, have attempted to compute the "depreciation required to eliminate the advantage of foreign borrowing in relation to interest-rate level and term to maturity." However, by defining the exchange rate as the "U.S. dollar price of the Canadian dollar" they actually computed the appreciation of the U.S. dollar.

[51]To simplify the notation, the subscript N will be dropped henceforth.

or an appreciation of the foreign currency immediately after the funds have been taken down. Then the first term on the right-hand side of expression (3-2) drops out and, as $PV^f = a_o X^f$, the new exchange rate that would nullify the interest advantage of foreign borrowing is

$$a_M = a_o \Big/ \left[R^f \sum_{n=1}^{N} (1 + R^d)^{-n} + (1 + R^d)^{-N} \right] .$$

Summing the geometric progression[52] and simplifying we obtain

$$a_M = a_o \left[(R^f/R^d) + \left[(R^d - R^f)/R^d \right] (1 + R^d)^{-N} \right]^{-1} . \qquad (3\text{-}3)$$

Obviously the value of a_M increases as the domestic interest rate, R^d, increases, and it decreases as the foreign interest rate, R^f, increases. In other words, the larger the interest rate differential, $R^d - R^f$, the higher the value of a_M has to be in order for the bond issuer to become indifferent between domestic and foreign borrowing. Remember that an increase in the exchange rate, a_M, means a depreciation of the domestic currency. A typical graph of the relationship between the interest rate differential and the devaluation percentage[53] that would eliminate the cost advantage of foreign borrowing is presented in Figure 3-1. It should be noted that as the interest rate differential doubles, the protection against unfavourable exchange rate changes more than doubles.

Differentiating equation (3-3) with respect to R^d and

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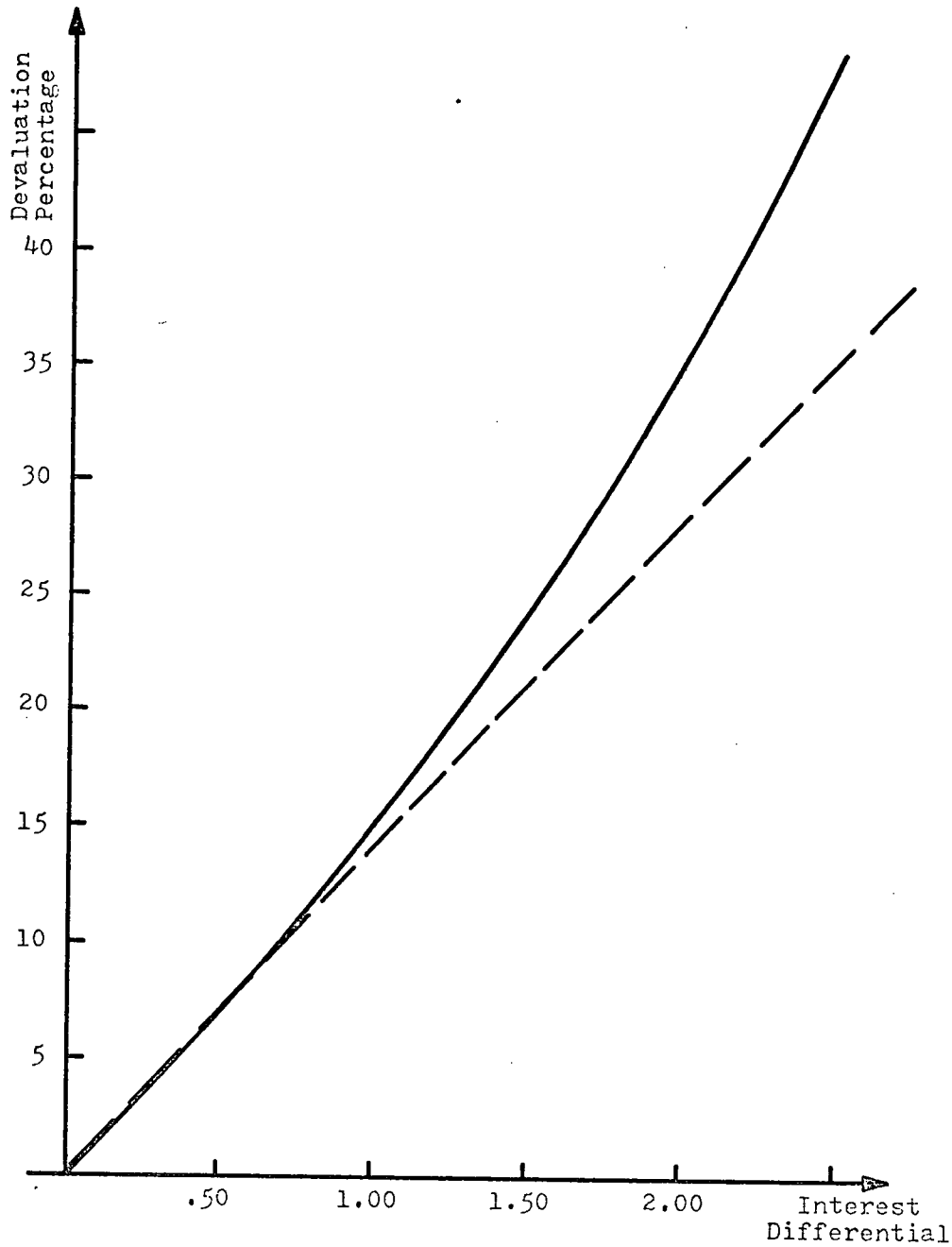
[52] $a_M = a_o \left[(R^f/R^d) \left[1 - 1/(1 + R^d)^N \right] + 1/(1 + R^d)^N \right]^{-1}$

[53] The percentage change in the exchange rate is $\left[(a_M - a_o) / a_o \right] 100$.

FIGURE 3-1

DEVALUATION PERCENTAGE REQUIRED TO OFFSET THE INTEREST ADVANTAGE OF FOREIGN BORROWING AS A FUNCTION OF THE INTEREST RATE DIFFERENTIAL

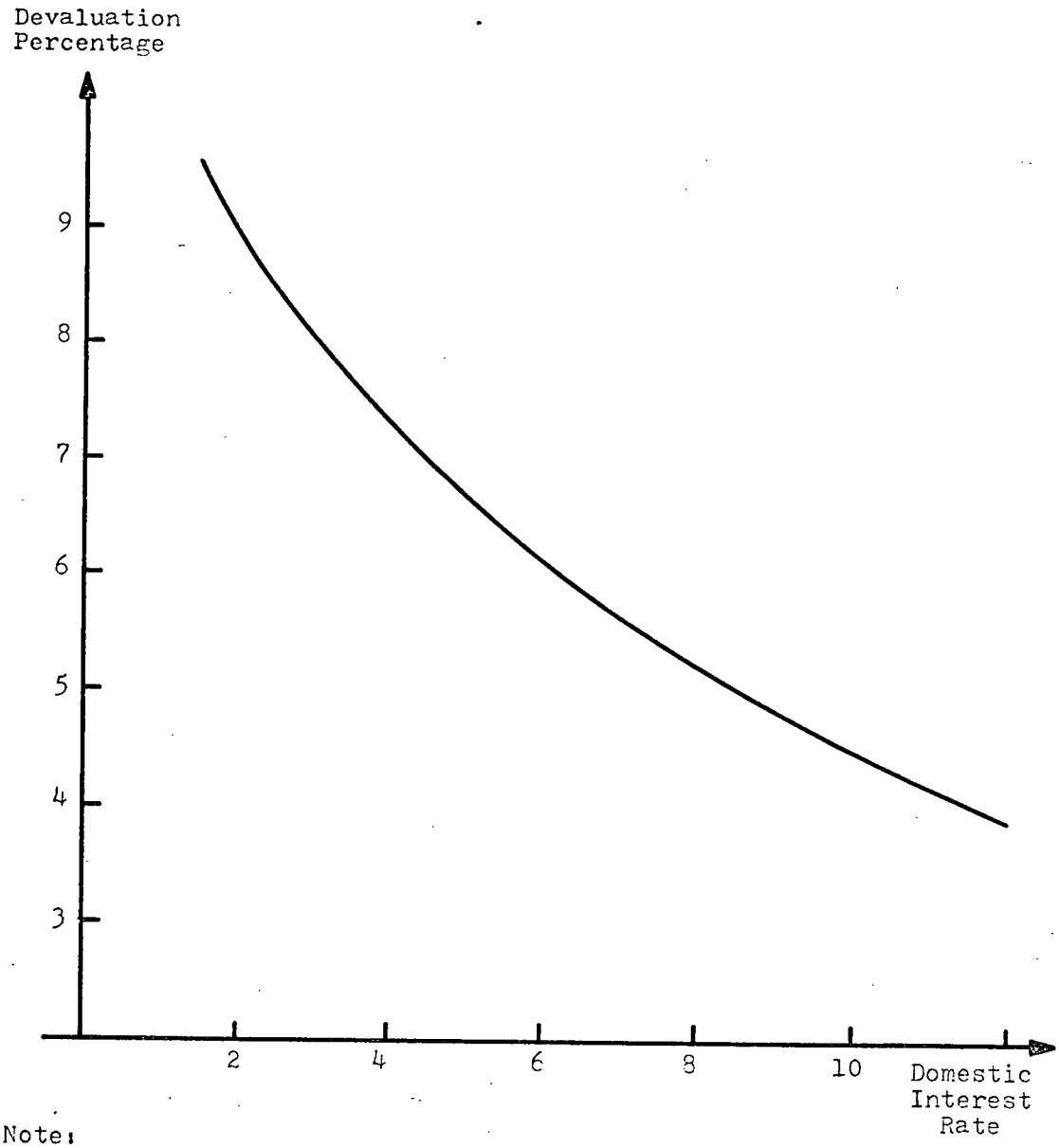


Note:

The domestic interest rate is assumed to be 4.5 per cent, the term to maturity to be twenty years, and the devaluation to occur immediately after the bonds have been issued.

FIGURE 3-2

DEVALUATION PERCENTAGE REQUIRED TO OFFSET A FIFTY BASIS POINTS INTEREST ADVANTAGE OF FOREIGN BORROWING AS A FUNCTION OF THE INTEREST RATE LEVEL



Note:

It is assumed that the term to maturity is twenty years and that the devaluation occurs immediately after the bonds have been issued.

assuming the interest rate differential to remain constant, it can be shown that for a positive interest rate differential a_M will decrease as R^d increases.[54] This means that if the interest rate differential remains constant, it will be less attractive to borrow abroad the higher the general interest rate level is because the less protection against a depreciation is provided. This result is the same which was derived earlier in Section 2.41 for one-period securities.[55] However, as Figure 3-2 demonstrates, the influence of the interest rate level on the protection provided by a given interest rate differential is quite dramatic for a long-term bond. For example, as the interest rate doubles from 4.5 per cent to 9.0 per cent the depreciation percentage required to eliminate a fifty basis points cost advantage of foreign borrowing decreases from 7.01 to 4.82 or by about 31 per cent.

Of particular interest is the influence the term to maturity has on the risk involved in foreign borrowing. Whereas the interest rate level and the differential are exogenous variables, a firm has considerable influence on the term of its bond issue. The partial differential of equation (3-3) with respect to maturity, N, is positive,[56] indicating that the unfavourable

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[54] As it is assumed that $dR^f/dR^d = 1$, $da_M/dR^d = -a_o(R^d - R^f)\left[\left[(1 + R^d)^{N+1} - (1 + R^d + NR^d)\right]/\left[R^{d2}(1 + R^d)^{N+1}\right]\right](A)^2$ where A denotes the right-hand side of equation (3-3) divided by a_o. For $R^d - R^f > 0$, $da_M/dR^d < 0$ because $(1 + R^d)^{N+1} > 1 + R^d + NR^d$.

[55] See p. 35 above.

[56] $\partial a_M/\partial N = \left[a_o(R^d - R^f)\ln(1 + R^d)\right]/\left[R^d(1 + R^d)^N(A)^{-2}\right] > 0$ if $(R^d - R^f) > 0$. Again A denotes the right-hand side of equation (3-3) divided by a_o.

exchange rate change has to be larger the longer the term to maturity. As the term to maturity approaches infinity, a_M approaches a constant value:

$$\lim_{N \to \infty} a_M = a_o(R^d/R^f).$$

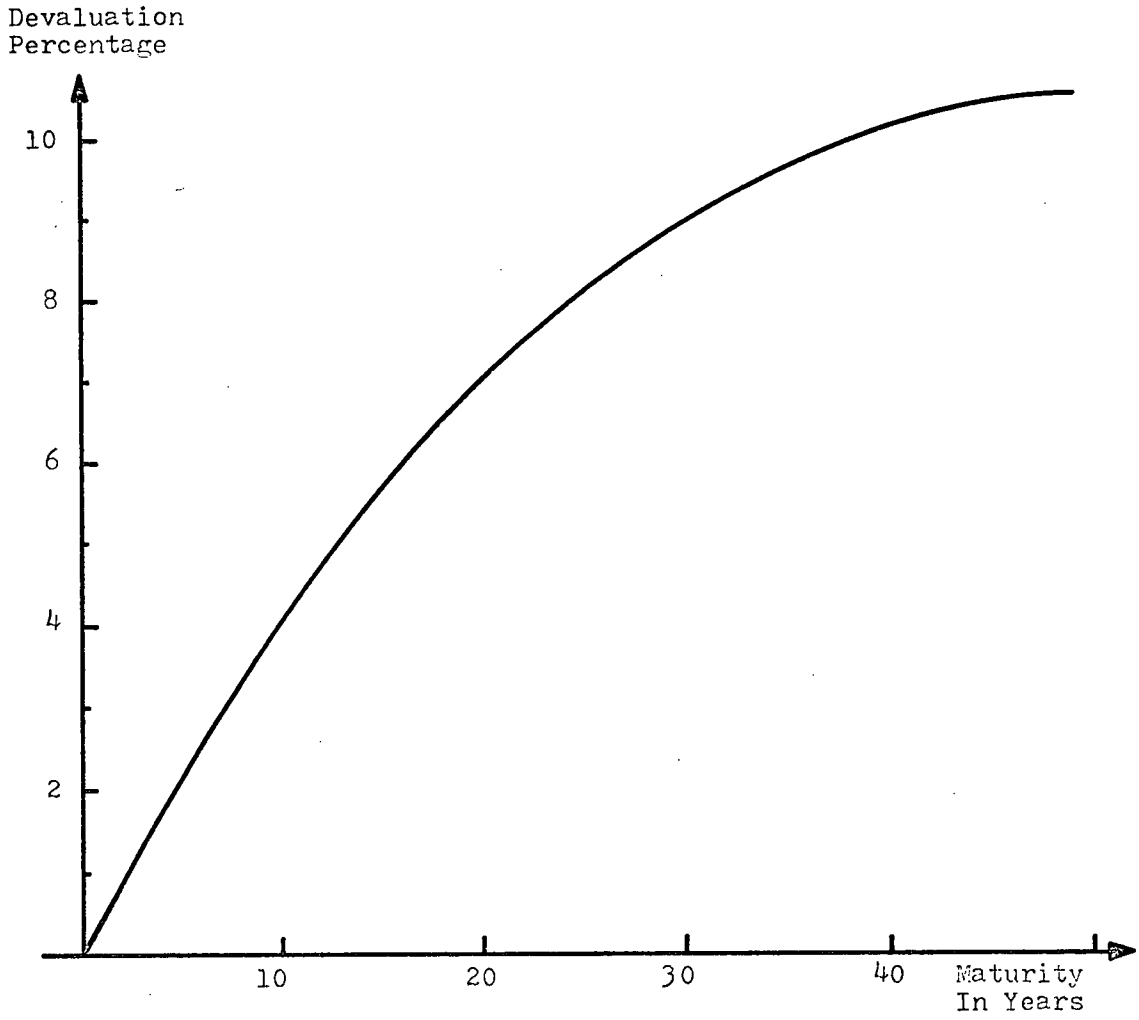
For example, if the foreign interest rate is .05 and the domestic interest rate .06, that is, twenty per cent higher, then an immediate depreciation of twenty per cent would eliminate the cost advantage on a perpetual foreign-pay bond. In figure 3-3 this relationship between maturity and protection against exchange risk is illustrated.

So far we have assumed the worst case possible, an adverse change in the exchange rate immediately after the foreign loan has been taken down. The same basis relationships demonstrated above hold if the domestic currency retains its international value for some time and depreciates only a few years after the bonds have been placed abroad. Of course, the later the exchange rate change occurs, the higher the devaluation has to be to make foreign borrowing more expensive than a domestic loan.

Most corporate bonds are sinking-fund bonds. Sinking fund requirements vary considerably, and whereas in most cases fifty per cent or more of a bond's principal is repayed through a sinking fund before final maturity, the balloon payment amounts to eighty per cent or more of the original loan in some instances. For sinking fund bonds it holds also that the exchange risk is lower the larger the interest rate differential, the lower the

FIGURE 3-3

DEVALUATION PERCENTAGE REQUIRED TO OFFSET A FIFTY BASIS POINTS INTEREST ADVANTAGE OF FOREIGN BORROWING AS A FUNCTION OF THE TERM TO MATURITY

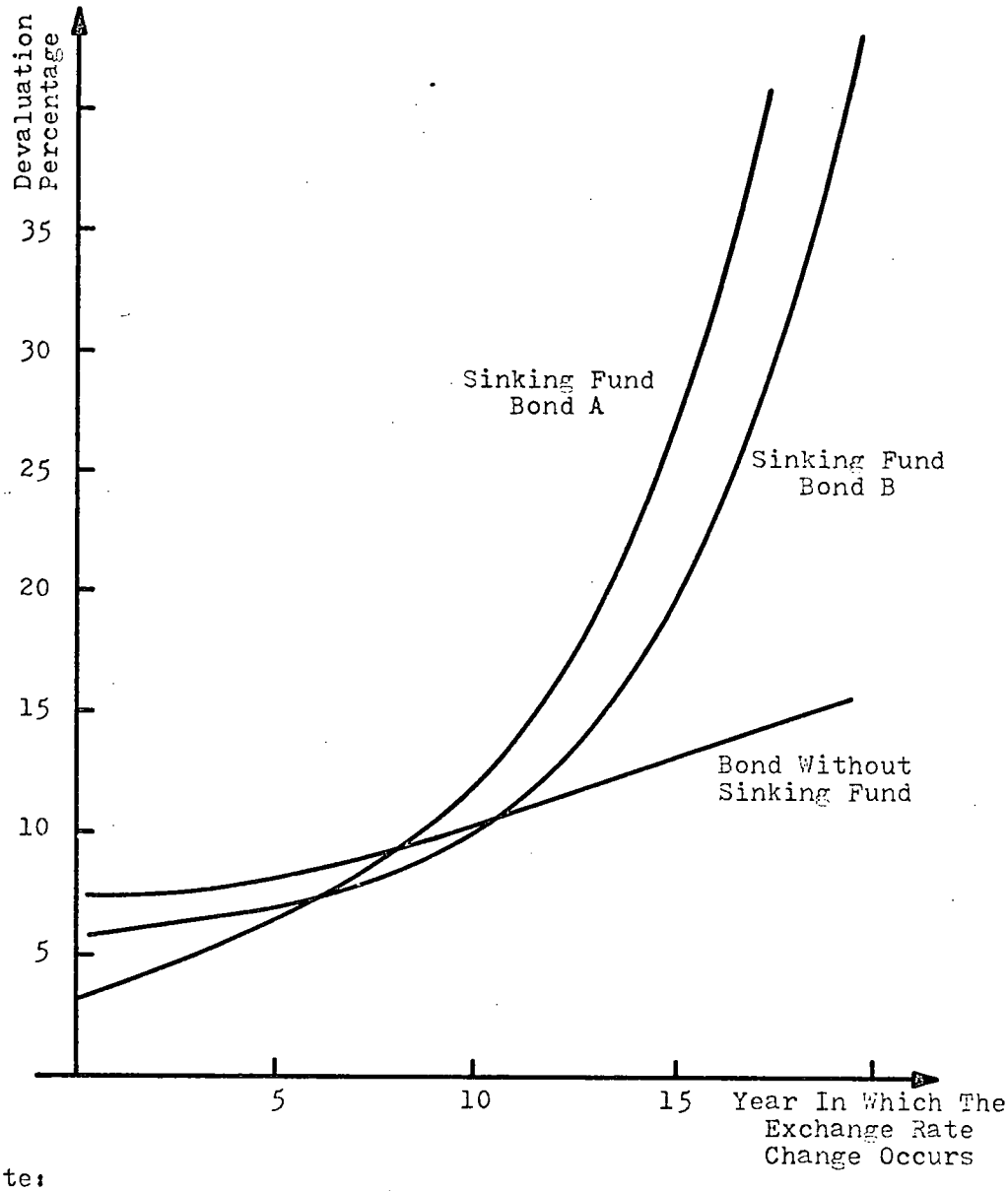


Note:

It is assumed that the domestic interest rate is 4.5 per cent and that the devaluation occurs immediately after the bonds have been issued.

FIGURE 3-4

DEVALUATION PERCENTAGE REQUIRED TO OFFSET A FIFTY BASIS POINTS INTEREST ADVANTAGE OF FOREIGN BORROWING AS A FUNCTION OF THE YEAR IN WHICH THE EXCHANGE RATE CHANGE OCCURS



Note:

It is assumed that sinking fund payments on Sinking Fund Bond A start six months after the date of issue and that an equal amount is paid semi-annually so as to retire the issue with the last sinking fund payment. For Sinking Fund Bond B payments start during the sixth year of its term, they are assumed to be equal in size and to retire 75% of the principal before final maturity.

The domestic interest rate is assumed to be 4.5 per cent and the bonds' term to maturity to be twenty years.

general level of interest rates, and the longer the term to maturity. However, the earlier sinking fund payments start and the larger they are relative to the total amount borrowed, the lower is the protection against unfavourable exchange rate changes during the early years of the term and the higher during later years. In Figure 3-4 we have graphed this relationship between exchange risk and year in which the exchange rate change occurs for three different types of twenty year bonds: a bond without sinking fund provisions, a bond where sinking fund payments start after five years and seventy-five per cent of the principal is retired before final maturity, and a bond where sinking fund payments start immediately and the final payment equals the semi-annual sinking fund payment.

To enable us to graph the Figures presented above, we developed a computer program for calculating the devaluation percentages required to offset the interest advantage of foreign borrowing. In Table 3-6 such data are presented for sinking fund and non-sinking fund bonds, maturities of ten, twenty and thirty years, and domestic interest rate levels of 9.0 and 4.5 per cent. The interest differential is taken to be fifty basis points.[57] Furthermore, different assumptions are made about the year in which an adverse exchange rate change occurs. For example, if a Canadian borrower has the option to issue a Canadian-pay bond with a 9.0 per cent coupon and 20 years to maturi-

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[57]On Canadian corporate bonds, a term of twenty years is fairly common. A domestic interest rate of nine per cent was chosen because in late 1973 the Canadian corporate bond rate approached this level. Casual observations on some Canadian-pay and U.S.-pay bonds issued by the same Canadian firm at the same point in time strongly suggests that the relevant interest rate differential is about fifty basis points.

TABLE 3-6

DEVALUATION PERCENTAGES REQUIRED TO OFFSET A FIFTY BASIS POINTS

INTEREST ADVANTAGE OF FOREIGN BORROWING

TYPE OF BOND	MATURITY IN YEARS	YEAR AT THE START OF WHICH DEVALUATION OCCURS							
		1	3	5	10	15	20	25	30
DOMESTIC INTEREST RATE 9.0 PER CENT									
NO S.F.	10	3.36	3.99	4.73	7.22				
WITH S.F.	10	1.98	2.94	4.67	43.05				
NO S.F.	20	4.82	5.74	6.83	10.52	16.15	24.62		
WITH S.F.	20	3.09	4.09	5.48	12.30	34.76	320.68		
NO S.F.	30	5.44	6.48	7.72	11.95	18.47	28.46	43.67	66.59
WITH S.F.	30	3.79	4.83	6.20	11.86	24.03	53.79	150.64	1265.23
DOMESTIC INTEREST RATE 4.5 PER CENT									
NO S.F.	10	4.16	4.51	4.90	5.99				
WITH S.F.	10	2.29	3.12	4.53	33.59				
NO S.F.	20	7.01	7.62	8.29	10.21	12.54	15.33		
WITH S.F.	20	3.99	4.83	5.92	10.67	24.19	179.31		
NO S.F.	30	8.92	9.72	10.59	13.19	16.18	19.93	24.64	29.90
WITH S.F.	30	5.33	6.22	7.31	11.22	18.22	32.72	73.54	496.18

Notes:

With respect to sinking fund (S.F.) bonds it is assumed that payments start after six months and that an equal amount is paid semi-annually so as to retire the bonds with the last sinking fund payment.

All interest and principal payments are discounted semi-annually at the domestic interest rate.

ty or to issue an 8.5 per cent bond denominated in U.S. dollars with an identical maturity, he should opt for the Canadian issue whenever he expects a devaluation of the Canadian dollar by 6.83 per cent or more five years hence or earlier.

For a corporation paying a fifty per cent tax on its income, the after-tax cost of debt capital is only 4.5 per cent if it can borrow at home at 9.0 per cent. Consequently the exchange risk should be evaluated by using the after-tax cost as a discount rate.[58] Looking again at Table 3-6, if the choice is between 30-year sinking fund bonds, a U.S.-pay issue is preferable whenever it is expected that the Canadian dollar will be devalued only ten years from now or later and by less than 11.22 per cent.

Obviously, tables like the one presented above cannot answer the question whether a Canadian corporation should borrow in the United States or not at any particular point in time. Factors other than exchange risk may be of paramount importance. Nevertheless, if exchange risk is mainly perceived as a potential loss due to an unfavourable change in the exchange rate, data like those in Table 3-6 help to focus on the exchange risk involved in foreign borrowing. For example, a firm contemplating to float a foreign-pay issue should form some expectations about future exchange rates and can then use such data to derive an estimate of the probability that foreign borrowing will be more

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[58]Though a fifty basis points interest advantage reduces to twenty-five points on an after-tax basis, the before-tax interest rate differential is still relevant for an evaluation of exchange risk. For example, on a foreign-pay perpetual bond a twenty percent devaluation implies only a ten percent increase in (interest) costs on an after-tax basis.

expensive than a domestic loan. This probability should become one of the major variables influencing the decision as to where to sell a new bond issue.

What are the implications of our discussion for Canadian corporate borrowing in the United States? Clearly, corporations can influence two factors that have a bearing on exchange risk: the term to maturity and the schedule of sinking fund payments. It seems that Canadian borrowers (and American lenders) are very much concerned about the risk of an adverse change in the exchange rate early during a bond's term.[59] If this is indeed true, then Canadian corporations should show a preference for U.S.-pay bonds which have long terms to maturity. As our earlier analysis has shown, exchange risk decreases as a bond's term to maturity increases. If firms need medium-term funds, a Canadian-pay issue should be sold. To test whether Canadian corporations actually behave in such a manner we hypothesize that

H_5: On average, the term to maturity of U.S.-pay bonds will be longer than the term to maturity of Canadian-pay bonds.

Whereas hypothesis H_1 above concerns only long-term bonds issued by those corporations that have sold debt instruments in both

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[59]See discussions in the literature cited above in footnotes 10 and 50.

the Canadian and United States market, hypothesis H_5 is aimed at a comparison of the term to maturity of all bonds issued by all Canadian corporations.

Of course, if corporations are relatively certain about future exchange rates and do not expect an adverse change during, say, the next ten years, then they should sell medium-term bonds in the United States rather than long-term issues. However, we doubt that corporate managers would have much confidence in long-range forecasts.

Usually corporate bonds have sinking fund provisions. But the time elapsed between sale of the bonds and the first sinking fund payment and the size of individual payments relative to the principal vary considerably among issues of identical maturity. Consequently variations in sinking fund provisions could also be used as a means to reduce the exchange risk involved in borrowing abroad. It is widely assumed that the Canadian-U.S. dollar exchange rate will fluctuate around a long-run value of one Canadian to one American dollar. If exchange rate expectations are diffuse and if borrowers find it difficult to forecast whether an adverse exchange rate change will be followed by a favourable one, whether the favourable change will materialize first, or whether no significant change will occur, then evenly distributed sinking fund payments coupled with a long maturity should lead to an optimal

protection against exchange risk. Not only should exchange losses and gains offset each other to some extent over the term of the issue, but perhaps more importantly, a firm would avoid the considerable strain on its liquidity that might be caused by an unexpected devaluation of the domestic currency shortly before a large balloon payment becomes due. To test for this, we hypothesize that

> H_6: Sinking fund payments on U.S.-pay bonds will be more evenly distributed over the term of the issue than those on Canadian-pay bonds.

Again, if corporate managers are relatively certain about their exchange rate expectations, than a different pattern of sinking fund payments may appear more favourable.

It should be noted that sinking fund payments reduce the average maturity of an issue. But, as the data in Table 3-6 showed, the protection against an early unfavourable exchange rate change increases for sinking fund bonds, too, as the term to maturity increases.

3.4 INFORMATION AND TRANSACTION COSTS IN AN INTERNATIONAL CAPITAL MARKET

Earlier in Chapter 2 we argued that transaction and information costs on international financial transactions are higher than on comparable domestic deals.[60] Now we shall turn to a more detailed discussion of these costs as they affect borrowers and lenders and of the possible implications such transaction costs differentials may have for international long-term debt capital flows.

3.41 TRANSACTION COSTS TO BORROWERS

The term transaction costs will be used as referring to all costs incurred by a firm when issuing and servicing its bonds except for interest costs.[61] Most of these costs are nonrecurring expenses incurred during the period when a new issue is planned, negotiated, and delivered. The net present value of the funds borrowed, X_{net}, can be defined as the difference between gross proceeds, X_{gross}, and the present value of all transaction costs, T, or

$$X_{net} = X_{gross} - PV(T)$$

where $PV(T) = \sum_{n=0}^{N} T_n/(1 + R)^n$. More commonly, "net proceeds",

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[60] See Section 2.5 above, pp.61 -69.

[61] If bonds are not issued at par, the amortization of bond discounts or premia is regarded as affecting interest costs. Exchange losses are not taken to be part of transaction costs. They should be included into a comparative evaluation of domestic and foreign financial opportunities through an exchange risk analysis.

X_{NP}, are computed as

$$X_{NP} = X_{gross} - T_o$$

where T_o includes only those expenses which have been incurred at time of issue, which can readily be identified as being related to a particular issue, and for which actual disbursements have been made to persons outside the issuing corporation. Usually T_o does not include any amount taking into account management time or other company resources spent on planning, negotiating, and selling an issue and on disseminating information about the firm to potential investors. Because of this and because future transaction costs are neglected, net proceeds do not truly reflect the present value of the funds obtained through a new issue but overstate it slightly. Because of transaction costs, the actual total cost of the funds to the borrower, when expressed in percentage terms, is always higher than the yield return to lenders. It can be calculated as the internal rate of return at which the present value of future interest and principal payments equals net proceeds.[62]

The largest single expense item is usually the compensation paid to investment bankers for underwriting an issue or for assisting in negotiating private placements.[63] Other trans-

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[62]Of course, the use of X_{net} would lead to a "correcter" result for this internal rate. Then a problem arises as to which rate to use for discounting future transaction costs. This question is not of material importance to our ensuing discussion and will not be pursued here.

[63]Extensive data on flotation expenses in the U.S. can be found in Securities and Exchange Commission, Cost of Flotation of Corporate Securities 1951-1955 (Washington, D.C.: U.S. Government Printing Office, June, 1957). For some Canadian data see Peters, Chapter 4. It seems that private issues in Canada

action costs include some or all of the following items: (1) Printing and engraving of the bonds; (2) printing of registration statements and prospectuses; (3) registration and stock exchange listing fees; (4) taxes; (5) accounting fees; (6) legal fees; (7) trustee's fees for handling interest payments and transfers, and for administering sinking funds or the redemption of the issue. Trustees' fees, printing and engraving costs, and legal fees account for the major part of these "other expenses" on public issues, whereas on private placements legal fees alone usually amount to fifty per cent or more of total other expenses.[64] In the United States, federal revenue stamps have also been a major cost item on large issues because they have been levied as a constant percentage of the amount borrowed. On the other hand, underwriting costs, trustee's fees, printing costs and some other expenses increase less than proportionally with issue size, and legal and auditors' fees are fixed rather than variable costs. Consequently total flotation costs generally decrease with issue size when expressed as a percentage of gross proceeds, and their impact on a firm's actual cost of debt capital diminishes accordingly.

Assuming for the moment that transaction costs are identical for domestic and foreign traders in their respective home markets, there are several reasons why one would expect trans-

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are usually placed through an agent whereas in the U.S. most private placements are sold directly without the aid of an intermediary; cf. Shapiro and Wolf, p. 90.

[64]Cf. Securities and Exchange Commission, pp. 55, 69. Comparable data for Canada are not available.

action costs to be higher when they operate in a market which is foreign to them. First of all, underwriting spreads may be higher because it will be more difficult to secure a market as lenders are less well informed about foreign economic, legal and political conditions and about particular foreign companies.[65] Also, legal fees, trustee's fees, and taxes may be higher because of regulations peculiar to international transactions which are of no relevance for domestic trading.[66] For example, U.S. lenders and Canadian borrowers have to be concerned with the United States "Guidelines for Banks and Nonbank Financial Institutions" with regard to their foreign lending activities as set out by the Board of Governers of the Federal Reserve System,[67] the U.S. Internal Revenue Code's stipulations with regard to the interest equalization tax, Canadian withholding tax regulations, the Canada-United States Tax Convention, Canadian estate tax regulations, and the Estate Tax Treaty between the United States and Canada. In addition, when converting funds from one currency into another, transaction costs arise. Having foreign debt outstanding can cause peculiar accounting

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[65] In Section 3.42 below we will discuss the problem of increased transaction costs to lenders.

[66] A discussion of legal and other aspects of foreign borrowing in the United States during the late 'fifties and early 'sixties can be found in Nathaniel Samuels, "The Investment Banking Background of Issuing and Marketing Foreign Securities in the United States", International Financing and Investment, ed. John F. McDaniels (Dobbs Ferry, N.Y.: Published for the World Community Association of the Yale Law School by Oceana Publ., 1964), pp. 411-29, and in "Legal Problems of Issuing and Marketing Foreign Securities in the United States", panel discussion, International Financing and Investment, pp. 430-60.

[67] Federal Reserve Bulletin, LI (March, 1965), pp. 371-376, and LVI (Jan., 1970), pp. 11-22. As of early 1974, these guidelines as well as the Interest Equalization Tax have been removed.

problems and makes it necessary to account specifically for exchange gains and losses.[68] The amount of time and money spent when negotiating a foreign issue is probably higher because of longer travel and communication distances. It may be more expensive to keep foreign investors informed about the firm's activities and performance than domestic investors. Clearly then it seems reasonable to expect transaction costs to be higher when traders of two different countries deal with each other.

No data on underwriters' discounts and other transaction costs with regard to foreign corporate bond issues placed in the U.S. market have been published. However, some information on the costs of floating foreign government bond issues in the New York market is available. Nevin reports that besides underwriters' discounts of 2.5 per cent to 3.5 per cent on issues varying in size from U.S. $6 million to $35 million the issuer had to reimburse the underwriter for his expenses incurred when "sounding out and securing a market" which usually amounted to $25,000 to $50,000. Other issuing expenses varied between $33,000 and $60,000, not counting expenses incurred on the borrowers's side which "can be very considerable in terms of time and labour of senior officials as well as of cash".[69] These data suggest that flotation costs on foreign bonds are

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[68] On such accounting problems see, for example, R. MacDonald Parkinson, Translation of Foreign Currencies, (Toronto: The Canadian Institute of Chartered Accountants, 1972).

[69] E. Nevin, "Some Reflections on the New York New Issue Market", Oxford Economic Papers, XIII (N.S.) (February, 1961), pp. 84-102. His data on other expenses seem not to include trustees' or legal fees, see p. 101.

perhaps twice as large as those incurred by domestic borrowers in the United States.[70]

If transaction costs are higher in a foreign capital market, then the actual interest savings on foreign borrowing will be higher the larger the bond issue at a given interest rate differential. To see this, let us assume that total transaction costs for a domestic bond issue of $2 million amount to $100,000 or 5.0 per cent of gross proceeds. For a similar foreign-pay issue, these costs are, say, sixty per cent higher or 8.0 per cent of gross proceeds. In order to eliminate this disadvantage of higher flotation costs abroad for a twenty-year bond and a domestic interest rate level of 8 per cent, the interest rate differential has to be approximately 31 basis points in favour of the foreign market. This figure can be derived from Table 3-7 where we computed the interest rate differential required to offset the disadvantage of higher flotation costs abroad on a twenty year bond as a function of the domestic interest rate level and the differential in flotation expenses expressed as a percentage of gross proceeds. Obviously, the required interest rate differential increases as the interest level increases. On the other hand, it will be lower the longer the (average) maturity of an issue.[71] To continue with our example, let us

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[70]No comparable data are available for bonds issued by American governments. However, flotation costs of a $6 million issue of Rhodesia & Nyasaland in June, 1958 amounted to 4.8 per cent and those of a $35 million issue by the European Coal and Steel Community in the same month to 2.8 per cent compared to about 2.0 per cent and 1.3 per cent respectively for an average domestic corporate bond issue of comparable size. See Nevin, p. 87 and Securities and Exchange Commission, p. 37.

[71]For an extensive analysis of transaction costs in relation to maturity in a closed economy see Burton G. Malkiel, The Term Structure of Interest Rates (Princeton, N.J.: Princeton University Press, 1966), Chapter 5.

TABLE 3-7

INTEREST RATE DIFFERENTIALS IN FAVOUR OF THE FOREIGN CAPITAL MARKET REQUIRED TO ELIMINATE THE DISADVANTAGE OF HIGHER FLOTATION COSTS ABROAD ON A TWENTY-YEAR BOND

Differential In Total Flotation Expenses As A Percentage of Proceeds	Domestic Interest Rate				
	2.0	4.0	6.0	8.0	10.0
5.00	.315	.378	.446	.542	.608
4.00	.250	.301	.355	.415	.482
3.00	.186	.225	.265	.309	.358
2.00	.123	.149	.176	.205	.238
1.00	.061	.074	.087	.102	.118
.50	.030	.037	.043	.050	.058
.25	.015	.018	.021	.025	.029

Source:
Derived from Bond Values Tables by interpolation.

assume that on a domestic bond issue of $20 million total transaction costs amount to $400,000 or 2.0 per cent of gross proceeds. If on a comparable foreign-pay bond issue expenses are fifty per cent higher or 3.0 per cent of gross proceeds, then already a 10 basis points interest differential will eliminate this disadvantage of higher flotation costs in the foreign market.

If our assertion that transaction costs in foreign markets are higher is correct, then loan size becomes a decisive factor as to whether a domestic or a foreign issue is cheaper, given the interest rate differential. It is therefore hypothesized that

H_7: The average size of U.S.-pay bond issues will be larger than that of Canadian-pay issues.

As loan size and size of company are closely related,[72] our above analysis implies that large Canadian corporations should find it more attractive to borrow in the United States than smaller ones. Also, we may expect that those corporations which have ready access to both markets sell only some of their larger issues abroad and all others, particularly smaller ones, at home. Because of exchange risk it is unreasonable to expect them to borrow solely in the United States.

Earlier we assumed that flotation costs on bonds sold in the home market are identical for both the domestic and the

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[72] Cf. Securities and Exchange Commission, p. 41.

foreign market. In the Canadian-United States case this does not hold for public offerings of corporate bonds. The data reported in Table 3-8[73] suggest that for smaller issues up to a size of about $5 million transaction costs are lower in Canada.[74] Particularly the differences in underwriting spreads seem to indicate that the Canadian market is more efficient with regard to small bond issues and the American market with regard to large issues.[75] The differences in other expenses

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[73]Note that in Table 3-8 underwriting spreads reported for United States corporate bonds are an average of three categories only, "Manufacturing", "Mining", and "Other" industries. Two other classifications, "Electricity, Gas and Water" and "Communication" have been excluded. In Canada, major public utilities are government owned. Therefore Canadian data are only to a minor extent influenced by bonds issued by public utilities whereas the usually reported U.S. "All Industries" underwriting spreads and other expenses are a weighted average of two-thirds public utility and one-third other industry bonds. U.S. underwriting spreads on public utility bonds usually amount to only one-half to one-third of the compensation paid on similar bonds issued by other industries. For comparisons with Canadian data, this introduces a considerable downward bias into the U.S. "All Industries" data.

[74]Similar observations have been made by The Investment Dealers' Association of Canada, Appendix E, Part I - Corporation Finance, pp. 14-15, and by Peters, p. 53. Comparable data on private placements are not available. Peters, p. 47, reports very rough estimates for Canada which, if correct, would suggest that for all issue sizes transaction costs on private placements are slightly higher in Canada.

[75]Our reinterpretation of the data on underwriting spreads in the United States as compared to Canadian data may shed some additional light on the ongoing discussion as to whether the Canadian capital market is less efficient than the United States market. Both Fullerton, pp. 311-313, and Peters, pp. 83-84 have argued that the Canadian market is less efficient than the U.S. market though taking notice of the obvious differences in volume and institutional investors' resources between the two markets which should lead to the expectation that the <u>absolute</u> efficiency with regard to large bond issues is higher in the United States. Recently Neufeld, p. 105, asserted that the <u>relative</u> (compared to market size) efficiency of the Canadian capital market is identical to that of the U.S. market: "There is no evidence here [in his data] that the market for long-term credit instruments is less developed in Canada than in the United States". We may add that there is some evidence indi-

TABLE 3-8

AVERAGE FLOTATION COSTS OF PUBLIC CORPORATE BOND ISSUES AS A PERCENTAGE OF GROSS PROCEEDS IN CANADA AND THE UNITED STATES AND COST DIFFERENTIALS BETWEEN THE TWO COUNTRIES

Size of Issues	Underwriting Spread			Other Expenses			Total Expenses		
(Mill. of $$)	Canada	US[a]	Diff.	Canada	US[a]	Diff.	Canada	US[a]	Diff.
.5 - .9	5.74	7.53	-1.79	1.96	3.96	-2.00	7.70	11.49	-3.79
1.0 - 1.9	5.30	6.31	-1.01	1.53	2.40	- .87	6.83	8.71	-1.88
2.0 - 4.9	3.84	4.46	- .62	.75	1.75	-1.00	4.59	6.21	-1.62
5.0 - 9.9	2.90	2.62	+ .28	.71	.92	- .21	3.61	3.54	+ .07
10.0 - 19.9	2.58	1.62	+ .96	.38	.60	- .22	2.96	2.22	+ .74
20.0 - 49.9	2.08	1.31	+ .77	.19	.40	- .21	2.27	1.71	+ .56
50.0 & over	1.50	.96	+ .54	.06	.26	- .20	1.56	1.22	+ .34

[a]Average of "Manufacturing", "Mining", and "Other" industries (i.e., public utilities have been excluded) weighted by number of issues in each size class.

Sources:
Peters, p. 46 and Securities and Exchange Commission, p. 38.

are probably in part due to differences in legal and other requirements. These differences in flotation costs between Canada and the United States will reinforce the postulated tendency that only relatively large Canadian issues will be floated in the United States.

One of the features of private placements that is particularly attractive to corporations is lower transaction costs.[76] Whether this leads to lower overall debt costs is not clear. Peters has argued that institutional investors in Canada try to reap the benefits of lower transaction costs by taking "up to one-quarter of 1% more on private placements than they will on public offerings of roughly parable quality."[77] For the United States, it has even been suggested that "the total cost is likely to be somewhat higher for a private placement than for a public offering."[78] On the other hand, Shapiro and Wolf present data which indicate that in the United States the yield on private placements is only marginally higher or even lower than on public issues of comparable quality except for bonds of highest quality.[79] As Canadian bonds never obtain the highest credit rating,[80] lower transaction costs should provide a strong incentive for Canadian corporations to place

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cating that the absolute efficiency of the Canadian market with regard to small public bond issues seems to be higher than that of the U.S. market.

[76]Shapiro and Wolf, p. 46.

[77]Peters, p. 62.

[78]James C. Van Horne, Financial Management and Policy (Englewood Cliffs, N.J.: Prentice-Hall, 1968), p. 237.

[79]Shapiro and Wolf, p. 28. See also p. 46 there.

[80]On this see Peters, p. 98 and Ripley, "United States Investment in Canadian Securities 1958-1965", p. 44.

their U.S.-pay bonds privately rather than to have them underwritten. Note that this argument reinforces our earlier assertion that U.S.-pay bonds will tend to be private placements.[81]

If the flow of information is imperfect and if it is costly to obtain new information, companies which have subsidiaries in the United States or which are (partly) owned by Americans may find it easier to approach the U.S. market for long-term capital. Through their dealings with their foreign affiliate or parent, these firms are more familiar with the foreign financial system. In addition, American shareholders or directors may be helpful in establishing good relationships to financial institutions in the United States and in gathering information on the foreign capital market. It is therefore asserted that

> H_8: Canadian corporations which have affiliates in the United States or which have American stockholders are more likely to approach the U.S. bond market than those firms that have no connections abroad.

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[81]See hypothesis H_2, p.94 above. But if indeed the majority of U.S.-pay bonds is placed directly, it may be difficult to discover whether this is mainly due to differences in liquidity preferences of institutional investors between the two countries or a function of transaction costs.

3.42 TRANSACTION COSTS AND LENDING BEHAVIOUR

So far, we have mainly dealt with the impact which higher information and transaction costs in international financing are expected to have on borrowing behaviour. But international and foreign tax laws, regulations concerning capital flows, lack of readily available information on foreign corporations and their home countries and similar imperfections in international capital markets will all lead to higher transaction costs for lenders as well. Consequently one would expect them to ask for a higher rate of interest on loans to foreigners than on otherwise comparable loans to domestic borrowers. At least part of lenders' transaction costs are fixed and independent of investment size so that their impact on the yield required by suppliers of funds should diminish as loan size increases.[82] Similarly, higher information and other costs involved in lending to foreigners will lose in relative importance as the amount of funds supplied increases. It is therefore to be expected that the difference between interest rates requested on loans to foreigners and rates demanded on loans to domestic borrowers declines as issue size increases. This influence of transaction costs on lending behaviour should reinforce our earlier conclusion that U.S.-pay issues will, on average, be larger than Canadian-pay issues. Because of the impact of transaction costs the actual interest

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[82] For an analytical treatment of the relationship between information and transaction costs and lending behaviour see D.J. Aigner and C.M. Sprenkle, "A Simple Model of Information and Lending Behaviour", Journal of Finance, XXI (March, 1968), pp. 151-66. Peters, p. 48, presents data which indeed show that the "yield return to lenders" decreases with issue size as one would expect if transaction costs of lenders are fixed or only semi-variable.

rate differential between domestic and foreign capital markets should be an increasing function of loan size.

In general, quite apart from the fact that size of issue and size of issuing corporation are correlated, large companies may find it easier and more attractive to approach a foreign bond market than smaller firms. The higher an investor's subjective probability estimate of the borrower's default on the loan, the higher will be the rate of return demanded by him. The risk of default as perceived by lenders is a function of the amount and quality of information available.[83] Information on leading Canadian corporations is more readily available to U.S. investors than data on smaller Canadian firms.[84] Also, large companies are more likely to be widely known abroad, particularly if their business activities extend to foreign countries.[85] However, because of the high interdependence between size of issue and size of corporation, it seems not very meaningful to introduce an independent hypothesis asserting that mainly large Canadian corporations will borrow in the United States.

Note that the above considerations also suggest that

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[83]Cf. Aigner and Sprenkle, pp. 153-156.

[84]For example, Standard & Poor's and Moody's manuals report on leading Canadian corporations and sometimes give even more exhaustive information than is available from the Financial Post's publications.

[85]With respect to the Eurobond market, Mendelson, p. 125, note 37, remarks that "the acceptability of a name is not necessarily a function of size. It is rather a function of the familiarity of the bankers or the investors with the firm."

H_9: A company which has already issued a U.S.-pay bond before or which has its stocks listed on a U.S. stock exchange will have easier access to the United States capital market.

Through an earlier bond issue, a firm has established a credit rating and investors already possess some information about it. Because of the lower risk and costs[86] involved, investment bankers will be more inclined to underwrite the issue of such a company.[87] A stock listing will similarly familiarize investors with a certain corporation and lead to the constant dissemination of information on this firm. With respect to bonds issued by American corporations, it has been observed that after a first private placement has been arranged successfully, "it is common for the borrower and lender to continue the relationship and for the lender to accommodate the borrower in preference to others when the money supply is tight."[88] The same may hold for Canadian corporate borrowers in the United States.

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[86]Costs like educating salesmen and clients.

[87]Nevin, p. 99, note 1, reports that "Australia enjoys unusually favourable terms in New York, mainly because it is a very familiar borrower in that market."

[88]Shapiro and Wolf, p. 3.

3.5 SUMMARY

In this chapter we turned to a more detailed discussion of the influence which (1) differences in time preferences between countries, (2) exchange risk, and (3) transaction costs are expected to have on international interest rate differentials and resulting capital flows, particularly with regard to Canadian corporate borrowing in the United States.

Some evidence was presented which indicates that interest rate differentials are partly but not solely a reflection of exchange rate expectations. By calculating the demand for funds in Canada and the United States as a percentage of gross national product in the respective country we showed that the relative demand for funds seems to be considerably higher in Canada. We suggested that this may be a major cause of the continuing inflow of long-term debt capital into Canada. To further inquire into a possible difference in time preferences between the two nations and the impact this may have on capital flows between them, the following hypotheses were advanced for empirical testing:

H_1: Consider only long-term bonds which may be defined as bonds having terms to maturity of more than twelve years. And compare only bonds that have been issued by Canadian corporations that have borrowed in both Canada and the United States. Then the term to maturity of U.S.-pay bonds will be, on average, longer than the term to maturity of Canadian-pay bonds.

H_2: The comparative preference of Canadian versus American financial institutions for bonds with a high degree of marketability has induced Canadian corporations to sell securities in the U.S. direct placement market.

H_3: The availability of forward commitments has been a major factor attracting Canadian corporations to borrow in the United States.

Next we analyzed the exchange risk involved in borrowing in the American capital market. The issuance of U.S.-pay bonds tends to reduce a corporation's exposure to exchange risk if it receives U.S. dollar income. If Canadian borrowers want to protect themselves against an early adverse change in the exchange rate, then they should issue only bonds with long terms to maturity. Furthermore, it is likely that sinking fund payments provide a better protection against exchange risk the more evenly they are distributed over the term of an issue. Therefore we asserted that

H_4: Canadian corporations with U.S. dollar revenue will exhibit a higher tendency to issue U.S.-pay bonds than those firms not engaged in export activities.

H_5: On average, the term to maturity of U.S.-pay bonds will be longer than the term to maturity of Canadian-pay bonds.

H_6: Sinking fund payments on U.S.-pay bonds will be more evenly distributed over the term of the issue than those on Canadian-pay bonds.

Finally, we briefly discussed those factors that led us to believe that information and transaction costs are higher on international transactions than on comparable domestic ones. From an analysis of the impact of higher transaction costs on borrower and lender behaviour we concluded that

H_7: The average size of U.S.-pay bond issues will be larger than that of Canadian-pay issues.

H_8: Canadian corporations which have affiliates in the United States or which have American stockholders are more likely to approach the U.S. bond market than those firms that have no connections abroad.

H_9: A company which has already issued a U.S.-pay bond before or which has its stocks listed on a U.S.stock exchange will have easier access to the United States capital market.

We also suggested that large Canadian corporations should find it easier and more attractive to sell bonds abroad than smaller firms. However, because of the expected high correlation between size of issue and size of corporation such a hypothesis could probably not be tested independently from H_7 above.

CHAPTER 4

DATA COLLECTION AND SAMPLE DESCRIPTION

In this chapter we briefly discuss the data collection process, and a description of our data samples will be given. Only information essential for a better understanding of the empirical results presented in Chapter 5 will be provided. For a more extensive discussion the reader should refer to Appendix 2 where also the data and interview questionnaires used for this study are reproduced.

4.1 DATA COLLECTION

In order to test the hypotheses advanced in Chapter 3, extensive information on characteristics of Canadian-pay and U.S.-pay bonds and on characteristics of the issuing Canadian corporations was needed. As such data are not readily available, it was necessary to collect most of the data for this study from original sources like public prospectuses, private placement memoranda and annual reports. In many instances the respective corporations supplied us with these documents or filled out a data questionnaire we sent them. Investment bankers were also very helpful.

For the period January 1960 through May 1973 information was gathered on Canadian-pay and U.S.-pay bonds issued by corporations <u>located</u> in Canada and the proceeds of which were intended for use in Canada. Up to May 1973 Canadian corporations, whether Canadian-controlled or foreign-controlled, had not yet

issued bonds denominated in any other currency though several firms had borrowed short-term funds denominated in Swiss Franks, Deutsche Marks and so on.

For 1968 and later years random samples of Canadian-pay corporate bonds were drawn from the annual editions of the Financial Post's Record of New Issues. Issues contained in these samples have been classified according to whether or not they have been sold by corporations that have issued U.S.-pay bonds at least once since 1960. The sample of bonds issued by corporations that have sold long-term securities in Canada only is called "Sample 1" and the acronym "CAonly" will be used to identify this sample. The other bonds contained in our random samples were grouped into "Sample 2"; they have been issued by firms that approached both the Canadian and U.S. capital markets, and the acronym "CAandUS" will be used.

In addition, we attempted to collect information on Canadian-pay bonds not contained in these random samples but issued since 1968 by corporations that borrowed at least once in the U.S. market since 1960. This "Sample 3", also identified by the acronym "CAandUS", together with "Sample2" provides us with almost complete information on all Canadian-pay bonds sold by those Canadian companies that placed their securities both in Canada and the United States.

For the period 1960 through 1967, data on Canadian-pay bonds were gathered only for those bonds that had been issued by corporations which approached the U.S. market at least once

TABLE 4-1

DEFINITION OF BOND SAMPLES

Item	Sample 1	2	3	4	5
Type of Issue	Can.-pay	Can.-pay	Can.-pay	Can.-pay	U.S.-pay
Time Period Covered	68 - 73	68 - 73	68 - 73	60 - 67	60 - 73
Randomly Selected[a]	yes	yes	no	no	no
Issuer Placed Bonds in the U.S.	no	yes	yes	yes	-
Acronym Used	"CAonly"	"CAandUS"	"CAandUS"	"CAandUS"	"USpay"

[a]For a detailed explanation of the random and non-random selection process see Appendix 2.

since 1960. This proved less difficult than collecting data on a random sample because most firms falling into this category turned out to be among the larger and better known Canadian companies. These bonds have been grouped into "Sample 4" which is also identified by the acronym "CAandUS".

The number of U.S. dollar bonds issued by Canadian corporations during a given time period is usually small relative to the total number of new corporate bonds sold during the same period. Considerable efforts were therefore made to collect complete data on all U.S.-pay bonds issued since January 1960. But in a few instances where corporations placed more than three bond issues in the United States during the period covered by this study a random number table was used to select at least three of them or fifty per cent of all U.S. dollar issues, whichever led to the higher number of issues selected. This seemed advisable to avoid "Sample 5"'s being dominated by and biased towards a few large corporations which are or used to be very active borrowers in the United States and which usually provided us with all the information requested. For "Sample 5" the acronym "USpay" is used.

In Table 4-1 summary information on the definition of samples 1 to 5 is presented for easier reference.

Some descriptive data for the four samples covering the period January 1968 through May 1973 can be found in Table 4-2. Of course, it was not possible to obtain complete information on all bond issues in all of our samples. But when

TABLE 4-2

DESCRIPTION OF SAMPLES COVERING PERIOD 1968 TO MID-1973: COMPARISON OF NUMBER OF ISSUES ON WHICH INFORMATION HAS BEEN OBTAINED WITH TOTAL NUMBER OF ISSUES IN EACH SAMPLE ACCORDING TO SELECTED ISSUE CHARACTERISTICS

Issue Characteristics	Sample 1 "CAonly"				Sample 2 "CAandUS"				Sample 3 "CAandUS"				Sample 5 "USpay"			
			Missing				Missing				Missing				Missing	
	Tot.	Obt.	Nos. (4)= (2)-(3)	%	Tot.	Obt.	Nos. (8)= (6)-(7)	%	Tot.	Obt.	Nos. (12)= (10)-(11)	%	Tot.	Obt.	Nos. (16)= (14)-(15)	%
(1)	(2)	(3)		(5)	(6)	(7)		(9)	(10)	(11)		(13)	(14)	(15)		(17)
Year of Issue																
1968	16	11	5	31%	6	6	0	-	7	7	0	-	9	7	2	22%
1969	19	19	0	-	12	12	0	-	0	0	0	-	11	10	1	9%
1970	24	23	1	4%	12	12	0	-	8	8	0	-	4	3	1	25%
1971	25	24	1	4%	7	7	0		12	12	0	-	4	3	1	25%
1972	26	24	2	8%	6	6	0	-	7	7	0	-	6	5	1	17%
1973	12	11	1	8%	5	5	0	-	2	2	0	-	3	3	0	-
Total	122	112	10	8%	48	48	0	-	36	36	0	-	37	31	6	16%
Size of Issue (Mill. of $$)																
less than 1.00	2	2	0	-	0	0	0	-	0	0	0	-	0	0	0	-
1.00 - 2.49	9	6	3	33%	0	0	0	-	0	0	0	-	1	1	0	-
2.50 - 4.49	22	17	5	23%	2	2	0	-	3	3	0	-	3	3	0	-
4.50 - 6.99	19	18	1	5%	3	3	0	-	1	1	0	-	2	2	0	-
7.00 - 11.49	31	31	0	-	9	9	0	-	4	4	0	-	5	4	1	20%
11.50 - 17.49	13	12	1	8%	8	8	0	-	4	4	0	-	7	4	3	43%
17.50 - 27.49	17	17	0	-	8	8	0	-	9	9	0	-	6	4	2	33%
27.50 - 42.49	7	7	0	-	5	5	0	-	3	3	0	-	3	3	0	-
42.50 - 62.49	2	2	0	-	9	9	0	-	9	9	0	-	3	3	0	-
62.50 & over	0	0	0	-	4	4	0	-	3	3	0	-	7	7	0	-

TABLE 4-2 - Continued

Issue Characteristics	Sample 1 "CAonly"				Sample 2 "CAandUS"				Sample 3 "CAandUS"				Sample 5 "USpay"			
	Tot.	Obt.	Missing Nos.	Missing %	Tot.	Obt.	Missing Nos.	Missing %	Tot.	Obt.	Missing Nos.	Missing %	Tot.	Obt.	Missing Nos.	Missing %
(1)	(2)	(3)	(4)=(2)-(3)	(5)	(6)	(7)	(8)=(6)-(7)	(9)	(10)	(11)	(12)=(10)-(11)	(13)	(14)	(15)	(16)=(14)-(15)	(17)
Placement of Issue																
Public Offerings	90	90	0	-	43	43	0	-	29	29	0	-	5	4	1	20%
Private Placement	32	22	10	31%	5	5	0	-	7	7	0	-	32	27	5	16%
Industry Classification																
Banking & Fin.	21	21	0	-	14	14	0	-	2	2	0	-	6	3	3	50%
Mining	0	0	0	-	0	0	0	-	0	0	0	-	0	0	0	-
Non-ferrous Metals	1	1	0	-	2	2	0	-	5	5	0	-	3	3	0	-
Oils	6	6	0	-	2	2	0	-	3	3	0	-	5	5	0	-
Property Dev.	10	9	1	10%	1	1	0	-	3	3	0	-	2	2	0	-
Public Util.	25	24	1	4%	17	17	0	-	10	10	0	-	11	11	0	-
Pulp & Paper	2	2	0	-	3	3	0	-	3	3	0	-	4	2	2	50%
Transportation	3	3	0	-	2	2	0	-	3	3	0	-	4	3	1	25%
Trust & Loan Companies	13	13	0	-	0	0	0	-	0	0	0	-	0	0	0	-
Pipe Lines	1	1	0	-	6	6	0	-	7	7	0	-	2	2	0	-
Others	40	32	8	20%	1	1	0	-	0	0	0	-	0	0	0	-

comparing the number of issues on which information has been obtained with the total number of issues in each sample according to year of issue, size of issue, placement of bonds and industry classification of issuing company it can be seen that the missing data are fairly evenly distributed and do not introduce any serious biases into our samples. Not surprisingly, information obtained on private placements is less complete than that on public offerings, and data on U.S.-pay bonds were more difficult to secure.

Similar information on the two samples covering the period 1960 through 1967 is reported in Table 4-3. In general, the missing information is again fairly evenly distributed.

Table 4-3 provides also summary statistics for the total number of U.S.-pay bonds which have been identified as having been issued from 1960 through 1967. Not all of these bonds were included in our "Sample 5" for this period because (1) in some instances no company address could be secured nor the placement agent identified, that is, it was impossible to even attempt to collect data for these issues; (2) some of these bonds were identified only after the data collection process had been terminated; (3) several bonds, mostly issued by financial institutions and public utilities, were excluded through the random selection process described earlier.

TABLE 4-3

DESCRIPTION OF SAMPLES COVERING PERIOD 1960 TO 1967: COMPARISON OF NUMBER OF ISSUES ON WHICH INFORMATION HAS BEEN OBTAINED WITH TOTAL NUMBER OF ISSUES IN EACH SAMPLE ACCORDING TO SELECTED ISSUE CHARACTERISTICS

Issue Characteristics	Sample 4 "CAandUS"				Sample 5 "USpay"				All U.S.-Pay Issues Identified
	Total	Obt.	Missing Nos.	Missing %	Total	Obt.	Missing Nos.	Missing %	
(1)	(2)	(3)	(4)=(2)-(3)	(5)	(6)	(7)	(8)=(6)-(7)	(9)	
Year of Issue									
1960	3	3	0	-	5	4	1	20%	6
1961	2	2	0	-	7	6	1	14%	10
1962	5	5	0	-	6	5	1	17%	7
1963	11	9	2	18%	8	5	3	37%	12
1964	6	6	0	-	11	6	5	46%	16
1965	4	2	2	50%	17	14	3	18%	24
1966	12	10	2	17%	17	10	7	41%	21
1967	9	8	1	11%	15	10	5	33%	20
Total	52	45	7	13%	86	60	26	30%	116
Size of Issue (mill. of $$)									
less than 1.00	3	3	0	-	2	1	1	50%	4
1.00 - 2.49	6	5	1	17%	7	4	3	43%	11
2.50 - 4.49	4	4	0	-	9	8	1	11%	14
4.50 - 6.99	6	5	1	17%	9	8	1	11%	9
7.00 - 11.49	11	11	0	-	20	11	9	45%	24
11.50 - 17.49	11	8	3	27%	8	5	3	37%	13
17.50 - 27.49	5	3	2	40%	11	7	4	36%	14
27.50 - 42.49	4	4	0	-	12	8	4	33%	14
42.50 - 62.49	2	2	0	-	3	3	0	-	7
62.50 & over	0	0	0	-	5	5	0	-	5

TABLE 4-3 - Continued

Issue Characteristics (1)	Sample 4 "CAandUS" Total (2)	Obt. (3)	Missing Nos. (4)=(2)-(3)	Missing % (5)	Sample 5 "USpay" Total (6)	Obt. (7)	Missing Nos. (8)=(6)-(7)	Missing % (9)	All U.S.-Pay Issues Identified
Placement of Issue									
Public Offering	23	21	2	9%	5	5	0	-	5
Private Placement	29	24	5	17%	81	55	26	32%	111
Industry Classification									
Banking and Finance	10	9	1	10%	11	8	3	27%	24
Mining	0	0	0	-	3	3	0	-	3
Non-ferrous Metals	0	0	0	-	2	2	0	-	2
Oils	10	8	2	20%	14	10	4	29%	15
Property Development	3	3	0	-	4	3	1	25%	8
Public Utilities	11	9	2	18%	9	9	0	-	14
Pulp and Paper	4	4	0	-	20	10	10	50%	21
Transportation	3	3	0	-	2	2	0	-	6
Trust and Loan Companies	1	1	0	-	1	1	0	-	1
Pipe Lines	3	3	0	-	7	7	0	-	8
Others	7	5	2	29%	13	5	8	61%	14

4.2 INTERVIEWS

In order to gain a better understanding of the financial behaviour of Canadian corporations and of the functioning of the Canadian corporate bond market, interviews were conducted with six Canadian investment bankers, four life insurance investment officers, and twenty-one corporate executives. All interviews took place during July and August 1973 when the author paid visits to Montreal, Toronto, Calgary and Vancouver. In addition, three written questionnaires were received, one from a Canadian corporation and two from American underwriters.

All the interviews sought with investment houses and life insurance companie . were successfully completed. Of the twenty-eight personal interviews sought with corporate financial officers, twenty-one did materialize, and one questionnaire from a public utility was received by mail. As can be seen from Table 4-4, the companies chosen covered firms in all those industries that are particularly active borrowers in the United States. The interview questionnaires used and a concise summary of the answers obtained from corporate managers can be found in Appendix 2.

TABLE 4-4

COMPARISON OF CORPORATE INTERVIEWS SOUGHT WITH INTERVIEWS GRANTED BY INDUSTRY CLASSIFICATION

Industry Classification	Number of Interviews	
	Sought	Granted
Banking and Finance	2	2
Mining	1	0
Non-ferrous Metals	3	2
Oil and Gas	5	4
Property Development	2	1
Public Utilities	5	4
Pulp and Paper	3	3
Transportation	2	0
Pipe Lines	4	4
Others	1	1
Total	28	21

CHAPTER 5

A COMPARATIVE ANALYSIS OF CANADIAN CORPORATE DEBT ISSUES IN THE UNITED STATES AND CANADIAN BOND MARKETS

5.1 INTRODUCTION

In this chapter statistical tests of the hypotheses developed in Chapter 3 will be presented. The information obtained through interviews will be summarized and used to interpret the statistical results. Our hypotheses concentrate on differences between particular characteristics of bonds denominated in U.S. dollars and of bonds denominated in Canadian dollars and on differences between firms that have issued bonds abroad and those that have not. Discriminant analysis will be used as the main statistical technique. This method allows us to construct a rule from sample observations which can be employed to assign a new observation to one of two or more mutually exclusive populations. Whenever a certain characteristic as asserted in our hypotheses indeed contributes significantly to the discriminatory power of the derived decision rule this will be judged as support for that particular hypothesis.

After a short exposition of the discriminant analysis technique the influence of interest rate differentials and of differences in the demand for funds between Canada and the United States on Canadian corporate borrowing abroad will be analyzed. This is followed by a discussion of exchange rate risk and transactions costs differences and their impact on

U.S. dollar debt issues. Based on these results, summary discriminant functions will be derived which lead to the best ex post and ex ante classification of Canadian corporate bond issues into those denominated in U.S. dollars and those denominated in Canadian dollars. Finally, the influence of non-economic factors on corporate borrowing behaviour will be discussed.

Usually empirical results will be presented for three time periods:

1. The period 1960 to 1967 for which we collected data only on those bonds that were issued by corporations which have approached the U.S. bond market at least once since 1960. That is, we compare the Canadian-pay bonds in "Sample 4" with the U.S.-pay bonds in "Sample 5" for this period. Consequently results for the period 1960 to 1967 should be regarded as representative only with respect to Canadian corporations that have borrowed in the United States and are not indicative for the financial behaviour of all Canadian firms during this time.
2. The period January 1968 to May 1970 during which the Canadian exchange rate was fixed.
3. The period June 1970 to May 1973 when no par value for the Canadian dollar was in effect. All discriminant analysis results for the period January 1968 to May 1973 are based on a comparison of the random sample of Canadian-pay bonds ("Sample 1" and "Sample 2" combined) with the sample of U.S.-pay bonds ("Sample 5") for this period.

As a bond's characteristics like coupon, issue price, maturity, and so on are determined before or at the date a prospectus is issued or the placement agreement is signed the "date of contract" rather than the issue or delivery date of the bonds has been chosen to classify bonds in our samples into these three time periods.

5.2 STATISTICAL METHODS

The objective of discriminant analysis is to derive from sample sets of observations on members of two or more mutually exclusive populations linear combinations of these measurements that allow to predict the group to which a new member belongs. Let us concentrate on the case of two populations, and let $\underline{x}' = (x_1, x_2, \ldots, x_k)$ be the vector of measurements on k characteristics of an individual drawing, $\underline{b}$ a (kx1) vector of discriminant coefficients, and z the discriminant score.[1] The general problem is to find a discriminant function

$$z = \underline{x}'\underline{b} \tag{5-1}$$

which differentiates between the two populations as much as possible by minimizing the overlap in discriminant scores between the two groups. This is achieved by maximizing the squared difference between the mean discriminant score for each group, $(\bar{z}_1 - \bar{z}_2)^2$, relative to the pooled variance within samples,

$$s_z = \sum_{i=1}^{2} \sum_{j=1}^{n_i} (z_{ij} - \bar{z}_i)^2/(n_1 + n_2 - 2),$$

where n_i is the number of observations on population i:

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[1]The case of several populations is discussed in Theodore W. Anderson, An Introduction to Multivariate Statistical Analysis (New York: Wiley, 1958), Chapter 6. Here we follow Gerhard Tintner, Econometrics (New York: Wiley, 1952), Chapter 6. See

$$\max_{\underline{b}} \quad F = (\bar{z}_1 - \bar{z}_2)^2 - \lambda s_z \tag{5-2}$$

Here λ is a Lagrange multiplier. Substituting from expression (5-1) into equation (5-2) we obtain

$$F = \underline{b}'(\underline{\bar{x}}_1 - \underline{\bar{x}}_2)(\underline{\bar{x}}_1 - \underline{\bar{x}}_2)'\underline{b} - (\underline{b}'\underline{S}\underline{b}). \tag{5-3}$$

$\underline{\bar{x}}_i$ is the vector of mean scores on the k variables for sample i, and

$$\underline{S} = (\underline{X}_1'\underline{X}_1 + \underline{X}_2'\underline{X}_2)/(n_1 + n_2 - 2)$$

where $\underline{X}_i$ is an $(n_i x k)$ matrix of deviations of individual measurement vectors from the mean scores for each group. $\underline{S}$ is an estimate of the common covariance matrix for the k variables. Setting the derivatives of F with respect to $\underline{b}$ equal to zero does not yield a unique solution for the vector of discriminant coefficients.[2] But when arbitrarily letting $\lambda = (\underline{\bar{x}}_1 - \underline{\bar{x}}_2)'\underline{b}$ the following solution is obtained:

$$\underline{b} = \underline{S}^{-1}(\underline{\bar{x}}_1 - \underline{\bar{x}}_2). \tag{5-4}$$

Multiplying $\underline{b}$ by any scalar different from zero does not change the discriminatory power of the discriminant function. This feature can be used for transforming the vector of discriminant coefficients in any convenient manner. When the discriminant score for an observation is greater than the value of the dis-

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also J. Johnston, Econometrics,(2nd ed.; New York: McGraw-Hill, 1972), pp. 334-340.

[2]George W. Ladd, in "Linear Probability Functions and Discriminant Functions", Econometrica, Vol. 34, No. 4 (October 1966), pp. 873-85, discusses alternative estimation methods which lead to discriminant coefficients that differ only by a factor of proportionality. The discriminant functions to be presented later were estimated using equation (5-4).

criminant function evaluated at the average of the two mean vectors,

$$\underline{x}'\underline{b} > \tfrac{1}{2}(\underline{\bar{x}}_1 + \underline{\bar{x}}_2)'\underline{b},$$

then this observation will be assumed to have come from population 1 and vice versa. An arbitrary choice has to be made whenever an individual score is equal to $\frac{1}{2}(\underline{\bar{x}}_1 + \underline{\bar{x}}_2)'\underline{b}$.

When later reporting estimates of discriminant functions, the value $\frac{1}{2}(\underline{\bar{x}} + \underline{\bar{x}})'\underline{b}$ will be included as a constant. This causes the mean discriminant scores for the two groups of bonds to be equidistant from zero except for rounding errors. The functions are always presented such that scores above zero indicate a bond issue denominated in U.S. dollars and that negative values would cause an issue to be classified as Canadian-pay.

The statistical significance of an estimated discriminant function can be determined by using a standard F-test where F is a function of Hotelling's T^2. Like most tests in multivariate analysis this test presupposes that the underlying distributions are normal and that the covariance matrices are equal. But a violation of these assumptions usually leads to only a mild disagreement between nominal and actual significance levels.[3] The

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[3]As Cooley and Lohnes point out, "many research workers prefer to ignore the issue of the homogeneity of group dispersions on the grounds that the test [for the equality of group means] is probably fairly robust under departures from its assumptions". See William W. Cooley and Paul R. Lohnes, Multivariate Data Analysis (New York: Wiley, 1971), p. 228. For experimental support of this assertion see Basil P. Korin, "Some Comments on the Homoscedasticity Criterion M and the Multivariate Analysis of Variance Tests T^2, W and R", Biometrika, LIX (April, 1972), pp. 215-16, and the literature cited there. On the question of normality, cf. H. J. Arnold, "Permutation Support for Multivariate Techniques", Biometrika, LI (1964), pp. 65-70.

significance of an individual variable entered in the discriminant function can be assessed by testing for the equality of the means of the two conditional distributions of this variable given the other variables included. Note that in several instances logarithmic transformations of variables which approximated a lognormal rather than a normal distribution were used.[4]

Ex post and ex ante classification results will be presented as an additional means to assess the usefulness of our estimates for actually discriminating between Canadian-pay and U.S.-pay issues. Ex post classification results indicate how well the derived function actually separates the two types of bonds contained in the sample that was used for estimating it. Ex ante classification results show us how well the estimated discriminant function predicts the group membership of new sets of observations.

Note that discriminant analysis allows us only to test for systematic differences between the characteristics of Canadian-pay and U.S.-pay bonds, and for differences between those Canadian corporations that sell new issues in the United States and those that do not. It does not indicate whether such differences are caused by borrower behaviour or are a function of lender preferences. In other words, we cannot test directly for causal relationships. However, our interview results will help us to overcome this obstacle.

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[4]Because the logarithm of zero is undefined, we added 1 to our observations in those cases where the lower limit of a variable equalled zero.

5.3 INTEREST RATE DIFFERENTIALS, DIFFERENCES IN TIME PREFERENCES AND CANADIAN CORPORATE BORROWING IN THE UNITED STATES

As discussed earlier in Chapter 3 there is considerable evidence in support of the assertion that the relative demand for loanable funds is higher in Canada than in the United States. It is to be expected that this leads not only to differences in effective interest rates between the two countries but also to differences in lender behaviour, particularly with regard to time preferences exhibited. First interest rate differentials and their impact on corporate borrowing in the United States will be discussed. Then discriminant analysis results will be presented as an indication for the strong influence differences in time preferences between Canadian and U.S. institutional investors have on long-term capital flows into Canada.

Interest Rate Differentials. - There cannot be any doubt that the difference in long-term interest rates usually observed between Canada and the United States constitutes an incentive for Canadian corporations to borrow south. All but two of the company officials interviewed indicated that lower interest rates were one of the factors that attracted them to the U.S. market, and this impression was reinforced by answers obtained from underwriters. But the actual interest advantage is considerably less than a comparison of yield indices between the two countries would suggest.[5] A casual comparison of yield

[5]See the data in Table 3-3 above. Because of higher information and transaction costs and additional risks (like potential changes in tax regulations or exchange controls) involved in lending to foreigners, American investors seem to demand a higher yield on foreign U.S.-pay bonds than on otherwise comparable domestic bonds.

differentials between Canadian-pay and U.S.-pay bonds, particularly on bonds issued by the same firm on the same date or on dates that were close together, would suggest that the cost advantage at time of issue is usually between twenty-five and seventy-five basis points.

In order to obtain a more precise notion of the interest rate differential, we computed the difference between the yield on all bonds in our samples and the (risk-free) yield on long-term Canadian government bonds at date of contract.[6] The results are presented in Table 5-1. Comparing these "risk premiums" on bonds placed privately in Canada and the United States by corporations that have approached both markets (see columns 6 and 7 in Table 5-1) suggests that the average actual interest advantage to Canadian corporations has decreased considerably from about seventy basis points in earlier years to about twenty-five points during the most recent period. However, our data on bonds privately placed in Canada since 1969 are biased insofar as these issues were usually either sold by public utilities and finance companies or had relatively short terms to maturity. Because of this and because many U.S.-pay bonds would, as an alternative, have to be sold to the public in Canada, a comparison of columns

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[6]Because of the wide swings in interest rates in recent years a direct comparison of yields on Canadian-pay and U.S.-pay bonds is meaningless. Subtracting the government rate is an attempt to adjust for these changes in interest levels over time. Commonly this yield differential is called a "risk premium" on corporate bonds. Cf. Cecil R. Dichand, "The Determinants of Risk Premiums and Development of Rating Classes for Publicly Traded Canadian Corporate Bonds", Proceedings of the First Annual Conference of the Canadian Association of Administrative Sciences (Kingston, Ont., 1973), pp. 2/133-2/165.

TABLE 5-1

MEAN DIFFERENCE BETWEEN YIELDS ON NEWLY ISSUED CANADIAN CORPORATE BONDS AND YIELDS ON LONG-TERM CANADIAN GOVERNMENT BONDS AT DATE OF CONTRACT[a]

Period	Public Offerings			Private Placements		
	Can.-pay Bonds		U.S.-pay Bonds	Can.-pay Bonds		U.S.-pay Bonds
	Sample 1 "CAonly"	Samples 2,3,4 "CAandUS"	Sample 5	Sample 1 "CAonly"	Samples 2,3,4 "CAandUS"	Sample 5
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1960 - 1967	-	1.012 (.326,21)[b]	.715 (.392, 5)	-	1.134 (.672,24)	.422 (.488,55)
1968	.971 (.465, 6)	1.239 (.263,10)	- .060 (.000, 1)	1.115 (.307, 5)	1.358 (.169, 3)	1.044 (.497, 6)
1/1969 - 5/1970	1.254 (.293,24)	1.286 (.555,19)	.655 (.134, 2)	1.040 (.782, 5)	.867 (.302, 3)	.955 (.506,12)
6/1970 - 5/1973	1.483 (.617,60)	1.420 (.474,43)	1.550 (.000, 1)	1.625 (.848,12)	1.275 (1.131,6)	1.046 (.752, 9)

[a]The yield on long-term Canadian government bonds has been obtained from Bank of Canada Statistical Summary and Bank of Canada Review, various issues.

[b]Values in brackets are standard deviations and numbers of observations respectively.

3 and 7 in Table 5-1 seems to be more meaningful. This would indicate that, on average, the interest advantage of foreign borrowing has decreased only from .60 per cent to about .35 per cent with a slight tendency to increase again in recent years. The improvement of the Canadian bond market and easier monetary policies in Canada in recent years probably have all contributed to narrowing the actual yield differential.

Because of the small number of public offerings of U.S.-pay bonds by Canadian corporations a comparison of relative yields on private and public U.S. dollar denominated bonds (columns 4 and 7) has to be made with great caution. However, when excluding two small public issues in the early sixties, the general impression is that the interest cost on public offerings is lower,[7] a pattern also observable in Canada.[8]

From these data it must not be concluded that lower interest costs are the only or the main factor inducing Canadian corpora-

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[7]This is not surprising because usually only large, international corporations sell U.S.-pay bonds to the public.

[8]Clearly, the interest rate differentials that can be derived from the data in Table 5-1 do not necessarily reflect the actual interest savings on U.S.-pay bonds. Shorter maturities on some Canadian dollar issues and lower interest costs on these medium-term bonds introduce a slight bias into the comparisons for recent years. Perhaps more importantly, many U.S. dollar issues could have been placed in Canada only at a premium because of their size or because of some other characteristics. As was repeatedly pointed out by many corporate managers, investment dealers and representatives of life insurance companies, funds as such have usually been available in Canada in sufficient amounts to meet corporate demand and, contrary to often found beliefs, a scarcity of funds in the domestic capital market cannot be regarded as a major reason for corporate borrowing abroad. A possible exception was 1969 when an unforeseen heavy demand for comparatively cheap policy loans and forward commitments in the mortgage market considerably reduced the life insurance firms' uncommited funds available for investment in corporate bonds.

tions to sell their bonds abroad. Rather the impression gained from our interviews is that the interest rate differential serves as a constraint only if the savings in cost of debt capital are judged large enough to make up for the perceived additional risks of foreign borrowing will Canadian corporations consider denominating bonds in a foreign currency. However, most of them will not place bonds in the United States just for interest savings; as our results will show, additional factors are usually necessary to lead to the decision to issue U.S.-pay bonds. On the other hand, when there is no material interest advantage as during much of the period 1970 through 1972, Canadian corporations tend to not borrow abroad. Though several issues were delivered during this period to United States investors, our sample contains only two issues for which contracts were signed during June 1970 through May 1972. Financial officers of corporations that sold bonds in Canada during this period indicated that they did not further consider issuing U.S. dollar denominated bonds once it was discovered that the yield on such bonds would have to be higher or would not be lower than on comparable Canadian-pay bonds.

This risk premium, the difference between a bond's yield and the yield on Canadian government bonds, will be later included in our discriminant analyses. It will be interpreted as a measure of the influence exchange risk has on Canadian corporate borrowing in the United States. Of course, it also measures the influence of lower interest costs abroad, but these factors are closely interrelated as our discussion has indicated.

Differences in Time Preferences. - Our interviews[9] revealed that the relatively higher demand for funds in Canada indeed exerts a considerable influence on the lending behaviour of Canadian financial institutions and thereby on the type of bond issue that can be sold in Canada. All four life insurance companies visited indicated that they have a preference for relatively liquid investments. This reduces their perceived risk, allows immediate portfolio adjustments and makes it feasible to attempt to improve profits through bond trading. As a matter of fact, two officers indicated that their firms sometimes turn over their bond portfolios more than once per annum. Always facing an attractive array of investment opportunities they prefer to buy publicly offered bonds, avoid forward commitments and, depending on their market outlook, regard investments in extendible or prepayable bonds[10] as particularly attractive because of the usually short initial term to maturity of these bonds.[11] On the other hand, underwriters and corporation officers

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[9]We promised to all those who contributed information to this study not to reveal their identity. This led to sometimes very frank and open discussions. When refering to particular interviews, it is therefore not possible to state place, time, or name of the interviewee.

[10]Extendible or prepayable bonds are securities where after an initial period of usually five or six years the individual lender can decide whether he wants to extend the term of the bonds owned by him or not. Extensions range usually from five to fifteen years, sometimes with multiple options. When measuring the term to maturity of these bonds, always the initial term was chosen. Bonds having such features seem not to be available in the American market, but a few Canadian U.S.-pay bonds have been extendible. Unfortunately, the term prepayable is sometimes also used for borrower-callable bonds and can lead to confusion.

[11]One insurance officer indicated that his firm does not regard extendible bonds as particularly attractive securities.

characterized U.S. institutional investors as constantly in search for good quality investments and consequently less concerned about the liquidity of a particular bond issue.

This preoccupation of Canadian investors with the liquidity of their investments has made it very difficult for most Canadian corporations to place their bonds privately in Canada, particularly larger issues with long maturities. Peters observed that during the early sixties private placements amounted to up to 70 per cent of the dollar amount of all gross new corporate issues in Canada and that this percentage declined steadily since 1966 to about 24 per cent in 1968.[12] Our data indicate that this tendency has continued, see Table 5-1.[13] On the other hand, most corporations visited indicated a preference for private placements because they are regarded as overall cheaper, easier and faster to arrange, and as providing considerably more flexibility in case trust deed or other changes become necessary in later years. To avoid public exposure, some privately owned firms will consider private placements only. Public issues are looked upon as a means to improve public relations, to provide stockholders with additional investment opportunities in their company, and to make future financing easier. When faced with a choice between a public issue in Canada and a private placement in the United States many Canadian corporations have selected the latter option.

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[12]Peters, p. 38.

[13]In the United States the relative volume of the private placement market increased again in the 'seventies; see John D. Rea and Peggy Brockschmidt, "The Relationship Between Publicly Offered and Privately Placed Corporate Bonds", Federal Reserve Bank of Kansas City Monthly Review, November, 1973, pp. 11-20.

We did not find any evidence indicating that Canadian borrowers have encountered significant problems in placing bonds directly in the United States. This holds even for the late 'sixties when a large demand for policy loans reduced the amount of free investment funds available to American life insurance companies. Many Canadian corporations entertain a continuing relationship with their American lenders and seem to belong to that group of borrowers which receives preferential treatment during a credit squeeze.[14] Also, several loan agreements signed during that time period contain delayed delivery provisions.

The statistical results presented in Tables 5-2a, 5-2b and 5-2c tend to support our earlier hypothesis that the availability of a private placement market in the United States has been a major factor inducing Canadian corporations to borrow abroad.[15] In all discriminant function estimates the private placement binary variable is very significant. Of course, this dummy variable also measures the influence which lower transaction costs have on corporations' preferences for direct placements, a point to be discussed later.

One other factor, which is closely related to the dearth of a private placement market in Canada, strongly attracts certain Canadian corporations to the U.S. market: the factual non-availability of long-term forward commitments from Canadian financial institutions. Some corporations are able to plan their needs for long-term funds well into the future and will under-

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[14]See Section 3.42 above.

[15]See hypothesis H_2, p. 94 above.

TABLE 5-2a

DISCRIMINANT ANALYSIS RESULTS, 1960 - 1967:
TIME PREFERENCE MEASURES

Item	Discriminant Function		Means and St. D.s.	
	Coefficients	F-Values F-Probab.	Can.-pay Bonds	U.S.-pay Bonds
Term to Maturity in Years	.074	1.79 (.1799)	19.29 (4.09)	20.12 (3.94)
Private Placement Dummy	2.567	25.26 (.0000)	.533 (.149)	.917 (.427)
Constant	-3.322	-	-	-
Function	-	13.32 (.0000)	-	-
Number of Observations	-	105	45	60
Ex Post Classification: Percentage of Issues Correctly Classified	72%	-	49%	90%

TABLE 5-2b

DISCRIMINANT ANALYSIS RESULTS, JANUARY 1968 - MAY 1970:
TIME PREFERENCE MEASURES

Item	Discriminant Function A		Discriminant Function B		Means and St. D.s.	
	Coefficients	F-Values F-Probab.	Coefficients	F-Values F-Probab.	Can.-pay Bonds	U.S.-pay Bonds
Term to Maturity in Years	.0098	2.69 (.1010)	.151	7.11 (.0090)	11.56 (7.34)	21.36 (6.30)
Several Closings Dummy	10.990	54.82 (.0000)	6.987	31.32 (.0000)	.031 (.174)	.619 (.498)
Private Placement Dummy	4.3178	14.65 (.0003)	4.840	26.31 (.0000)	.185 (.391)	.857 (.359)
Log (Years Elapsed between Contract and Delivery+1.0)	207.000	23.34 (.0000)	-	-	.0042 (.0059)	.0160 (.0205)
Constant	-9.700	-	-7.277	-	-	-
Function	-	49.43 (.0000)	-	45.68 (.0000)	-	-
Number of Observations	-	86	-	86	65	21
Ex Post Classification: Percentage of Issues Correctly Classified	92%	-	89%	-	A 95% B 89%	A 81% B 90%

TABLE 5-2c

DISCRIMINANT ANALYSIS RESULTS, JUNE 1970 - MAY 1973:
TIME PREFERENCE MEASURES

Item	Discriminant Function A		Discriminant Function B		Means and St. D.s.	
	Coefficients	F-Values F-Probab.	Coefficients	F-Values F-Probab.	Can.-pay Bonds	U.S.-pay Bonds
Term to Maturity in Years	.121	2.71 (.0985)	.130	3.29 (.0692)	15.36 (6.42)	21.97 (3.38)
Several Closings Dummy	11.430	22.44 (.0000)	11.042	21.60 (.0000)	.011 (.103)	.300 (.483)
Private Placement Dummy	6.590	34.49 (.0000)	6.590	35.69 (.0000)	.149 (.358)	.900 (.316)
Log (Years Elapsed between Contract and Delivery+1.0)	210.000	1.79 (.1810)	-	-	.0038 (.0021)	.0053 (.0073)
Constant	-6.400	-	-7.600	-	-	-
Function	-	20.55 (.0000)	-	26.59 (.0000)	-	-
Number of Observations	-	104	-	104	94	10
Ex Post Classification: Percentage of Issues Correctly Classified	85%	-	87%	-	A 86% B 85%	A 80% B 100%

take certain investment projects only if financing can be arranged well in advance. Almost without exception these firms are forced to borrow in the United States because Canadian life insurance companies are reluctant to commit their funds even a few months into the future at a predetermined interest rate.[16] Two of the four interviewed insurance officers said that their firms do not enter into forward contracts, and the two others indicated that they might agree to such a deal, but usually only in a mortgage-type situation. The potential loss in yield in case interest rates rise is seen as a major risk involved in forward commitments, particularly as supposedly some Canadian corporations defaulted on forward agreements in the sixties during times when interest rates declined. It was also pointed out that institutional investors have no need for forward contracts because sufficient attractive investment opportunities are available on a spot basis.

American investors in search for attractive investments for their huge cash flows are, on the other hand, prepared to enter into negotiations with Canadian corporations two to three years before the scheduled (first) closing, and it is not uncommon to sign the final contract twelve to twenty months before the bonds will be delivered. The time elapsed between signing of the final agreement and the date of (first) delivery of the bonds or between date of issue of the final prospectus and the

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[16]This statement applies only to investments in corporate bonds and seems not to hold for other types of investments, particularly mortgage funds.

first offer date has been measured for each issue. For the period 1960 to 1967, no significant difference between Canadian-pay and U.S.-pay bonds could be detected, and the data indicate little demand for long-term forward commitments by Canadian corporations. However, rapidly rising interest rates in the late 'sixties changed this as evidenced by discriminant functions A reported in Tables 5-2b and 5-2c. It is interesting to note that contracts for three U.S. dollar issues delivered in late 1970 and 1971 were signed in 1969 already and therefore included in estimates of discriminant functions for the period 1968 to May 1970.

Major investment projects usually involve expenditures stretched over months and years. Especially if large amounts are involved, some companies prefer to obtain loan contracts providing for several closings rather than to rely on short-term interim financing. Again such agreements usually cannot be arranged for in Canada and firms are forced to resort to the U.S. market. Our sample includes several issues where bonds were delivered in up to four closings stretching over one to four years. Indeed, one large issue (even for the American bond market) has been drawn down in sixteen closings over five years.[17] Public offerings of Canadian corporate bonds in the United States sometimes also include delayed delivery provisions. Unfortunately exact information on the number and dates of closings and the amount involved each time was not available

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[17]In a singular effort Canadian institutional investors provided funds for an additional Canadian-pay issue amounting to one-tenth of the U.S.-pay issue at almost identical conditions.

in many instances even though firms made attempts to reconstruct this information from their files. Therefore only a dummy variable for more than one closing could be included in the statistical analysis. As can be seen in Tables 5-2b and 5-2c, it was very important in discriminating between the two types of bonds for the period from 1968 through May 1973. This variable did not improve the discriminatory power of the function reported in Table 5-2a for the period 1960 to 1967. However, our data suggest that the possibility of arranging for several closings did attract several Canadian issues to the U.S. during that time period, and this binary variable is significant in discriminant function A reported below in Table 5-8a.

The significance both of the variable measuring the time elapsed between signing of a loan agreement and the data of (first) delivery and of the several closings binary variable lends statistical support to our hypothesis H_3 that the availability of forward commitments has been a major factor attracting Canadian corporations to the American capital market.[18] It also indicates that lower transaction costs were not the main or at least not the only reason why Canadian corporations placed their bonds privately in the United States.

Earlier it was asserted that differences in time preferences between Canada and the United States may lead to longer maturities on U.S.-pay bonds.[19] Five (or roughly 25%) of the

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[18] See p. 95 above.
[19] See p. 91 above.

managers interviewed said that longer terms to maturity available in the U.S. market were a major factor of attraction. A close analysis of our data showed that indeed the term to maturity on some U.S.-pay bonds is twenty-five to thirty years or up to five years longer than on comparable Canadian-pay bonds issued by the same or other firms belonging to the same industry.[20] But the availability of longer maturities in the United States is neither a widely known fact nor do most Canadian corporations seem interested in longer terms than are presently available in Canada. In Table 5-3 the mean maturities of Canadian-pay and U.S.-pay bonds are compared for bonds having terms to maturity of more than twelve years and which have been issued by corporations that have approached the U.S. market.[21] In the light of the foregoing discussion it is not surprising that these data do not indicate a significant difference in the mean maturities on bonds having relatively long terms to maturity. Therefore, from a statistical point of view, our hypothesis H_1 has not been confirmed, though a slight tendency of U.S.-pay bonds to have longer maturities is obvious.

Almost all Canadian corporate bonds issued during the early and middle 'sixties had terms to maturity close to twenty years. With the increased liquidity consciousness of institutional

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[20] However, as one interviewee pointed out, terms of more than thirty years offered to some American firms, in particular to public utilities, are not available on bonds issued by Canadian corporations.

[21] A maturity of twelve years has been chosen as a cutpoint because standard terms seem to be five, six, ten, twenty and twenty-five years to maturity with a gap between twelve and fifteen years.

TABLE 5-3

MEAN TERMS TO MATURITY OF BONDS HAVING TERMS TO MATURITY OF MORE THAN TWELVE YEARS AND WHICH HAVE BEEN SOLD BY CORPORATIONS THAT HAVE BORROWED IN THE UNITED STATES

Period	Can.-Pay Bonds	U.S.-Pay Bonds
1960 - 1967	20.31 (2.42, 42)[a]	20.46 (3.54, 58)
Jan. 1968 - May 1970	21.78 (5.17, 16)	22.15 (5.28, 20)
June 1970 - May 1973	20.36 (.87, 36)	21.97 (3.38, 10)

[a]Values in brackets are standard deviations and numbers of observations respectively.

investors and the tailoring of issues to meet the medium-term investment needs of banks, trust companies and other investors the mean term to maturity on all bonds offered in Canada has decreased considerably in recent years. Including the term to maturity as a variable when estimating discriminant functions usually led to marginally significant results depending somewhat on the presence of other measures intended to capture differences in time preferences. These results are reported in Tables 5-2a, 5-2b, and 5-2c.

In order to allow for an additional evaluation of the discriminatory power of the estimated functions, ex post classification results are reported in the bottom of each Table. These results are very satisfactory, particularly for the two more recent periods. As a further check on our estimates, a discriminant function including the same variables as those mentioned in Table 5-2a was estimated for the period 1960 to mid-1965 and used for predicting the population of the bonds in the "CAandUS" sample 4 and the "USpay" sample 5 for the period mid-1965 to 1967.[22] Seventy-four per cent of all bonds were correctly classified. Similarly, using mid-1965 to 1967 estimates to predict the group membership of bonds in the "CAandUS" samples 2 and 3 and the "USpay" sample 5 for 1968 to May 1970 led to a correct prediction in ninety per cent of the cases.[23] When discriminant

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[22]Mid-1965 was a convenient cutpoint leading to a relatively even distribution of Canadian-pay and U.S.-pay bonds in both the estimation and the prediction samples.

[23]It should be remembered that for the period 1960 to 1967 data have been collected only on bonds issued by corporations that have borrowed in the United States. Estimates based on these data should therefore not be used to predict the group membership of bonds issued by Canadian firms that never sold U.S.

function A reported in Table 5-2b was employed to classify bonds in samples 1 ("CAonly"), 2 ("CAandUS") and 5 ("USpay") for the period June 1970 to May 1973, ninety-three per cent of all bonds but only forty per cent of the U.S.-pay bonds were correctly classified. Function B led to a correct prediction for all U.S.-pay bonds, eighty-nine per cent of Canadian-pay bonds and ninety-one per cent of all bonds. Note that this last result is better than the ex post classification obtained from discriminant function B in Table 5-2c.

To summarize our analysis, there are strong indications that the relatively higher demand for funds in Canada than in the United States has made it possible for Canadian financial institutions to be selective and to invest only in relatively liquid corporate bonds without facing a dearth of attractive investment opportunities.[24] This has resulted in a rather thin private placement market in Canada. Canadian investors are generally not willing to commit funds for delivery several months or even years into the future or to permit a corporation to draw down a loan in several closings. American institutional investors, particularly the larger life insurance companies, seem to be less concerned with the liquidity of their invest-

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dollar denominated bonds, i.e., bonds in sample 1. On the other hand, 1968 to 1973 estimates are based on a comparison of our random sample of Canadian-pay bonds (samples 1 and 2) with the sample of U.S.-pay bonds (sample 5).

[24] One life insurance officer pointed out that recently, at times, Canadian life insurance companies were relatively liquid and therefore prepared to accept private placements with interest rates comparable to those on public issues only in order to not forego an investment in an attractive corporation. But these seem to have been rare instances. And, as one corporate manager said, the size of such issues is limited forcing companies either to resort to public issues or to place part or all of an issue in the United States if large amounts of funds are needed.

vents and eager to maintain a fully invested position. Their willingness to enter into direct placement agreements has been a major factor attracting Canadian corporate borrowers to the United States capital market. The discriminant analysis results reported in Tables 5-2a, 5-2b and 5-2c tend to confirm this observation. They also support our hypothesis that the availability of long-term forward commitments and the possibility of taking a loan down in several closings stretched sometimes over several years leads Canadian firms to borrow abroad. The hypothesis that U.S.-pay bonds will have, on average, longer terms to maturity than Canadian-pay bonds issued by the same group of firms when comparing only bonds that have relatively long terms to maturity is not confirmed by the data reported in Table 5-3. But our interviews revealed that terms to maturity available in the United States are sometimes longer than the longest terms offered to the same firms in Canada and that this is a factor making the American market more attractive to some financial officers in Canada. Mainly due to lender demand the mean maturity of Canadian-pay bonds has decreased considerably in recent years whereas no such change could be detected for U.S. dollar bonds.

5.4 EXCHANGE RATE RISK AND INTERNATIONAL LONG-TERM FINANCING BY CANADIAN CORPORATIONS

When issuing a bond denominated in a foreign currency, a firm faces two peculiar problems. (1) The proceeds of the issue have to be converted into Canadian dollars, and the exchange rate prevailing at the time of conversion determines the amount of Canadian dollars actually obtained. (2) Changes in exchange rates during the bonds' lifetime may change the actual costs of foreign borrowing considerably. Through our interviews we attempted to gain a better understanding of how Canadian corporations actually evaluate and manage these risks involved in borrowing in the United States. We were very surprised to discover that many financial officers of major Canadian corporations seemed not to regard the possibility of an adverse change in the exchange rate as a major risk involved in international financial transactions, at least not with respect to U.S. dollar borrowing. The question "When you were contemplating the issuance of U.S. dollar bonds, did you regard the possibility of a devaluation of the Canadian dollar as a serious risk influencing your choice of where to float the new bonds?" was answered with "No" by thirteen (or 62%) of the managers interviewed. Seven of these firms did not have enough foreign exchange earnings to cover regular interest and sinking fund payments on outstanding U.S.-pay bonds. Only eight officers acknowledged that foreign exchange risk entered their decision as a major variable.

Three managers defended their neglect of foreign exchange risk with the argument that, in their opinion, the Canadian-U.S. dollar exchange rate will continue to fluctuate around par

so that exchange gains and losses will offset each other in the long run. This seems to be a widely held belief. Five executives were more specific and pointed out that as long as the American dollar was at a premium vis-à-vis the Canadian dollar only an upward revaluation of the Canadian dollar was expected. Consequently they did not think that borrowing in the United States entailed any exchange risk at all.

We also encountered four instances where the issuing corporations have been able to cover part or all of the exchange risk through agreements with Canadian and American customers. As a rule, the firms involved in such contracts are utilities or regulated corporations in the oil and gas industry. Two types of agreements seem to prevail: (1) Exchange losses and gains are for the customer's account. (2) The customer is billed in Canadian dollars but, on a one-to-one basis, must provide sufficient U.S. dollars to enable the bond issuer to discharge all his foreign currency interest and principal payments which become due during a given period.

Of those corporations which indicated that foreign exchange risk was a major variable entering their borrowing decision only one attempted to forecast the future trend of the exchange rate. All others relied on a more or less subjective evaluation of the protection a given interest rate differential provides against unfavourable exchange rate changes. Two firms showed us studies in which they had attempted to quantify the exchange rate change necessary to eliminate the cost advantage of lower interest rates abroad, but both did not use a present value approach. Other

firms based their risk evaluation on information obtained from underwriters[25], Canadian and American banks and in-house economists.

Except for three instances where the U.S. dollar proceeds were used to reduce short-term U.S. dollar liabilities or to import equipment into Canada, firms converted these foreign funds almost immediately into Canadian currency. Usually this is done through the spot exchange market over a time period which, depending on the amount involved, may stretch over up to two weeks in order to avoid disruptions of the exchange market that might lead to unfavourable exchange rates. Only four corporations attempted to completely eliminate the exchange risk involved in such transactions by negotiating forward exchange contracts that matured at the time of delivery of the bonds. Four other firms mentioned that they sold part of the proceeds of an issue in the forward exchange market.

During the term of the bonds, U.S. dollars needed to meet interest and sinking fund payments are usually obtained only a few days beforehand in the spot exchange market unless company revenue denominated in U.S. dollars is available. Only three of the larger corporations interviewed indicated that they have

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[25]In general, investment bankers play an important role in a firm's decision to place a new issue in the United States. When they recommend the sale of U.S.-pay bonds, they are usually asked by their clients for an opinion regarding the exchange risk involved. The economist of one investment dealer demonstrated for us their computer program that calculates the protection against unfavourable exchange rate changes which a given interest rate differential provides. The output data seemed to be identical to those calculated by our program and presented above in Table 3-6.

attempted to cover foreign exchange liabilities in the forward market for up to one and a half years. One other firm even obtained coverage for up to four years in advance.[26] However, in the latter case the trust deed restricts that corporation's outstanding foreign currency debt which is not protected against exchange losses through forward exchange contracts to twenty per cent of its total debt. Consequently this firm covers as much of its foreign currency liabilities as possible through forward exchange contracts in order to be able to increase its U.S. dollar borrowings. Even at times of an unsettled international monetary scene usage of the forward market by Canadian corporations to reduce foreign exchange risk does not increase.

Trustees and lenders also seem not too concerned with foreign exchange risk. We came across only two instances where a trust deed took foreign exchange risk explicitly into account. In one case, all U.S. dollar revenue of a Canadian corporation has to be routed through an account with its New York trustee. After making monthly deductions for interest and sinking fund payments the remaining sum is remitted to Canada. The other case has been discussed in the preceding paragraph. In December 1973 one of the companies interviewed, also a regular borrower in the United States, proposed to revise its indenture by including, amongst others, an article dealing with the valuation of foreign currency debt. This could become very important in disputes about whether or not a corporation has met certain pro-

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[26]Such long-term deals are not readily available. However, they can be arranged through banks occasionally if sufficient time is permitted.

visions stipulated in its trust deed.

Four of the six Canadian investment bankers interviewed did also not attach major importance to exchange rate risk. One of them even said that because of the close ties between the Canadian and American economies "we think that exchange risk is not a relevant variable." Two of them also mentioned that, in their opinion, some Canadian firms are overly concerned with foreign exchange risk, an obvious reference to those major Canadian corporations that do not borrow in the United States. However, three of the six underwriters pointed out that, as a general rule, they prefer to recommend U.S.-pay issues only to corporations with sufficient U.S. dollar income to cover the exchange risk.

Given the prevailing expectation that the value of the Canadian currency vis-a-vis the U.S. dollar will fluctuate around a par value of one Canadian to one U.S. dollar, we showed in Section 3.32 above that foreign exchange risk will decrease as a foreign-pay bond's term to maturity increases.[27] The results reported earlier in Tables 5-2a, 5-2b and 5-2c and the discriminant functions shown in Tables 5-4a and 5-4b would lend support to the assertion that Canadian corporations are aware of this effect and prefer to sell U.S.-pay bonds with long terms to maturity in order to reduce foreign exchange risk. However, only two of the twenty-one corporate managers interviewed had recognized this relationship between exchange risk and term to

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[27]See hypothesis H_5, p. 111 above.

TABLE 5-4a

DISCRIMINANT ANALYSIS RESULTS, 1960-1967:
EXCHANGE RISK MEASURES

Item	Discriminant Function		Means and St. D.s	
	Coefficients	F-Values F-Probab.	Can.-pay Bonds	U.S.-pay Bonds
Term to Maturity in Years	.093	1.20 (.2756)	19.29 (4.09)	20.12 (3.94)
Average Maturity in Years	- .162	4.70 (.0307)	14.21 (4.55)	14.18 (4.64)
Risk Premium	-2.732	41.18 (.0000)	1.077 (.537)	.462 (.478)
Constant	2.564	-	-	-
Function	-	14.83 (.0000)	-	-
Number of Observations	-	105	45	60
Ex Post Classification Percentage of Issues Correctly Classified	78%	-	73%	82%

TABLE 5-4b

DISCRIMINANT ANALYSIS RESULTS, JANUARY 1968-MAY 1970:
EXCHANGE RISK MEASURES

Item	Discriminant Function		Means and St. D.s.	
	Coefficients	F-Values F-Probab.	Can.-pay Bonds	U.S.-pay Bonds
Term to Maturity in Years	.451	15.22 (.0003)	11.56 (7.34)	21.36 (6.30)
Average Maturity in Years	- .394	6.35 (.0132)	9.65 (5.44)	14.73 (5.58)
Risk Premium	-1.251	3.12 (.0776)	1.224 (.445)	.892 (.512)
Log (Percentage of Revenue Denominated in US $+1.0)	1.211	4.01 (.046)	.130 (.429)	.701 (.825)
Constant	-1.795	-	-	-
Function	-	13.46 (.0000)	-	-
Number of Observations	-	86	65	21
Ex Post Classification Percentage of Issues Correctly Classified	80%	-	83%	71%

maturity. Most underwriters seemed not to be aware of the fact that the mean term to maturity on Canadian-pay bonds has decreased considerably since the early and middle 'sixties whereas this does not hold for U.S.-pay bonds. As an explanation they offered the hypothesis that there may exist a market in the United States for medium-term bonds issued by Canadian corporations but that placement agents had neglected to develop this market. Our own explanation is that, as a rule, Canadian corporations prefer to issue long-term bonds. Whereas U.S. life insurance companies are basically long-term investors, Canadian institutions have developed a certain preference for medium-term issues which has led at times to lower interest rates on these bonds. As a consequence, corporate borrowers sometimes trade off interest costs and term to maturity on Canadian-pay bonds. This has not been necessary in the United States because of a ready direct placement market for Canadian corporate bonds with long terms to maturity.

Earlier we had also asserted that, in order to reduce exchange risk, sinking fund payments on U.S.-pay bonds will be more evenly distributed over time than those on Candian-pay bonds.[28] Or, in other words, given a bond's term to maturity, the average term to maturity on U.S.-pay bonds will be shorter.[29] The sig-

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[28]See hypothesis H_6, p.113 above.

[29]Average maturity has been measured as the mean maturity of all sinking fund and balloon payments weighted by their size. When computing a bond's average maturity, only mandatory sinking fund or purchase fund provisions have been taken into account. Individual payments have not been discounted as is done when calculating a bond's "duration". For a discussion of this concept see Lawrence Fisher and Roman L. Weil, "Coping With the Risk of Fluctuations: Returns to Bondholders from Naive and Optimal Strategies," Journal of Business, LXVII (October, 1971), pp. 415-420.

nificant negative coefficients of the average maturity variable in the discriminant functions reported in Tables 5-4a and 5-4b could be interpreted as confirming this hypothesis. However we are reluctant to give such an interpretation to our data. In our interviews we discussed this point and discovered that underwriters and financial managers do generally not regard sinking fund provisions as a potential instrument to reduce foreign exchange risk. It seems that sinking fund payments are usually determined by U.S. lender preferences.[30] Whether exchange risk considerations enter into U.S. life insurance companies' deliberations about sinking fund requirements on Canadian bonds is not known.

As an additional measure of the influence which exchange risk has on Canadian corporate borrowing in the United States we included the risk premium on corporate bonds, the difference between a bond's yield to maturity and the yield on long-term Canadian government bonds, into the discriminant analysis. As can be seen in Table 5-4a, this variable is extremely significant for the early period, but in Table 5-4b it is no longer significant by common standards.

It will be remembered that we also hypothesized that Canadian firms with U.S. dollar revenue will show a greater tendency

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[30]In addition it was pointed out during interviews that institutional investors, particularly American life insurance companies, have a preference for pro-rata sinking funds. We did not inquire into why Canadian lenders are prepared to accept relatively longer average terms to maturity than U.S. lenders. We became aware of this only through our statistical analysis which was performed <u>after</u> we had conducted the interviews.

to borrow in the United States than companies not engaged in export activities.[31] Unless information on the percentage of total revenue denominated in U.S. dollars during the year preceding the date of issue was obtained from the firm itself, this datum was estimated from information contained in prospectuses and annual reports. For the period 1968 to May 1970 the discriminant function reported in Table 5-4b indicates that corporations with U.S. dollar revenue indeed exhibited a greater preference to sell U.S.-pay bonds than those firms active only in domestic markets.[32] But again we are reluctant to regard this as a conclusive confirmation of our hypothesis. For the period June 1970 to May 1973 no evidence for such a relationship between export activities and foreign borrowing could be found in spite of the fact that the Canadian dollar had appreciated considerably in 1970 and has been floating since June of that year. Indeed, none of our exchange risk measures led to a meaningful estimate of a discriminant function for this latter period. This may be partly due to a relatively large proportion of public utility bonds in our sample of U.S.-pay bonds for that period. Through our interviews we gained the impression that Canadian financial managers see only a loose relationship between export earnings and foreign borrowing and do not regard the issuance of U.S.-pay bonds as a means to hedge future U.S. dollar income.

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[31] See hypothesis H_4, p. 98 above.

[32] As our estimates for the period 1960 to 1967 are based only on samples of bonds issued by corporations that approached both the Canadian and the American bond markets, the export revenue variable cannot be expected to be significant for that period.

When testing the predictive power of the discriminant function reported in Table 5-4a, eighty-one per cent of the bonds in our test sample for the period mid-1965 to 1967 were correctly classified and eighty per cent of the bonds for the period 1968 to May 1970. Using the function shown in Table 5-4b, only seventy per cent of the bonds in our test sample for the period June 1970 to May 1973 were correctly classified. These results, particularly the last one, are not very encouraging and seem to indicate that these relationships are not very stable over time.

In summary, both the information obtained through interviews and our data suggest that foreign exchange risk had only a weak influence on the characteristics of bonds placed in the United States. Statistical evidence in support of our hypotheses that U.S.-pay bonds have relatively long terms to maturity and provide for sinking fund payments to be evenly distributed over time has been presented. But our interviews led us to conclude that these differences in bond characteristics are mainly due to differences in lender preferences rather than due to deliberate attempts by Canadian corporations to reduce exchange risk. Similarly, data to support the claim that there exists a relationship between a firm's U.S. dollar revenue and its foreign borrowing have been reported. But again the evidence is relatively weak. Foreign currency borrowing is not seen as a means to reduce the exchange risk connected with export earnings. Even corporations with large and stable U.S. dollar revenues feel no incentive to sell U.S. dollar bonds unless it involves some expected interest cost savings. Except for such a trade-off

between exchange risk and lower interest costs abroad, Canadian corporations do usually not make deliberate efforts to reduce foreign exchange risk further through varying a bond's characteristics or through extensive use of the forward exchange market. The risk premium variable which intends to measure the advantage of lower interest costs in the United States was extremely significant in our estimate of a discriminant function for the early and middle 'sixties but is no longer significant in estimates for recent periods. This seems to indicate that factors other than exchange risk (or lower interest costs abroad) have become dominant in Canadian corporations' decisions to issue U.S.-pay bonds.

5.5 TRANSACTION COSTS DIFFERENCES AND INTERNATIONAL DEBT ISSUES

For the period 1968 to 1973 data regarding placement fees and other issuing expenses on privately placed Canadian-pay and U.S.-pay bonds are reported in Table 5-5a.[33] Total flotation costs are similar for both types of bonds with a slight tendency to be higher on U.S. dollar issues. As expected, this is mainly due to "other expenses". These data confirm the opinion voiced by most of the interviewed managers that placement fees are about the same on Canadian-pay and U.S.-pay issues but that other transaction costs are higher for foreign currency bonds. Our efforts to obtain at least very rough estimates of transaction costs incurred with regard to a firm's officials' time spent on negotiating a particular issue and travel and similar expenses were a complete failure. No corporation seems to collect such data.

[33] For the period 1960 to 1967 the information on flotation costs of directly placed Canadian-pay bonds was too limited to allow a meaningful comparison. Even for 1968 to 1973 the data are incomplete and can only be regarded as suggestive.

TABLE 5-5a

FLOTATION COSTS OF PRIVATELY PLACED CORPORATE BONDS: 1968-1973
AS A PERCENTAGE OF GROSS PROCEEDS

Size of Issue (Mill. of $$)	Average Size of Issues	No. of Issues	Placement Fee		Other Expenses		Total Flotation Costs	
			Average	Range	Average	Range	Average	Range
Canadian-Pay Bonds								
up to 2.50	1.450	2	4.100	2.20-6.00	1.444	0.22-2.67	5.544	2.42-8.67
2.50- 6.99	4.611	9(6)[a]	0.901	0.25-1.75	0.715	0.24-1.33	1.615	0.84-2.83
7.00-11.49	9.556	9	0.798	0.37-1.25	0.255	0.12-0.50	1.053	0.53-1.53
11.50-27.49	18.667	3	0.799	0.25-1.00	0.156	0.13-0.19	0.955	0.42-1.19
27.50-62.49	37.500	4	0.452	0.25-0.87	0.285	0.04-0.92	0.737	0.39-1.17
62.50 & over	75.000	1	0.250	-	0.067	-	0.317	-
U.S.-Pay Bonds								
up to 2.49	-	-	-	-	-	-	-	-
2.50- 6.99	4.250	2(1)[a]	0.779	0.25-1.25	0.444	-	1.223	-
7.00-11.49	9.333	3	0.661	0.50-0.75	0.711	0.18-1.66	1.372	0.93-2.16
11.50-27.49	17.429	7	0.700	0.25-1.00	0.143	0.06-0.23	0.842	0.42-1.06
27.50-62.49	44.500	4	0.521	0.40-0.60	0.678	0.25-1.30	1.199	0.65-1.90
62.50 & over	189.000	4	0.567	0.40-1.10	0.210	0.09-0.31	0.777	0.59-1.37

[a]Number of issues for which data on other expenses were available.

TABLE 5-5b

FLOTATION COSTS OF PUBLICLY OFFERED CORPORATE BONDS: 1968-1973
AS A PERCENTAGE OF GROSS PROCEEDS

Size of Issue (Mill. of $$)	Average Size of Issues	No. of Issues	Underwriting Spread		Other Expenses		Total Flotation Costs	
			Average	Range	Average	Range	Average	Range
			Canadian-Pay Bonds					
up to 0.99	0.462	2	5.297	3.00-8.00	2.378	1.40-3.53	7.675	4.40-11.53
1.00- 2.49	1.333	3	2.250	1.50-2.50	0.950	0.25-2.00	3.200	2.75- 3.80
2.50- 4.49	3.206	16	2.597	1.00-6.00	0.836	0.17-1.67	3.433	2.00- 7.67
4.50- 6.99	5.394	17	2.337	0.50-4.00	0.536	0.14-1.25	2.873	0.90- 4.83
7.00-11.49	9.041	35	2.078	0.50-3.00	0.422	0.09-1.13	2.500	0.70- 3.71
11.50-17.49	14.526	19	2.311	1.50-4.00	0.346	0.17-1.00	2.657	1.70- 4.67
17.50-27.49	22.076	33	1.695	0.0 -2.50	0.246	0.05-0.75	1.940	0.09- 2.90
27.50-42.49	33.917	12	1.569	0.75-2.00	0.190	0.01-0.50	1.759	0.76- 2.50
42.50-62.49	52.368	19	1.705	1.30-2.40	0.185	0.05-0.33	1.890	1.45- 2.61
62.50 & over	92.500	6	1.637	1.30-2.00	0.199	0.10-0.30	1.836	1.40- 2.22
			U.S.-Pay Bonds [a]					
up to 17.49	-	-	-	-	-	-	-	-
17.50-27.49	25.000	2	1.060	1.00-1.12	0.550	0.38-0.72	1.610	1.38- 1.84
27.50-42.49	30.000	2	1.060	1.00-1.12	0.371	0.23-0.51	1.431	1.23- 1.63
42.50-62.49	50.000	1	1.050	-	1.130	-	2.180	-
62.50 & over	150.000	1	0.875	-	0.147	-	1.022	-

[a]Data include two issues sold during the second half of 1967.

But it was pointed out that quite often the Vice President Finance spends the larger part of his time on securing long-term funds, and sometimes even the President is extensively involved in such activities. In one instance three employees of a large Canadian corporation spent about one year on preparing comparative analyses of Canadian and U.S. capital markets. They also made an extensive evaluation of the exchange risk before the firm decided to place its first large U.S.-pay issue. Of eleven managers that ventured a guess seven estimated that U.S. dollar issues are more costly than Canadian dollar issues in terms of time spent on preparing and selling an issue and in terms of expenses usually not allocated to "other issuing expenses". Four thought there is no difference.

In Table 5-5b flotation costs on public bonds issued since 1968 are compared.[34] There exists only a small number of publicly sold U.S.-pay bonds ranging in size from twenty-five to one hundred and fifty million U.S. dollars. For these large bond issues underwriting spreads are considerably lower in the United States than in Canada whereas "other issuing expenses" tend to be higher. Though total flotation expenses are generally lower in the United States on these large issues, the dearth of public offerings of Canadian corporate bonds in the United States seems to be due mainly to three factors: (1) The relative ease with

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[34]The data on U.S.-pay bonds include two issues sold during the second half of 1967. For the period 1960 to mid-1967 we could identify only three public offerings, two of which were below four million dollars in size and which had flotation costs considerably in excess of those on comparable bonds sold in Canada.

which direct placements can be secured in the United States; (2) the lengthy and, in terms of management time, costly process of preparing a public U.S. dollar offering for sale; and (3) the hesitance of most Canadian firms to register with the American Securities and Exchange Commission because of the information they have to disclose and the costs involved in keeping their file in New York up-to-date.[35] But Canadian managers and investment bankers think that some of the planned huge energy development projects can only be financed through public offerings in the New York and perhaps the European and Japanese capital markets. Consequently we may see in future an increase in publicly offered foreign currency bonds issued by Canadian corporations.

In view of the foregoing discussion it is not surprising that we found considerable statistical evidence (see Tables 5-6a, 5-6b, and 5-6c) in support of our assertion that U.S.-pay issues will, on average, be larger in size than Canadian-pay issues and that only larger Canadian corporations place their bonds in the United States.[36] The size of the issuing company has been measured by its assets. The negative sign of this variable in

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[35]Some firms believe that they would have to change their accounting system in order to produce all the information required by the SEC. At least one Canadian corporation that is a regular borrower in the United States but which has not yet issued a public bond denominated in U.S. dollars has nevertheless registered with the SEC to provide ready access to information on itself to the New York investment community and to be able to act faster in case a public offering becomes desirable.

[36]See hypothesis H_7, p. 121 above. For additional evidence see Tables 5-8a, 5-8b, and 5-8c below. - The correlation coefficients between the logarithms of issue size and asset size of issuing corporation were .630 for 1969 to 1967, .664 for 1968 to 1970 and .807 for 1970 to 1973 for all bonds in our samples.

TABLE 5-6a

DISCRIMINANT ANALYSIS RESULTS, 1960-1967:
MEASURES RELATED TO TRANSACTIONS COSTS

Item	Discriminant Function		Means and St.D.s.	
	Coefficients	F-Values F-Probab.	Can.-pay Bonds	U.S.-pay Bonds
Private Placement Dummy	2.608	24.60 (.0000)	.533 (.505)	.917 (.279)
Log (Issue Size in Mill. of $$)	1.446	6.70 (.0107)	.857 (.510)	1.050 (.514)
Log (Assets in Mill. of $$)	-.781	2.87 (.0894)	2.072 (.618)	2.058 (.641)
Constant	-1.657	--	--	--
Function	--	10.83 (.0000)	--	--
Number of Observations	--	105	45	60
Ex Post Classification Percentage of Issues Correctly Classified	72%	--	55%	83%

TABLE 5-6b

DISCRIMINANT ANALYSIS RESULTS, JANUARY 1968-MAY 1970:
MEASURES RELATED TO TRANSACTIONS COSTS

Item	Discriminant Function		Means and St.D.s.	
	Coefficients	F-Values F-Probab.	Can.-pay Bonds	U.S.-pay Bonds
Log (Issue Size in Mill of $$)	3.073	14.51 (.0004)	.964 (.366)	1.388 (.630)
Log (Percentage of Company Owned by Foreigners + 1.0)	1.063	5.023 (.0263)	.427 (.737)	1.108 (.871)
Private Placement Dummy	5.551	47.76 (.0000)	.185 (.391)	.857 (.359)
Earlier U.S.-pay Issues Dummy	1.431	3.46 (.0634)	.354 (.482)	.667 (.483)
Constant	-8.053	--	--	--
Function	--	23.74 (.0000)	--	--
Number of Observations	86	--	65	21
Ex Post Classification Percentage of Issues Correctly Classified	87%	--	88%	86%

TABLE 5-6c

DISCRIMINANT ANALYSIS RESULTS, JUNE 1970-MAY 1973:
MEASURES RELATED TO TRANSACTIONS COSTS

Item	Discriminant Function		Means and St.D.s.	
	Coefficients	F-Values F-Probab.	Can.-pay Bonds	U.S.-pay Bonds
Log (Percentage of Company Owned by Foreigners Other Than Americans + 1.0)	1.706	5.09 (.0249)	.152 (.491)	.528 (.851)
Log (Assets in Mill. of $$)	.628	2.30 (.1280)	2.174 (.762	2.492 (.601)
Private Placement Dummy	6.324	41.38 (.0000)	.149 (.358)	.900 (.316)
Constant	-5.828	--	--	--
Function		16.70 (.0000)	--	--
Number of Observations	--	104	94	10
Ex Post Classification: Percentage of Issues Correctly Classified	86%	--	85%	90%

the discriminant function reported in Table 5-6a where we compare only bonds issued by those corporations that have borrowed in the United States indicates that these corporations place their larger bonds abroad and smaller ones in Canada. Given a firm's assets size, the probability of a bond being classified as a U.S. dollar issue increases with issue size. The data in Table 5-7 confirm this, too, except for the period June 1970 to May 1973. As will be discussed in the last section of this chapter, political pressure exerted upon Canadian underwriters and corporations is at least partly to blame for the small number of issues and the modest amounts borrowed in the United States during this time interval. No evidence could be detected that Canadian corporations decreased the size of their U.S.-pay issues in order to reduce exchange risk when the Canadian dollar was floating.

This tendency that only larger Canadian corporations place only their larger bond issues in the United States is reinforced by the lending behaviour of U.S. life insurance companies. It is not uncommon for these institutions to send their investment analysts to Canada for an extensive study of a particular corporation, and it may take several weeks before they commit their funds. All underwriters said that U.S. lenders generally look only at medium to large corporations and are only interested in lending larger amounts.[37] Otherwise it would not be "worth their

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[37]But some Canadian firms, mainly smaller finance companies, have been able to place now and then small U.S.-pay issues.

TABLE 5-7

MEAN ISSUE SIZE OF BONDS SOLD BY CORPORATIONS
WHICH HAVE BORROWED IN THE UNITED STATES
(In millions of dollars)

Period	Can.-Pay Bonds	U.S.-Pay Bonds
1960 - 1967	12.06 (11.44, 45)[a]	20.99 (25.13, 60)
Jan.11968 - May 1970	18.87 (14.60, 35)	62.08 (107.91, 21)
June 1970 - May 1973	38.67 (28.26, 49)	21.15 (15.40, 10)

[a]Values in brackets are standard deviations and numbers of observations respectively.

time" to monitor the Canadian borrower.[38] They also pointed out that the lack of information with regard to Canada, differences in legal requirements between the two countries and the potential risks involved in foreign lending[39] cause U.S. investors to demand a higher yield on Canadian bonds denominated in U.S. dollars than on American bonds of comparable quality. Only eleven of the managers interviewed agreed with this view. But the data shown earlier in Table 5-1 strongly confirm this assertion that the interest advantage enjoyed by Canadian corporations in the U.S. bond market is considerably lower than a comparison of Canadian and U.S. bond yield indices would suggest.

Another deterrent for smaller Canadian corporations to borrow in the United States are the detailed and sometimes rather restrictive trust deeds demanded by U.S. lenders.[40] Larger corporations are in a much better position to provide the expert staff support necessary for negotiating and executing such contracts.

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[38]Note that this is not typical for their lending behaviour. As Shapiro and Wolf, p. 2, remark, "the most important characteristic of the private placement market is that it serves as the major source of long-term debt financing for smaller, less financially secure companies. One reason is that small borrowers tend to sell small issues..." The average issue size of private placements in the United States has been about five million dollars, ibid., pp. 91-94.

[39]U.S. institutions have been mainly concerned about changes in withholding tax or American interest equalization tax regulations. Some trust deeds contain articles protecting the lender against such eventualities.

[40]There was much general agreement that trust deeds for U.S.-pay bonds are much more detailed and usually more restrictive than deeds for comparable Canadian-pay bonds. But one manager pointed out that their sole reason for borrowing in the United States on two occasions was that Canadian institutional investors would not agree to certain articles in the indenture which were acceptable to a U.S. life insurance company. It was also repeatedly mentioned that U.S. institutions are more flexible regarding later changes in indentures.

Foreign ownership has had considerable impact on Canadian corporate borrowing in the United States. The data in Table 5-6b show that during 1968 to May 1970 the probability of a particular bond to be classified as a U.S.-pay issue increased as the percentage of the company's equity owned by foreigners increased. Since June 1970 this pattern has changed. Corporations owned by foreigners other than Americans still exhibit a tendency to borrow abroad (see Table 5-6c) whereas U.S.-owned firms have developed a slight preference for the Canadian capital market (see Table 5-8c below). Growing nationalism, particularly growing resentment of U.S. investment in Canada, is probably responsible for this. Parent pressure because of U.S. balance of payments problems may also have had some influence.

In general, relationships between the board of directors and foreign interests seem to have had considerable influence on U.S. dollar borrowing. One corporation mentions in its prospectuses for Canadian-pay public offerings under "Material Contracts" verbal agreements between the firm and one of its directors, a partner in a New York investment house, concerning the placement of U.S.-pay issues. We encountered firms where executives initiated relationships to New York underwriters whom they were familiar with from earlier employment in the United States. Exchange of information on international capital markets among subsidiaries of multinational corporations seems to be widespread. In at least one instance a European parent company used its New York connections to arrange financing for a Canadian subsidiary without the local corporation having much influence on the particulars of the deal.

On the other hand, neither our interviews nor our data led to any evidence indicating a relationship between foreign investment by Canadian corporations and U.S. dollar borrowing for domestic purposes.[41] Similarly, whether a corporation has its shares listed in the United States or not seems not to influence its access to the U.S. bond market. But this is probably true only with respect to the private placment market. Because of the unexpectedly small number of public U.S.-pay offerings no general conclusions could be derived as to what determines a Canadian corporation's acceptability in the U.S. retail bond market. One American investment banker remarked in his written questionnaire that "the U.S. market is more name conscious and access is generally reserved for only larger credit worthy companies."

Once a Canadian corporation has sold an issue to U.S. financial institutions, the placement of future bonds with the same lenders is usually simpler and cheaper. Both underwriters and managers mentioned that American life insurance corporations like to be informed about planned U.S. dollar issues by former borrowers, and it is not uncommon that a Canadian firm places two or three issues with the same small group of U.S. institutions.[42] Instead of drafting anew bulky trust deeds the sale of even large issues is sometimes arranged through an exchange of letters, and we encountered several cases where no placement agent was involved in the deal. There was general agreement among under-

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[41]Consequently hypothesis H_8, p. 125 above can be regarded as only partly confirmed.

[42]Comparatively small issues are sometimes bought by only one or two institutions.

writers and financial managers that regular borrowers enjoy a slight interest advantage and that the Canadian firm's bargaining position is the stronger the more familiar the lender is with it from earlier contracts. A binary variable measuring whether a corporation had U.S.-pay issues outstanding or not at the date of issue of a particular bond contributes significantly to the discriminatory power of the functions reported in Tables 5-6b, 5-8b and 5-8c and thus lends statistical support to these conclusions.[43]

As already discussed earlier, U.S. dollar bonds are usually placed directly because Canadian corporations have a preference for private placements. Part of the reason why direct placements are preferred is that they are believed to provide overall cheaper debt funds than public offerings. Savings in placement fees, other issuing expenses, and in company officials' time and other resources are assumed to more than offset the sometimes marginally higher interest costs. The inclusion of a private placement dummy among the variables intended to measure the influence of transaction costs on borrowings in the United States improved the significance of the discriminant functions presented in Tables 5-6a, 5-6b and 5-6c considerably.

When using the same variables included in the discriminant function reported in Table 5-6a to predict the population of bonds in our samples for the time interval mid-1965 to 1967,

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[43] Cf. also hypothesis H_9, p.128 above, which in part is supported by these results. Similar statistical results were not obtained for 1960 to 1967 because our samples for that period include only bonds issued by corporations that have borrowed in the United States.

sixty-eight per cent of all bonds were correctly classified. For the period 1968 to May 1970, eighty-six per cent of all bonds were grouped right. The discriminant function estimated for 1968 to May 1970 (see Table 5-6b) predicted the correct population for eighty-seven per cent of all bonds for the period June 1970 to May 1973. Note that again this result is better than the ex post classification reported in Table 5-6c.

To summarize our discussion, we have found strong evidence that transaction and information costs have had a considerable influence on foreign borrowing by Canadian corporations. Because of extra costs connected with international transactions for both borrowers and lenders, the average size of U.S.-pay bond issues is considerably larger than that of Canadian-pay issues except for the most recent period when firms bowed to political pressure and sold only medium-sized issues abroad. These bonds are usually only issued by larger Canadian corporations. Companies (partly) owned by foreigners or which through their directors have connections to New York underwriters are more likely to borrow abroad than other Canadian corporations. Once a firm has gained access to the U.S. bond market and American institutions are familiar with its business, the placement of future issues is usually easier and sometimes can be arranged very fast and informally. Almost all U.S.-pay issues are not sold to the general public but are placed directly, partly because of savings in transaction costs and partly because of the greater flexibility possible through arm's length negotiations with a very small number of investors and because of other advantages discussed earlier.

5.6 SUMMARY ANALYSIS OF FACTORS INFLUENCING CANADIAN CORPORATE BORROWING ABROAD

In the preceding sections considerable evidence has been presented to confirm our theoretical conclusions that (1) differences in time preferences between countries, (2) exchange rate risk and (3) transaction costs differences influence the international flow of long-term capital. However, each of these three factors has been analyzed in isolation. We shall now draw those individual results together to show their combined effect on Canadian corporate borrowing in the United States.

In Table 5-8a discriminant analysis results for the period 1960 to 1967 are presented. Because of collinearity problems some variables are not significant in the presence of others, and therefore two different estimates are reported. The most significant variable in function A is the risk premium measure which attempts to capture the influence which exchange risk and lower interest costs have on Canadian borrowing in the United States. A private placement dummy measuring the influence of differences in time preferences between the two countries and of transaction costs is also very significant. The several closings binary variable indicates that the availability of contracts involving delayed takedowns was a factor attracting Canadian corporations to the American market. In function B, besides the private placement dummy, two variables relating to information and transaction cost, size of issue and asset size of issuing corporation, are marginally significant. The U.S dollar revenue measure is not significant by common standards but leads

TABLE 5-8a

DISCRIMINANT ANALYSIS RESULTS, 1960-1967:
COMBINATION OF SEVERAL MEASURES

Item	Discriminant Function A		Discriminant Function B		Means and St.D.s	
	Coefficients	F-Values F-Probab.	Coefficients	F-Values F-Probab.	Can.-pay Bonds	U.S.-pay Bonds
Several Closings Dummy	1.757	5.35 (.0216)	-	-	.022 (.149)	.233 (.426)
Private Placement Dummy	2.667	19.02 (.0001)	2.618	24.28 (.0000)	.533 (.505)	.917 (.279)
Risk Premium	-2.293	24.20 (.0000)	-	-	1.077 (.537)	.461 (.478)
Log (Percentage of Revenue Denominated in US $$ + 1)	-	-	.331	.99 (.3225)	.368 (.637)	.637 (.824)
Log (Issue Size in Millions of $$)	-	-	1.240	4.20 (.0408)	.857 (.510)	1.050 (.514)
Log (Assets in Mill. of $$)	-	-	- .748	2.56 (.1085)	2.072 (.618)	2.058 (.641)
Constant	+ .404	-	-1.703	-	-	-
Function	-	23.58 (.0000)	-	8.37 (.0000)	-	-
Number of Observations	-	105	-	105	45	60
Ex Post Classification Percentage of Issues Correctly Classified	83%	-	72%	-	A 80% B 56%	A 85% B 85%

to a marginal improvement in ex post and ex ante classification results. Estimates based on the variables mentioned in Table 5-8a for functions A and B correctly predicted the classification of ninety-six and sixty-nine per cent, respectively, of all bonds in our test samples for the time interval mid-1965 to 1967 and of eighty-six and eighty-six per cent, respectively, of all cases for the period 1968 to May 1970.

When evaluating our results for the period 1960 to 1967 two things sould be borne in mind: (1) these data reflect only the financial behaviour of those corporations that have borrowed in the United States during the time interval 1960 to 1973, and (2) information for this early period is less complete than for later periods. Nevertheless, all the data presented indicate that factors predicted by our theory influenced long-term capital flows between Canada and the United States.

The estimates for the time interval January 1968 to May 1970 (see Table 5-8b) show that combinations of several variables lead to an almost perfect ex post classification of the bonds in our samples. The predictive power of these functions is equally impressive. For the period June 1970 to May 1973, function A and function B lead to a correct classification of ninety-six and of ninety-five per cent of all cases, respectively. Most significant are three variables measuring the influence of differences in lenders' time preferences on foreign issues: the several closings and private placement binary variables and a measure of the time elapsed between contract and delivery of a bond issue. A maturity variable is also significant. Measures

TABLE 5-8b

DISCRIMINANT ANALYSIS RESULTS, JANUARY 1968-MAY 1970:
COMBINATION OF SEVERAL MEASURES

Item	Discriminant Function A		Discriminant Function B		Means and St.D.s	
	Coefficients	F-Values F-Probab.	Coefficients	F-Values F-Probab.	Can.-pay Bonds	U.S.-pay Bonds
Term to Maturity in Years	.162	6.21 (.0142)	.157	4.48 (.0354)	11.56 (7.34)	21.36 (6.30)
Several Closings Dummy	7.999	31.24 (.0000)	10.58	38.61 (.0000)	.031 (.174)	.619 (.498)
Log (Years Elapsed between Contract and Delivery + 1	-	-	201.0	18.05 (.0001)	.0042 (.0059)	.0160 (.0205)
Private Placement Dummy	5.183	22.80 (.0000)	4.971	16.347 (.0002)	.184 (.391)	.857 (.358)
Risk Premium	-1.450	1.84 (.1749)	-	-	1.224 (.445)	.892 (.512)
Log (Percentage of Company Owned by Foreigners + 1)	1.416	5.46 (.0209)	1.318	4.06 (.0447)	.427 (.737)	1.108 (.871)
Earlier U.S.-pay Issues Dummy	2.944	9.10 (.0035)	-	-	.354 (.482)	.667 (.483)
Log (Assets in Mill. of $$)	-	-	1.855	4.59 (.0334)	2.195 (.620)	2.475 (.626)
Constant	-9.026	-	-6.00	-	-	-
Function	-	30.22 (.0000)	-	37.02 (.0000)	-	-
Number of Observations	-	86	-	86	65	21
Ex Post Classification	94%	-	92%	-	A 95% B 95%	A 90% B 81%

intended to capture the influence of differences in information and transaction costs like the percentage of a corporation owned by foreigners, an "earlier U.S.-pay issues" dummy and the asset size of the issuing firm are equally important variables. In the presence of these variables both measures directly related to exchange risk, the risk premium variable and the variable measuring the percentage of a firm's revenue denominated in U.S. dollars, are insignificant. Nevertheless, we included the risk premium measure into discriminant function A in Table 5-8b to demonstrate the remarkable change in the importance of this variable for discriminating between Canadian-pay and U.S.-pay bonds when compared to the earlier period.

We would regard our 1968 to May 1970 data as most appropriate for testing our theory. During this period political interference with the economic forces influencing the financial behaviour of Canadian corporations was almost absent, and we compare a sample of U.S.-pay bonds with a random sample of <u>all</u> Canadian-pay bonds issued during this time interval. The high predictive power of the estimated functions indicates that the basic factors influencing Canadian corporate borrowing in the United States have not materially changed in recent years.

The estimates in Table 5-8c for the period June 1970 to May 1973 confirm this because basically the same variables are included as those mentioned in Table 5-8b. However, some smaller changes are obvious. Whereas measures related to differences in time preferences are still very significant as in estimates for earlier years, variables intended to capture the influence

TABLE 5-8c

DISCRIMINANT ANALYSIS RESULTS, JUNE 1970-MAY 1973:
COMBINATION OF SERVERAL MEASURES

Item	Discriminant Function A		Discriminant Function B		Means and St.D.s.	
	Coefficients	F-Values F-Probab.	Coefficients	F-Values F-Probab.	Can.-pay Bonds	U.S.-pay Bonds
Term to Maturity in Years	-	-	.162	4.40 (.0365)	15.36 (6.42)	21.97 (3.38)
Several Closings Dummy	12.528	25.91 (.0000)	11.987	21.97 (.0000)	.011 (.103)	.300 (.483)
Private Placement Dummy	7.287	40.96 (.0000)	7.345	38.74 (.0000)	.149 (.358)	.900 (.316)
Earlier U.S.-pay Issues Dummy	2.805	7.35 (.0071)	-	-	.266 (.444)	.600 (.516)
Log (Percentage of Company Owned by Foreigners Other Than Americans + 1)	1.868	4.61 (.0324)	1.705	3.63 (.0567)	.152 (.491)	.528 (.851)
Log (Percentage of Company Owned by Americans + 1)	-	-	- 1.255	3.19 (.0736)	.396 (.716)	.360 (.687)
Log (Assets in Mill. of $$)	-	-	1.109	2.95 (.0853)	2.174 (.762)	2.492 (.601)
Constant	- 6.619	-	-11.422	-	-	-
Function	-	23.55 (.0000)	-	15.89 (.0000)	-	-
Number of Observations	-	104	-	104	94	10
Ex Post Classification	96%	-	91%	-	A 97% B 90%	A 90% B 100%

of differences in information and transaction costs have lost somewhat in importance except for the "earlier U.S.-pay issues" dummy. Indeed discriminant function B in Table 5-8c suggests that firms (partly) owned by Americans have developed a slight aversion against U.S.-pay bonds. As will be discussed in the following section, growing nationalism in Canada and political pressure can explain these results.

Somewhat puzzling is the complete insignificance for this period of any measure intended to capture the influence of foreign exchange risk on corporate borrowing in the United States except perhaps for the maturity variable. Since June 1970 the Canadian dollar has been floating and has fluctuated around par vis-a-vis the U.S. dollar most of the time after appreciating in value sharply in 1970. We had expected that this would focus attention on exchange risk but we were unable to detect any evidence of this. For example, when including the risk premium as a variable into the discriminant functions reported in Table 5-8c, it was "significant" only at the twenty-eight and nineteen per cent level, respectively.

When comparing our results for the period 1960 to 1967 with those for 1968 to 1973, the increased significance of measures related to differences in time preferences and the diminished importance of the risk premium variable (or the interest rate differential) are most noteworthy. We do not have a ready explanation for this. Our interviews concentrated mostly on recent financing activities and did not provide many clues. However, it seems that the increased liquidity conscious-

ness of Canadian financial institutions since the middle 'sixties, the improved efficiency of the Canadian capital market in recent years and a greater financial sophistication of Canadian corporations have all contributed to these results.

5.7 NON-ECONOMIC INFLUENCES ON CORPORATE BORROWING BEHAVIOUR

Our theory of long-term international debt capital flows is solely based on an analysis of economic factors that influence borrower and lender behaviour. Though no direct statistical evidence can be presented for this assertion, our discussion with underwriters and financial managers strongly suggest that non-economic variables also have had a surprisingly great effect on Canadian corporate debt financing in the United States. Two influences seem of particular importance: growing nationalism in Canada and pressure exerted by financial authorities in Ottawa.

More than half of the corporations which we interviewed have not approached the U.S. bond market since 1970. When asked why they did not sell U.S. dollar bonds in recent years, several managers answered that, as a Canadian corporation, they wanted to maintain a Canadian image by financing in Canada thereby keeping their name in front of the Canadian public. Others said that major stockholders, out of national feelings, requested Canadian financing. Mangers of subsidiaries of multinational corporations mentioned the changing political climate with regard to American direct investment in Canada.[44] Consequently they

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[44] On this see, for example, John Fayerweather, Foreign Investment in Canada: Prospects for National Policy (New York: International Arts and Sciences Press, 1973).

thought it opportune to finance Canadian projects in Canada.[45]

Requests by the Bank of Canada and the Federal Minister of Finance to restrict financing activities to the Canadian market seem to have had even more influence on the borrowing behaviour by Canadian corporations in recent years. In its Annual Report for the year 1970 the Bank of Canada notes that "in view of the continued undesirability of a large inflow of capital, both the Minister of Finance and the Bank of Canada attempted to reinforce the effect of declining interest rates in Canada by asking Canadian borrowers to explore very carefully the possibilities of doing their necessary financing in Canadian markets before they had recourse to borrowing abroad. Since the first quarter of 1970 the use of external markets has fallen to a low level and this has been a helpful development."[46] According to our information, the Bank of Canada also solicited the cooperation of Canadian investment dealers. Underwriters play an important role in foreign borrowing by corporations because they often have been the initiating force that finally led to U.S.-pay issues. This Bank of Canada request has put Canadian underwriters into a compromising position. They feel that it is their obligation to provide their clients with objective information on all capital markets accessible to Canadians and to advise them on where to obtain the cheapest funds at the best conditions.

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[45] From a Canadian point of view it probably would be more desirable to reduce foreign direct investment by approaching the Canadian capital market for equity funds and perhaps even increase foreign borrowing. It seems that a controlling interest by foreigners rather than the use of foreign funds as such is objectionable to Canadians.

[46] Bank of Canada, Annual Report 1970, p. 7.

On the other hand, they attempt to be "good corporate citizens" and, perhaps more importantly, want to protect their share in the allotment of new government securities. General practice seems to be to inform corporate clients about conditions in the U.S. bond market but to no longer recommend foreign-pay issues. As a rule, investment dealers try to avoid official contact with the Bank of Canada regarding any particular issue planned but may informally make the Bank aware of it. Usually the client is expected to inform the Bank of Canada of a new U.S.-pay issue. He may also ask for the Bank's opinion if he feels this is advisable.

The majority of corporations interviewed agreed that the Bank of Canada's position on foreign borrowing influenced their financial decisions in recent years. Most of those that borrowed in the United States since 1970 indicated that they consulted with the Bank before issuing foreign currency bonds. Information gathered through our interviews suggests that the Bank of Canada gives a "permission" to borrow abroad only if an issue meets certain criteria, some of which seem to be: (1) Issue size must be relatively small, not more than twenty to thirty million dollars. (2) The borrower should present convincing reasons why he cannot obtain the funds in Canada at an acceptable interest rate. Useful arguments are a need for a long-term forward commitment or for delayed deliveries. (3) If the proceeds are used for the import of equipment or payment of other U.S. dollar debt obligations, larger issue sizes are permissible. Most firms seem very reluctant to defy official requests for changes in their

financing policies because of fear of government retaliation. In at least one case a corporation advised the Bank of Canada, as a matter of courtesy, about an impending large U.S.-pay issue; it had to cancel the deal because of pressure exerted upon it.

CHAPTER 6

SUMMARY AND CONCLUSIONS

This study has presented a new attempt to gain a better understanding of those forces that lead to the movement of funds from one country to another. We restricted our attention to the international market for long-term debt capital. The empirical analysis focused on capital flows between Canada and the United States, particularly on Canadian corporate borrowing in the United States.

First we developed a model of the international term structure of interest rates. Assuming that capital markets are perfect, we showed that interest rate differentials between countries reflect exchange rate expectations as well as risk premia necessary to reimburse international investors for accepting exchange risk. The demand for funds by a country's residents, which is a function of their time preferences, determines whether a nation's effective interest rate level is higher or lower than that of other countries. If information and transaction costs are higher when two traders from different countries deal with each other than when both investors are from the same country, then interest rate differentials will tend to be larger than they would be otherwise.

The inflow of long-term debt capital into Canada is almost exclusively due to the sale of new bond issues abroad by Canadian borrowers. Activities of international investors in secondary markets are only of minor importance. This makes a direct test of our model through regression analysis rather difficult. Furthermore, the Bank of Canada has attempted to interfere with the free play of economic forces by manipulating interest rate differentials and through moral suasion. Consequently we had to rely on an indirect test of the basic features of our theory.

We presented some evidence which suggested that the yield differential between Canadian and American corporate bonds indeed reflects exchange rate expectations to some extent, but only short-term and medium-term expectations. It is widely believed that in the long run the exchange rate will fluctuate around an equilibrium value of one Canadian to one United States dollar. Given such expectations, the high level of interest rates in Canada and the continuous inflow of long-term debt capital are probably due to higher time preferences of Canadians. We calculated the (relative) demand for funds in Canada and in the United States as a percentage of GNP and showed that it is considerably greater in Canada. We analyzed the impact which such differences in time preferences between the two countries might have on Canadian corporate borrowing behaviour. Discussions in the literature suggested that Canadian financial institutions have a comparative preference for bonds with a high degree of marketability. To test for this, we hypothesized

that the availability of a well-functioning private placement market, of long-term forward commitments, and of longer maturities should be factors attracting Canadian corporations to the U.S. bond market.

Both our discriminant analysis results and our interviews confirmed that the relative abundance of attractive investment opportunities in Canada has allowed Canadian financial institutions to concentrate their investments in comparatively marketable securities. Corporations wanting to sell their bonds directly often had to resort to the U.S. market, and long-term forward commitments and contracts providing for several closings are extremely difficult to arrange for in Canada. The longer maturities available in the American bond market seem to be of lesser interest to Canadian firms.

These findings raise some significant questions: (1) How can we explain differences in time preferences between countries? A comparative analysis of the age structure of different nations, of savings behaviour, of investment opportunities in real assets, and of inflationary experiences should be of considerable interest. (2) How can the functioning of the Canadian private placement market be improved? Can Canadian financial institutions indeed consistently increase their profits through bond trading? If yes, is the secondary market for Canadian corporate bonds inefficient? (3) A comparative analysis of the different investment strategies pursued by Canadian and American life insurance corporations seems warranted to determine whether they

result in marked differences in benefits accruing to shareholders and policy holders.

Our model indicated that exchange risk should have a considerable influence on borrower (and lender) behaviour. To test for this, we analyzed how Canadian corporations could reduce the exchange risk involved in selling U.S.-pay bonds, given that they want to protect themselves against an early adverse change in the exchange rate. We showed that exchange risk decreases as the term to maturity increases. Also, if exchange rate expectations are rather diffuse, then sinking fund payments evenly distributed over the term of an issue should be preferred. Corporations receiving income denominated in U.S. dollars can provide themselves with a long-term forward exchange market by selling U.S. dollar bonds.

Our statistical results suggested that Canadian corporations behave in the predicted manner, but the evidence was relatively weak. Through our interviews we found out that corporations do not deliberately alter bond characteristics to reduce exchange risk. Rather, lender behaviour is responsible for the observed differences in maturities and sinking fund provisions. A slightly lower interest rate seems to be all the protection against exchange risk firms require. The function and purpose of the forward exchange market is often not well understood,[1] and few corporations can afford to employ a foreign

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[1] Forward exchange contracts are sometimes regarded as a means to speculate rather than as a means to protect future U.S. dollar revenue or U.S. dollar liabilities against exchange risk.

exchange specialist. Usually foreign borrowing is not regarded as a means to sell future export earnings forward.

A closer analysis of exchange risk management by Canadian corporations and by those in other countries should prove valuable. The development of relatively simple, operational models to assist firms in this task is needed.[2] Also, there should be considerable opportunities for improved services by banks and underwriters in this respect.

Finally, we looked at the influence which information and transaction costs have on international capital flows. For both Canadian borrowers and American lenders these costs seem to be higher when dealing with foreigners. Consequently it is not surprising that only larger Canadian corporations borrow in the United States and that only relatively large issues are sold abroad. Once a Canadian firm is familiar to American lenders, the placement of future issues can often be arranged relatively easily and quickly. Connections to U.S. investors through foreign stockholders or directors have also proven helpful.

From a corporate viewpoint, material differences in trust deeds of Canadian-pay and U.S.-pay issues seem to be a major concern. A comparative analysis and evaluation of the economic implications of such differences would be highly desirable.

When considered together, both our interviews and our discriminant analysis results have provided strong support for our theoretical conclusions that (1) differences in time

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[2]Sophisticated models like the one developed by Lietaer are beyond the financial and technical capabilities of most Canadian corporations. See, Bernard A. Lietaer, Financial Management of Foreign Exchange, (Cambridge, Mass.: MIT Press, 1971).

preferences, (2) exchange risk, and (3) transaction costs have a considerable influence on the direction and volume of international capital flows. A typical U.S.-pay bond issued by a Canadian corporation is a private placement, is relatively large in size, often involves a long-term forward commitment by an American lender, and is sometimes drawn down in several closings. The interest rate is slightly lower than in Canada. The issuing corporation is relatively large in size, has often foreign stockholders, and has sold U.S.-pay bonds before. It seems to be engaged in export activities to a greater extent than a typical corporation selling only Canadian-pay bonds.

We did not compare our sample of Canadian U.S.-pay bonds with a sample of American U.S.-pay bonds. However, it seems that the typical American private placement is small in size and is issued by a "smaller, less financially secure" firm.[3] Also, features like long-term forward commitments and several take-downs seem to be less prevalent. In addition, the interest rate is usually lower than on Canadian U.S.-pay issues. The investment behaviour of American lenders with respect to foreign U.S.-pay bonds should be worth further exploration.

In Chapter 1 we indicated that a major deficiency of Canadian-United States capital flow data is that information is available only on the amount of new corporate issues <u>delivered</u> to American lenders. If data based on <u>the date of</u>

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[3]Cf. footnote 38 in Chapter 5 above.

contract should become available, then a more rigorous regression analysis of Canadian corporate borrowing abroad may become feasible. The information provided by our study should contribute to the success of such research.

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APPENDIX 1

EQUILIBRIUM INTEREST RATES IN AN INTERNATIONAL CAPITAL MARKET: A PORTFOLIO APPROACH

In Chapter 2 we indicated that because of methodological considerations we used Roll's model of the determinants of equilibrium interest rates in a closed economy as a basis for extending term structure theory to open economies.[1] We believe that this leads to a more general model of the behaviour of international lenders and borrowers of long-term funds than a portfolio approach. On the other hand, Bierwag and Grove have shown that portfolio theory can be applied to develop "a model of the term structure of interest rates;"[2] consequently it should be of interest to extend their theory to open economies as well and to compare the results with those obtained earlier in Chapter 2.

Before we do that, the following caveats should be noted:

1. The portfolio model is inherently a one-period model. This necessitates rather restrictive assumptions concerning the investment opportunities open to investors.
2. The risk-free interest rate is assumed to be exogenously given. In open economies, it seems more reasonable to assume that all interest rates are determined simultaneously by the demand for and supply of funds

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[1]See pp.42 -44 above.

[2]G. O. Bierwag and M.A. Grove, "A Model of the Term Structure of Interest Rates," Review of Economics and Statistics, IL

by investors in all countries.

3. The risk of foreign investments is assumed to be measured by the variance of the expected rate of return on a foreign-currency denominated security. As pointed out in Section 2.421 above, this assumption seems to be questionable.

First, we shall review Bierwag and Grove's model. Then we demonstrate that their theory can be extended to open economies.

Bierwag and Grove's Model. - In their multi-period model Bierwag and Grove assume that there exist n investors who share a common time horizon of T periods.[3] Attention is restricted to the case of simple interest. Then the relationship between observed interest rates and implied on-period forward rates is

$$jR_j = \sum_{i=1}^{j} r_i \qquad \text{for } j = 1, 2, \ldots, T. \qquad \text{(A1-1)}$$

Investors are assumed to have only the following investment options. The first option is to invest for T periods by purchasing a bond of maturity T. The (riskless) return on this option is $TR_T = \rho_1$. The second option is to invest for T-1 periods by purchasing a bond of maturity T-1, and to reinvest for one period at time T-1 by purchasing a bond of maturity one. The return on this option is $(T-1)R_{T-1} + \tilde{R}_{1,T-1} = \tilde{\rho}_2$. Here the tilde denotes a random variable. The third option is to invest for T-2 periods, and to reinvest for two periods at T-2 for a total re-

(February, 1967), pp. 50-62.

[3] Ibid., pp. 59-60.

return of $(T-2)R_{T-2} + 2\tilde{R}_{2,T-2} = \tilde{\rho}_3$, and so on.[4]

If an investor allocates x_j of his funds to investment option j, then the expected return on his portfolio is

$$\bar{\rho} = \sum_{j=1}^{T} x_j E(\tilde{\rho}_j).$$

To simplify the analysis, we shall always assume that $\sum_j x_j = 1$. Investors' wealth can easily be introduced into the analysis by multiplying the x_j by an individual investor's total funds. The total variance of an investor's portfolio is

$$S^2 = \sum_{i=2}^{T} \sum_{j=2}^{T} x_i x_j s_{ij}$$

where s_{ij} is the expected covariance between the return on option i and the return on option j.

Assuming that the investor chooses an optimal portfolio by maximizing a utility function, U, over the moments $\bar{\rho}$ and S^2, we can solve for the optimal values of the x_j^*, (subject to the usual portfolio conservation constraint $\sum_j x_j = 1$) by differentiating U partially with respect to the x_j. As necessary conditions for a constraint maximum of U we obtain

$$\sum_{i=2}^{T} x_i^* s_{ij} = m\left[E(\tilde{\rho}_j) - E(\rho_1)\right] \quad \text{for } j = 2, 3, \ldots, T. \quad \text{(A1-2)}$$

Here $m = (\partial U/\partial \bar{\rho})/-(2\partial U/\partial S^2)$, a measure of the investor's risk aversion. Note that expression (A1-1) may be employed in equa-

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[4]This rather restrictive assumption can be relaxed somewhat by assuming that an investor assigns "the <u>same</u> expected return and variance of return at time t to a bond spanning the remaining T-1 periods of his horizon as he does to <u>any combination</u> of short and long bonds spanning the same set of periods." <u>Ibid.</u>, p. 59.

tions (A1-2) to substitute implied one-period forward rates for the differences between the observed market rates. For example, for $j = 2$, $(T-1)R_{T-1} - TR_T = -r_T$, and $E(\tilde{\rho}_2) - E(\rho_1) = E(\tilde{R}_{1,T-1}) - r_T$.

Let $\underline{S}$ be the $(T-1)(T-1)$ covariance matrix $\|s_{ij}\|$ and $\underline{x} = (x_2, x_3, \ldots, x_T)'$ a column vector. Denote by

$$\underline{R} = (r_T, r_{T-1} + r_t, \ldots, r_2 + r_3 + \ldots + r_T)'$$

a column vector of forward rates, and by

$$\underline{E} = \left[E(\tilde{R}_{1,T-1}), 2E(\tilde{R}_{2,T-2}), \ldots, (T-1)E(\tilde{R}_{T-1,1})\right]'$$

a column vector of expected rates.

Using these definitions, the solution (A1-2) can be written as

$$\underline{x}^* = m\underline{S}^{-1}(\underline{E} - \underline{R}).$$

Market equilibrium is obtained when excess demand by all investors for all investment options is zero. Note that when n-1 markets are in equilibrium, then the nth market must be in equilibrium as well. Let the subscript k refer to the kth investor. Then the condition for market equilibrium is

$$\sum_{k=1}^{n} m_k \underline{S}_k^{-1}(\underline{E}_k - \underline{R}) = \underline{0}. \qquad \text{(A1-3)}$$

The system of equations (A1-3) can easily be solved for the vector of equilibrium forward rates

$$\underline{R}^* = (\sum_k m_k \underline{S}_k^{-1})^{-1} \sum_k m_k \underline{S}_k^{-1}\underline{E}_k.$$

An Extension to Open Economies. - When extending Bierwag and Grove's model to open economies we retain their basic assumptions as outlined above. However, we will restrict our analysis to a two-period model and to two "representative" investors from two countries, the domestic country D and a foreign country F. An extension to T periods and n investors should be obvious from the earlier discussion. It is also assumed that there exist two capital markets, one in country D and one in country F.

In such a model world, an investor from country D is faced with four investment options from which he may choose:

1. A two-period bond denominated in country D's currency and yielding a riskless rate of return of R_2^d per period and $2R_2^d$ over the investor's time horizon.
2. A two-period bond denominated in country F's currency and yielding $2R_2^f + \tilde{c}_1 + \tilde{c}_2$, where c_j denotes the rate of change in the exchange rate during period j.
3. A one-period bond denominated in country D's currency followed by another one-period bond also denominated in country D's currency. The total return on this option is $R_1^d + \tilde{R}_{1,2}^d$.
4. A one-period bond denominated in country F's currency followed by another one-period bond also denominated in country F's currency. The total return on this option is $R_1^f + \tilde{R}_{1,2}^f + \tilde{c}_1 + \tilde{c}_2$.

Note that our investor must not switch investments from country D to country F or vice versa before the end of his investment horizon.

Using our earlier notation, the domestic investor's expected rate of return on his total portfolio is

$$\bar{\rho}d = \sum_{j=1}^{4} x_j E_d(\tilde{\rho}_j)$$

and the total variance is

$$S_d^2 = \sum_{i=2}^{4} \sum_{j=2}^{4} x_i x_j s_{ij}^d \ .$$

Differentiating his utility function partially with respect to the x_j, employing our earlier matrix notation and defining $\underline{Q}_d$ as the column vector of excess rates of return expected by the domestic investor on the three risky investment options, we obtain the following optimal solution:

$$\underline{x}_d^* = m_d \underline{S}_d^{-1} \underline{Q}_d. \qquad \text{(A1-4)}$$

Note that $\underline{x}_d^* = (x_{d2}^*, x_{d3}^*, x_{d4}^*)$.

Of particular interest is the vector of excess rates of return, $\underline{Q}_d$. The first element, the expected excess rate of return on a two-period bond denominated in country F's currency, is $2R_2^f + E_d(\tilde{c}_1) + E_d(\tilde{c}_2) - 2R_2^d$. Taking note of the definition of forward rates in equation (A1-1) and defining

$$c_j = r_j^d - r_j^f \qquad \text{(A1-5)}$$

as the one-period rate of change in the exchange rate implied by the term structure of interest rates in the two countries, then the excess rate of return on option two becomes $2R_2^f - R_1^f + R_1^f - (2R_2^d - R_1^d + R_1^d) + E_d(\tilde{c}_1) + E_d(\tilde{c}_2) = r_2^f - r_2^d + r_1^f - r_1^d + E_d(\tilde{c}_1) + E_d(\tilde{c}_2) = E_d(\tilde{c}_1) + E_d(\tilde{c}_2) - c_1 - c_2$. In other words, the ex-

pected excess rate of return on option two equals the difference between the sum of the expected rates of change in the exchange rate during those two periods and the sum of the market implied forward rates of change in the exchange rate. Defining these as $E(\tilde{C}_T) = E(\tilde{C}_2)$ and $C_T = C_2$, respectively, the excess rate of return on investment option two becomes

$$\tilde{Q}_2^d = E_d(\tilde{C}_2) - C_2. \qquad \text{(A1-6a)}$$

Similarly, the expected excess return on option three is

$$\tilde{Q}_3^d = E_d(\tilde{R}_{1,2}^d) - r_2^d. \qquad \text{(A1-6b)}$$

Making use of the definitions (A1-1) and (A1-5), it can be shown that the expected excess return on option four is

$$\tilde{Q}_4^d = E_d(\tilde{R}_{1,2}^f) - r_2^f + E_d(\tilde{C}_2) - C_2 \ . \qquad \text{(A1-6c)}$$

Note that because of equation (A1-6c) an expression like (A1-4) cannot be solved immediately for the vector of forward interest rates and the forward rate of change in the exchange rate over the investor's time horizon. But we want to obtain a solution for the market forward rates as a function of investors' expectations and their degree of risk aversion. Fortunately, equation (A1-4) can easily be transformed into the desired form.

Consider an identity matrix $\underline{I}_3 = \underline{AB}$ where the matrices $\underline{A}$ and $\underline{B}$ are defined as

$$\underline{A} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix} \quad \text{and} \quad \underline{B} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ -1 & 0 & 1 \end{bmatrix} \ .$$

Premultiplying $\underline{Q}_d$ in equation (A1-4) by $\underline{I}_3$ we obtain

$\underline{x}_d^* = m_d \underline{S}_d^{-1} \underline{ABQ}_d$ or

$$\underline{x}_d^* = m_d \underline{Z}_d^{-1} (\underline{E}_d - \underline{R}) \qquad \text{(A1-7)}$$

where $\underline{Z}_d^{-1} = \underline{S}_d^{-1} \underline{A}$, the column vector of expected rates $\underline{E}_d = \left[E_d(\tilde{C}_2),\ E_d(\tilde{R}_{1,2}^d),\ E_d(\tilde{R}_{1,2}^f)\right]'$, and the column vector of forward rates $\underline{R} = (C_2,\ r_2^d,\ r_2^f)'$.

Our next task is to derive the foreign investor's demand for investment options two, three, and four as a function of the vector $(\underline{E} - \underline{R})$. However, before we proceed with this, one peculiar problem should be noted. In equation (A1-5) we defined $c_j = r_j^d - r_j^f$ as the forward rate of change in the exchange rate implied by the term structure of interest rates in the two countries. But, as will be remembered from Chapter 2, this is not quite correct unless the interest rates are defined as continually compounded rates of return and the rate of change in the exchange rate as an instantaneous relative rate of change. Therefore $E(\tilde{c}_j)$ must be redefined as being only a function of the expected rate of change in the exchange rate, that is, as representing an expected interest rate differential that would eliminate the advantage (disadvantage) of higher (lower) nominal interest rates abroad, given the investor's exchange rate expectations. Of course, c_j must be reinterpreted in a similar manner.[5] For low interest rate levels and small rates of change in exchange rates this difference between interest rate differentials and implied rates of change in exchange rates is

[5]Instead of using simple interest we could also redefine the interest rates as continually compounded rates. For periodic compounding the problem is not immediately amenable to a solution.

negligible, and therefore we shall continue to use our somewhat inaccurate terminology to avoid unnecessary confusion. Also, as a positive interest rate differential from one country's point of view is a negative interest rate differential from the other country's point of view, let us introduce the following definitions:

$$c_j = r_j^d - r_j^f = -c_j' = -(r_j^f - r_j^d) \qquad \text{(A1-8)}$$

and

$$E(\tilde{c}_j) = -E(\tilde{c}_j') \ . \qquad \text{(A1-9)}$$

Let us now return to our foreign investor. For him investment option one, a two-period bond denominated in country D's currency, becomes a risky investment yielding $2R_2^d + \tilde{c}_1' + \tilde{c}_2'$. Option two is a riskless investment for him returning $2R_2^f$, and his return on option three is $R_1^d + \tilde{R}_{1,2}^d + \tilde{c}_1' + \tilde{c}_2'$. Finally, option four yields $R_1^f + \tilde{R}_{1,2}^f$.

The foreign investor's expected rate of return on his total portfolio becomes

$$\bar{\rho}_f = \sum_{j=1} x_j E_f(\tilde{\rho}_j)$$

and the variance of this portfolio is

$$s_f^2 = \sum_1 \sum_j x_i x_j s_{ij}^f \quad \text{for } i,j = 1, 3, 4.$$

Remember that for the foreign investor option two is a riskless investment. Differentiating the foreign investor's utility function partially with respect to the x_j and proceeding as earlier, the following solution for the optimal allocation of his funds

among the three risky investments is obtained:

$$\underline{x}_f^* = m\underline{S}_f^{-1}\,\underline{Q}_f. \tag{A1-10}$$

Here $\underline{x}_f^* = (x_{f1}^*,\ x_{f3}^*,\ x_{f4}^*)$.

Of particular interest is the vector of expected excess rates of return on the foreign investor's three risky investment options, $\underline{Q}_f$. The expected excess rate of return on option one is $2R_2^d + E_f(\tilde{c}_1') + E_f(\tilde{c}_2') - 2R_2^f$. Defining $E(\tilde{C}_2') = E(\tilde{c}_1') + E(\tilde{c}_2')$ and $C_2' = c_1' + c_2'$, and taking note of expressions (A1-1), (A1-8) and (A1-9) we obtain

$$\tilde{Q}_1^f = E_f(\tilde{C}_2') - C_2' = C_2 - E_f(\tilde{C}_2)$$

as the foreign investor's expected excess rate of return on option one. Similarly, it can be shown that the expected excess return on option three is

$$\tilde{Q}_3^f = E_f(\tilde{R}_{1,2}^d) - r_2^d + C_2 - E_f(\tilde{C}_2).$$

Finally, on option four the excess return becomes

$$\tilde{Q}_4^f = E_f(\tilde{R}_{1,2}^f) - r_2^f.$$

In order to obtain $\underline{x}_f$ as a function of $(\underline{E}_f - \underline{R})$, where $\underline{E}_f = \left[E_f(\tilde{C}_2),\ E_f(\tilde{R}_{1,2}),\ E_f(\tilde{R}_{1,2})\right]'$ and $\underline{R}$ is defined as above, let the identity matrix $\underline{I}_3$ equal $\underline{GG}$ where $\underline{G}$ is defined as

$$\underline{G} = \begin{bmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}.$$

Premultiplying $\underline{Q}_f$ in equation (A1-10) by $\underline{I}_3 = \underline{GG}$ we get

$$\underline{x}_f = m_f \underline{V}_f^{-1}(\underline{E}_f - \underline{R}) \qquad \text{(A1-11)}$$

where $\underline{V}_f^{-1} = \underline{S}_f^{-1}\underline{G}$. Though expression (A1-11) looks very similar to equations (A1-7), we cannot yet solve for the vector $\underline{R}$ because (A1-7) gives us the demand of the domestic investor for investment options two, three and four whereas (A1-11) provides us with an expression for the foreign investor's demand for investment options one, three and four.

Therefore, as the next step in our derivation, we have to determine the foreign investor's demand for investment option two. Actually, analytically it is more convenient to derive a solution for one minus his demand for option two, or $1 - x_{f2}$. First, rewrite expression (A1-11) as

$$\begin{bmatrix} x_{f1}^* \\ x_{f3}^* \\ x_{f4}^* \end{bmatrix} = m_f \begin{bmatrix} \underline{v}_{f1} \\ \underline{v}_{f3} \\ \underline{v}_{f4} \end{bmatrix} (\underline{E}_f - \underline{R}) .$$

The $\underline{v}_{fj}$ denote the three row vectors in $\underline{V}_f^{-1}$. Because of the portfolio conservation constraint $\sum_j x_j = 1$, one minus the foreign investor's demand for option two equals $x_{f1} + x_{f3} + x_{f4}$, or

$$1 - x_{f2}^* = m_f(\underline{v}_{f1} + \underline{v}_{f3} + \underline{v}_{f4})\ (\underline{E}_f - \underline{R}).$$

To simplify this expression, set $\underline{v}_{f2} = \underline{v}_{f1} + \underline{v}_{f3} + \underline{v}_{f4}$. Then

$$1 - x_{f2}^* = m_f \underline{v}_{f2}(\underline{E}_f - \underline{R}).$$

The foreign investor's demand for investment options two, three

and four can now be written as follows:

$$\begin{bmatrix} 1-x^*_{f2} \\ x^*_{f3} \\ x^*_{f4} \end{bmatrix} = m_f \begin{bmatrix} \underline{v}_{f2} \\ \underline{v}_{f3} \\ \underline{v}_{f4} \end{bmatrix} (\underline{E}_f - \underline{R}) .$$

Or, when simplifying the above expression, we get

$$\underline{x}_f'^* = m_f \underline{Z}_f^{-1} (\underline{E}_f - \underline{R}). \qquad \text{(A1-12)}$$

Expression (A1-12) finally provides us with the foreign investor's demand for investment opportunities two, three and four as a function of his expectations and market observed forward rates.

Market equilibrium is obtained when the excess demand for investment opportunities two, three and four is zero, or when the domestic investor's demand for a particular option equals the foreign investor's supply of that option. Employing expressions (A1-7) and (A1-12), market equilibrium implies that

$$\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} = m_d \underline{Z}_d^{-1} (\underline{E}_d - \underline{R}) + m_f \underline{Z}_f^{-1} (\underline{E}_f - \underline{R}) .$$

Let $\underline{i}$ denote a column vector $\underline{i} = (1, 0, 0)'$. A solution for the vector $\underline{R}^*$ of equilibrium forward rates is then

$$\begin{bmatrix} C_2^* \\ r_2^{d*} \\ r_2^{f*} \end{bmatrix} = \left(\sum_{k=d}^{f} m_k \underline{Z}_k^{-1}\right)^{-1} \left(\sum_{k=d}^{f} m_k \underline{Z}_k^{-1} \underline{E}_k - \underline{i}\right) \qquad \text{(A1-13)}$$

In equilibrium, the international term structure of interest rates is a quite elaborate function of individual investors' expectations of future spot interest rates, of their expectations

of interest rate differentials which are functions of exchange rate expectations, of a complicated structure of elements of the inverse of their variance-covariance matrices and of their degree of risk aversion, all weighted by the sum of all investors' measures of risk aversion multiplied by the respective elements of the inverse of their covariance matrices. As the risk-free rate in each country is assumed to be exogenously determined, exchange rate expectations enter explicitly into the solution.

When extending this analysis to T periods, a solution for 2T-2 forward interest rates and C_T, the forward rate of change in the exchange rate over the investors' time horizon, can be derived.

A simpler result can be obtained by assuming that all traders in the capital markets have identical expectations. In that case expression (A1-13) becomes

$$\underline{R}^* = \underline{E} - \left(\sum_k m_k \underline{Z}_k^{-1}\right)^{-1} \underline{i}. \qquad \text{(A1-14)}$$

Here $\underline{E}$ is the vector of commonly shared expectations. As only the first element in $\underline{i}$ is different from zero and the first element in $\underline{R}$ is C_2, the exchange rate change over the investors' time horizon implied by the term structure of interest rates, it follows from expression (A1-14) that C_2 does not represent an unbiased estimate of investors' exchange rate expectations. On the other hand, the forward rates correctly reflect investors' expectations of interest rates in both countries, given common expectations. This latter result is identical to the one derived

by Bierwag and Grove for a closed economy.[6]

Earlier in Chapter 2 we assumed that investors lend or borrow in a foreign capital market only if the interest rate differential is larger than the expected rate of change in the exchange rate that would tend to offset the advantage of higher (lower) interest rates abroad. If this is true, then observed interest rate differentials overestimate the rate of change in the exchange rate actually expected by investors.[7] The same holds in our present model only if the first element of the right-hand term in expression (A1-14) is negative. For risk-averse investors the m_k will be positive. However, whether the whole element is positive or negative depends then on the individual investors' covariance matrices. If an investment in foreign bonds is regarded as a means to reduce overall portfolio risk because of expected low or negative correlations between domestic and foreign investment opportunities, then it is conceivable that indeed observed interest rate differentials underestimate rather than overestimate expected rates of change in exchange rates. It becomes an empirical question as to what actually holds in a particular case.

Because of this last result one may be inclined to regard the portfolio model developed in this appendix as a more general theory than the one presented above in Chapter 2. However, the very restrictive assumptions that had to be made in order to derive a solution to our problem render the portfolio model a less appealing and less general theoretical basis than the model developed by Roll.

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[6] Ibid., p. 60

[7] The empirical results reported on pages - above lent support to this view.

APPENDIX 2

SAMPLE SELECTION, DATA SOURCES, AND QUESTIONNAIRES

Almost all of the data employed for the empirical tests presented above in Chapter 5 had to be collected from original sources like public prospectuses, private placement memoranda, and corporate files. On the following pages we shall provide information on how we selected our bond samples and the time periods covered by these samples, which sources we used to identify Canadian-pay and U.S.-pay bonds to be included in these samples, and where we obtained the data on bond characteristics needed for our analysis. Also, the interview questionnaires that served as a guideline for our discussion with Canadian financial managers, investment bankers, and life insurance officers are reproduced in their original form.

Sample Selection. - Information has been gathered only on Canadian-pay and U.S.-pay bonds issued by corporations located in Canada and the proceeds of which were intended for use in Canada. Of course, we did not exclude an issue if its proceeds were used for the repayment of U.S. dollar debt or for the payment of imported goods. But the following bonds were excluded from our samples: (1) Canadian-pay bonds issued in Canada by firms located abroad, (2) U.S.-pay bonds issued in the United

States or in the Eurobond market by foreign subsidiaries of Canadian companies, and (3) bonds issued by Canadian chartered banks because they are not allowed to sell their bonds abroad. In other words, our analysis involves only the financial behaviour of such Canadian firms which, at least in principle, can borrow abroad to finance domestic investments. We are not interested in Canadian corporate borrowing abroad for investment in foreign countries because this does not lead to an inflow of long-term capital into Canada and because the managerial problems involved are quite different.

The empirical part of our study is mainly concerned with analyzing and comparing corporate financial activities regarding straight debt issues sold in the bond market. Consequently convertible bonds and bonds issued together with stocks and sold in so-called "units" have not been included into our bond samples. Whereas such issues are quite common in the Canadian market we could identify only two convertible U.S.-pay bonds. U.S. dollar issues also rarely carry warrants, but such bonds have been included. Two foreign customer loans made to a Canadian mining company by buying two U.S.-pay bond issues, two U.S.-pay bonds not sold but issued as collateral, bonds guaranteed by provincial governments, parent company loans and long-term U.S. dollar loans granted by the American Export-Import Bank to Canadian companies have all been excluded from our analysis.

From October 1950 through April 1962 and from June 1970 onwards the Canadian dollar has been allowed to float freely in foreign exchange markets. It was pegged to the United States dollar only during the period from May 1962 through May 1970. As a financial manager's perception of exchange risk may be a function of the prevailing exchange system, it seemed desirable to compare Canadian corporate financing behaviour during times of a flexible exchange rate with that during times of a fixed rate. However, when undertaking preliminary inquiries concerning the availability of data needed for this study, it soon became obvious that even basic information on "When did which corporation issue what kind of bond" was not readily available, particularly with respect to United States dollar bonds and private placements in Canada. In order to reduce the workload to a manageable level and increase the probability of actually obtaining the desireed data, it was therefore decided to gather data only on U.S.-pay and Canadian-pay bonds issued from 1960 through May 1973.

The number of U.S. dollar bonds issued by Canadian corporations during a given time period is small relative to the total number of new corporate bond issues floated during the same period. Considerable efforts were therefore made to collect complete data on <u>all</u> U.S.-pay bonds issued since January 1960. However, as discussed in Chapter 4, for the period 1960 to 1967 a few U.S.-pay issues were excluded from our sample through a random selection process.[1] This has been done to

[1]A company's U.S.-pay issues were numbered consecutively, and a random number table was used to select at least three of

avoid a potential bias which might have arisen because the larger, more regular borrowers in the United States usually provided us with all the information requested whereas data on other U.S.-pay issues were sometimes difficult to obtain. All U.S.-pay bonds have been grouped into "Sample 5". Table 4-1 (see p. 134 above) provides a summary of the characteristics of all our bond samples.

In order to allow a comparison of Canadian corporate financing behaviour in the United States with corporate activities in the domestic bond market, it was necessary to obtain information on the characteristics of Canadian-pay bonds. Our original plan called for the random selection of a sample of Canadian dollar issues covering the period from 1960 onwards. However, particularly on many small issues and private placements, the needed data are simply not available for early years. Consequently only for 1968 and later years random samples of Canadian-pay corporate bonds were drawn. 1969 was an unusual year for the Canadian bond market because of the very restrictive monetary policy pursued by the Bank of Canada, and therefore 1968 was included though some problems in gathering data for these two early years were anticipated. These samples of Canadian-pay bonds were drawn from the respective annual Record

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them or fifty per cent, whichever led to the higher number of issues selected.

of New Issues.[2] The 1973 sample was obtained from a cumulative record of this publication covering the period January to May 1973. Bonds in these random samples have been grouped into "Sample 1" ("CAonly") if they have been issued by corporations that have sold long-term securities in Canada only. All other bonds have been included in "Sample 2" ("CAandUS").

In addition, information has been collected on Canadian-pay bonds not contained in these random samples but issued since 1968 by corporations that borrowed at least once in the U.S. market since 1960. This has been done to obtain more complete information on domestic bonds sold by this group of corporations and to allow a better comparison between bonds floated by them in the Canadian and U.S. bond markets. "Sample 3" ("CAandUS") contains these issues.

Because of the data collection problems mentioned earlier, we gathered for the period from 1960 through 1967 data only on Canadian-pay bonds issued by corporations that approached the U.S. market at least once since 1960. This proved less difficult than collecting data on a random sample because most firms falling into this category are among the larger and better known Canadian companies. Some corporations in this group have

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[2]Published by the Financial Post Corporation Service, Toronto. The number of straight bond issues identified for each year and the number of issues in our random samples are as follows:

1968, 44 and 25;	1971, 76 and 35;
1969, 29 and 29;	1972; 62 and 35;
1970, 57 and 35;	1973, 34 and 18 (until May).

Bonds issued by chartered banks or non-Canadian corporations were deleted from the random samples. In a few instances bonds being members of the sample for a particular year turned out to have in fact been issued during December of the prece ding or January of

been borrowing almost continually in the Canadian market. In order to avoid them dominating this "Sample 4" ("CAandUS"), only at most four of their issues were selected. If they had issued Canadian-pay bonds close to the date of their U.S.-pay bonds included in the analysis, then these Canadian dollar bonds were selected. Otherwise a random number table was used.

Data Sources. - One of the most difficult tasks encountered during the empirical part of this study was the identification of individual U.S.-pay bond issues. To start with, we obtained from the Bank of Canada a list of sixty Canadian corporations which have issued debt in the United States since 1960.[3] Though this list was incomplete, it proved to be very helpful.[4] From

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the following year and were later classified accordingly.

[3]Unfortunately, the Bank of Canada refused to provide us with more detailed information. Two researchers at an American institution reported that the Bank of Canada made available to them privately the "date of issue and delivery, as well as the amount of each issue" with respect to new Canadian bonds payable in United States currency. See Caves and Reuber, p. 250.

[4]In its letter of April 13, 1973 to Professor W. Winiata, the Bank of Canada mentions the following: "The enclosed list of over sixty corporations was prepared from our records of individual issues by Canadian borrowers in the domestic and foreign capital markets. There are names which do not appear in the list for a variety of reasons. First, in the case of a private placement not publicly announced, we do not release information, Second, we have excluded issues which were exchanges for assets rather than for the raising of funds. Finally, we have omitted the occasional case in which a small corporation made minor and tentative use of the U.S. market. The three exclusions together do not involve more than twenty names and do not represent a significant credit flow when compared to the activities of the listed corporations."

this list, four firms had to be deleted. Two were bankrupt and it was virtually impossible to obtain information on their bond issues. One company issued only a convertible bond in the United States. And a fourth firm obtained only parent company loans. An item by item search of every annual edition of the Record of New Issues published since 1960,[5] of various annual reports and prospectuses, and information obtained from Canadian and American investment houses led to the identification of thirty-one additional Canadian corporations that sold U.S. dollar bonds since 1960. Some of these companies have been quite regular borrowers in the United States.[6]

With the help of this list of eighty-seven Canadian corporations that have sold one or more U.S.-pay issues since 1960 an attempt was made to identify individual U.S. dollar debt issues from public sources.[7] For many private companies this was impossible, and the information available on public companies proved to be incomplete with regard to U.S.-pay debt.

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[5]Peters, p. 3, notes that "apart from the incomplete data published by the Financial Post on new corporate bond issues (private placements and public offer ings), little data exist respecting new corporate debt financing in Canada". Our research indicates that this is still true. But in view of the fact that some new issues are never publicly announced the data seem to be as complete as one can expect them to be.

[6]Whether this indicates that the Bank of Canada's information on capital inflows is incomplete is difficult to judge.

[7]A complete list of data sources used for this study can be found on pages 218-219 above.

Consequently every firm was approached directly and asked for basic information on its foreign bonds[8] like date of issue, amount involved, and maturity. In general, the response was very favourable though a few corporations either outrightly refused the requested information or did not respond in spite of two letters and, in several cases, a direct phone call. Therefore for four companies not a single U.S.-pay issue could be identified though it is known that they have foreign debt outstanding.

The identification of Canadian-pay bonds not included in our random samples but sold by these eighty-seven companies since 1960 was less troublesome as published records are fairly complete in this respect. But in several instances we also had to enlist the help of the firms concerned.

After all bonds had been identified on which detailed information was to be collected, considerable efforts were made to obtain public prospectuses or private placement memoranda for the respective issues. Such documents usually contain all the information needed for this research. Local offices of Canadian investment dealers were very helpful in securing prospectuses on recent public issues by larger firms. However, information on smaller issues or bonds offered several years ago and on private placements was not readily available.

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[8]It was surprisingly difficult to secure the addresses of all eighty-seven firms, particularly of privately-owned companies and of those that had changed their names. For three firms addresses are still missing but at least one issue for each of these three companies has been identified.

This made it necessary to approach the head offices of forty-nine Canadian and American underwriters in an attempt to secure documents on particular issues underwritten or placed by these investment bankers. Many were very cooperative and sent all the information on file. Others, as a matter of policy, did not release documents older than one year. Also, private placement memoranda are generally not available through investment dealers.

So it turned out that in many instances, particularly with regard to private placements in Canada and the United States, the corporations themselves remained as the only source of information. Every effort was made to explain to them the importance of this research for a better understanding of the Canadian and international capital markets and strict confidentiality of any information provided was assured. Again many companies responded very favourably whereas others did not respond at all. Several private corporations gave detailed data on bond characteristics but omitted balance sheet and income statement data. In Exhibit A2-1 (see pp.245 -250 below) the data questionnaire used for obtaining this information is shown. Besides data needed for testing our theory some additional information has been collected which, we hope, will prove useful for further research on the Canadian corporate bond market.

Public sources have sometimes been used for collecting additional information. But in general these sources do not provide the detailed data on bonds required for this study.

Interviews. - When reviewing the literature on long-term capital flows between the United States and Canada we discovered that the decision-process that leads to the issuance of U.S.-pay bonds by Canadian corporations has apparently never been analyzed in detail. Therefore we thought it advisable not to rely exclusively on an interpretation of statistical results but to obtain additional information through discussions with financial managers who have been involved in such decisions. The questionnaire on which these discussions were based is reproduced in its original form in Exhibit A2-2 (see pp. 251 - 266 below. A concise summary of the answers obtained can be found on pp. 267-272.) A preliminary version of this questionnaire had been tested in exploratory interviews with three firms. All interviews took place during July and August of 1973 when we paid visits to Montreal, Toronto, Calgary, and Vancouver. Given these geographical constraints, those corporations were selected that either had several U.S. dollar bonds outstanding or had at least one such bond issued since 1969. The interviewee was usually the Vice President Finance or the Treasurer of the firm. In general, interviews lasted between forty-five and seventy-five minutes though sometimes discussions went on for two hours and more. Only twenty-one of the twenty-eight interviews asked for with corporations did come about because of problems caused by vacation time, disinterest, and strikes.

The advice of investment bankers plays an important role in a corporation's decision to sell bonds abroad. Therefore we also interviewed six Canadian underwriters. The questionnaire we used is shown in Exhibit A2-4 (see pp. 273-285 below).

The investment houses visited were those most active in the placement of U.S.-pay corporate securities. The relevant information was derived from the Record of New Issues which usually lists the Banking Group manager or the principal placement agent for each issue recorded. These six investment dealers are also among the leading underwriters of Canadian-pay bonds. The inverviewees were vice-presidents or partners active in the corporate underwriting field. In three instances, two members of the respective house participated in the interview. In addition, questionnaires were mailed to five American underwriters. Unfortunately, only two responded.

Life insurance companies are the most important institutional investors in Canadian corporate bonds.[9] Therefore investment officers in charge of the corporate bond portfolio in four companies were interviewed regarding their investment policies and strategies. The questionnaire is reproduced in Exhibit A2-5 (see pp. 286 - 296 below). The companies selected were those most active in the corporate bond market, given the geographical constraints imposed by our research budget. Interviews with insurance companies were sought because discussions in the literature suggested that institutional investment behaviour may be one of several factors leading to the placement of bonds with American investors.[10]

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[9] See Bank of Canada Review, March 1973, p. S129, Table A7: "Estimated Distribution of Holdings of Provincial, Municipal, Corporate and Other Bonds."

[10] On this point see also Fullerton, p. 312, who remarked with respect to the fifties: "The small group of institutional buyers of new corporate issues in Canada increases underwriting risks, because if the majority decide against a new issue there is no other place to turn to except the retail market or to volatile demand in the United States."

EXHIBIT A2-1

DATA QUESTIONNAIRE

Questionnaire Concerning Characteristics of U.S. Dollar and Selected Domestic Debt Issues of Canadian Corporations

Where the prospectus (or a statement in lieu of the prospectus) is available to the researcher, most of the following questions (with the possible exception of questions 5, 11, 12, and 20) can be answered therefrom. Consequently, this questionnaire is being used only where neither of the aforementioned statements is available to us.

Responses to the following questions are needed for statistical analyses only and will remain confidential. Any information provided by your company will be used in such a way as not to reveal information about your firm.

In order to make your task as easy as possible, answers have been drawn up whenever possible in such a manner that you have only to insert the data requested or to indicate by a check (✓) which part of the answer applies to your case or whether the answer is YES or NO. An OR means we need only one of the two pieces of information mentioned.

If the questionnaire is to be mailed please send it to

Dr. W. Winiata
Faculty of Commerce
University of British Columbia
Vancouver 8, B. C.
Canada

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1. Name of firm:

2. Month and Year of issue:
   (Or date of first delivery if issued in several closings)

3. Date prospectus was issued OR contract was finalized:

4. Total amount issued:

5. Has the issue been delivered in several closings? YES NO
   If YES: Please indicate dates and amounts of drawdowns.

	Date	Amount
1st drawdown:		
2nd drawdown:		
3rd drawdown:		
4th drawdown:		

6. Coupon: _____%
(If not issued at par ___, indicate yield ____% OR issue price_____.

7. Are these sinking fund or serial bonds? YES NO
(If YES, please provide repayment schedule on page 4, see question 21)

8. Month and year of (final) maturity:

9. Are these bonds extendable or prepayable? YES NO

If YES: Please indicate date(s) to which bonds are extendable/ at which bonds are prepayable.

Bonds are extendable to/prepayable at:

10. Was this a public offering ___ or a private placement ___ or both ___?

11. Underwriting discount (placement fee): _____% (OR: Total compensation payed to underwriter(s)/placement agent(s): $_____.

12. Other issuing expenses: $_____.

13. Are the bonds unsecured ___ or secured ___?
If secured, are they secured by a first mortgage ____?

14. Are the bonds redeemable before maturity? YES NO
If YES: a) For the first time redeemable during the year ending _____at _____%.

b) Redeemable at par (100.00%) for the first time in 19__.

c) Do the bonds have a non-call feature? YES NO
If YES: Bonds are not redeemable prior to 19__ if refunded by debt yielding less than present issue.

15. Have warrants been attached to the bonds? YES NO

16. Are your company's stocks listed at a stock exchange? YES NO
If YES: At a Canadian stock exchange ___, at a U.S. stock exchange ____, at another foreign stock exchange ____?

17. What was the intended use of the proceeds of this issue?

a) For capital expenditures, working capital, and so on ___.

b) For funding of shorter-term Canadian debt ___ or U.S. debt ___.

c) For refunding of long-term debt denominated in Canadian dollars ____ or denominated in U.S. dollars ____.

Please comment.

18. To what extent is your firm owned by

a) U.S. shareholders? _____%

b) Other foreign shareholders? _____%

19. Does your firm have branch plants or subsidiaries in

a) the U.S.? YES NO

b) other foreign countries? YES NO

20. Does your firm engage in exports or imports of any kind? YES NO

If YES: a) Can you provide us with a rough estimate of that part of your total operating revenue (gross income) that was denominated in U.S. dollars in 19 ____? (The year preceeding the date of issue).

About U.S. $_____. (OR: About ___% of total revenue).

b) Can you provide us with a rough estimate of that part of your total expenses that was denominated in U.S. dollars during the same year?

About U.S. $_____. (OR: About ___% of total expenses).

21. When these bonds are sinking fund or serial bonds, please provide retirement schedule. Give data only for mandatory retirements. If the firm may opt to increase the sinking fund payments at its discretion, please indicate ____.

We realize that the information which is requested in the following questions is typically not available from private corporations. However, for the aggregative analyses which we intend to perform, this information is very important as it would enhance the quality of our results considerably. We sincerely hope that it will be made available.

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22. (a) What were your firms total assets at the end of your fiscal year immediately preceeding this issue?

19____ $_____

OR (b) If this issue was intended to finance your company's initial investment and to allow you to commence operations would you provide pro-forma balance sheet data? (If this is the case, skip questions 24 and 25).

23. Please provide the following information on your firm's liabilities and shareholder's equity at the end of the same year:

a) current and accrued liabilities: $_____
b) Medium-term and Long-term debt: $_____.
c) Deferred credits, including deferred income taxes, and other items: $_____
d) Total shareholders' equity (including common and preferred equity paid in, retained earnings and surpluses): $_____

24. For the five fiscal years preceeding the date of this issue, what was your firm's total operating revenue (gross income/gross earnings) during each year?

19__:
19__:
19__:
19__:
19__:

25. What were your firm's net earnings (net income) during the same years?

19__:
19__:
19__:
19__:
19__:

26. If this issue is guaranteed by another corporation ____, please provide in questions 22 to 25 in separate columns the same information for the guarantor. If the issue has several guarantors ___, please provide data only for principal or largest guarantor.

The guarantying firm's name is _____.

EXHIBIT A2-2

INTERVIEW QUESTIONNAIRE, CANADIAN CORPORATIONS

Introduction to an Interview with a Canadian Issuer of U.S. Dollar Bonds

As you already know from your correspondence with Dr. Winiata, I am conducting a study on international bond financing by Canadian corporations. The purpose of this research is to gain a better understanding of the financial behaviour of Canadian corporations, particularly with regard to foreign borrowing activities. It is hoped that these efforts will provide new insights into the determinants of international capital flows and the relationships between Canadian and international capital markets.

As part of its cultural exchange program with Germany the Canadian Government, through the Canada Council, is supporting my studies and providing most of the financing for this research.

Interviews will be conducted with about twenty-five industrial companies. In addition, data will be assembled from another seventy companies, from investment dealers and from major institutional investors. Any information provided by a company will be used in such a way so as not to reveal information about that company. The analyses will be in terms of Canadian corporate behaviour in general.

The sequence of the questions to follow attempts to roughly trace in chronological order the considerations and decisions involved from planning a new issue, to selling the bonds and to servicing the debt outstanding. You may give multiple answers to these questions whenever you think that this better reflects all the factors you took into consideration. Whenever possible, please answer these questions with respect to your most recent U.S. dollar issue.

K. Stroetmann,
Ph.D. Candidate,
Faculty of Commerce and Business Administration
University of British Columbia
Vancouver, Canada

I. WHY DID YOU APPROACH THE UNITED STATES BOND MARKET?

In the main this group of questions will explore the reasons behind your decision to float bonds denominated in United States dollars. As a preface I should like to ask you a question on the kind of long-term financing instruments you took into consideration when finally deciding for a U.S.-pay issue.

1. A firm in need of long-term outside funds usually has a choice between new equity financing and the issuance of bonds. In addition, a Canadian firm intending to float a new bond issue often can choose between bonds denominated in Canadian dollars and bonds denominated in U.S. dollars. Many companies, however, consider only one alternative. -When your firm was searching for long-term funds and finally issued U.S.-pay bonds, did you make a choice between (or did you choose a package of)

a) A new stock issue, a bond issue in Canada, and a bond issue in the United States?	YES	NO
b) A Canadian bond issue and a U.S. bond issue?	YES	NO
c) A stock issue and a U.S. bond issue?	YES	NO
d) Or did you only consider the U.S. bond market?	YES	NO

2. Quite different reasons are often mentioned as to why Canadian firms approach the U.S. bond market. In your particular case, did your company take into consideration the flotation of an issue denominated in U.S. dollars

a) Because you thought the Canadian market would not be willing to absorb another issue of your firm <u>because of earlier issues</u> by your company?	YES	NO
b) Because the Canadian market was depressed and would not absorb a straight bond issue without an <u>equity sweetener</u>?	YES	NO
c) Because your underwriter advised you to consider the U.S. market?	YES	NO
d) Because U.S. investors approached your firm with the intention of lending money to your firm?	YES	NO
e) Because of earlier successful U.S.-pay bond issues by your company?	YES	NO

f) (Please see next page.)

f) Because you considered the size of the bond issue as too large for the Canadian market? YES NO

If YES:

Why did you not float part of the issue in Canada and part of it in the United States?

If you did this, what determined the size of the U.S.-pay issue relative to the size of the Canadian-pay issue?

Or, are there any other reasons why you considered flotation of a U.S.-pay issue?

3. Typically, a firm would like to be free to specify the characteristics of a bond issue (including maturity, call features, and so on) according to its individual needs. Often, however, these characteristics are influenced by capital market conditions and lender behavior. When you made the decision for a U.S. dollar issue, were you particularly attracted by

a) longer terms to maturing available in the U.S. market compared to maturities in the Canadian market? YES NO

b) Less restrictive call features? YES NO

c) More suitable sinking fund requirements? YES NO

d) Less restrictive indentures? YES NO

e) Lower underwriters' discounts and issuing expenses? YES NO

f) Lower interest rates? YES NO

4. Speaking about the characteristics of your U.S. dollar issue, what determined the maturity of the bonds:

a)	The longest maturity available to your firm at that point in time in the U.S. market?	YES	NO
b)	The lenders' preferences with regard to maturity?	YES	NO
c)	The estimated life time of the investment project to be financed through that issue?	YES	NO
d)	Your firm's preferences with regard to maturity? Please comment. (Does, for example, the exchange rate risk influence the length of the term to maturity you prefer?)	YES	NO

5. Becoming familiar with a foreign capital market is sometimes not an easy task. Through your parent company or subsidiaries in the United States or through other sources, did your firm already have contacts with American financial institutions which made access to the U.S. bond market easier? YES NO

If YES:

Please specify source of earlier contact:

Parent company?	YES	NO
U.S. subsidiary?	YES	NO
Exports to the U.S.?	YES	NO
Earlier U.S. issues?	YES	NO

Other: (Please comment.)

II. INTEREST AND TRANSACTION COSTS

We should expect a firm to try to minimize its cost of capital (percentage-wise). The yield required by investors will be the major factor determining the cost of debt capital to a company. However, underwriters' compensations and other transaction costs may also be of considerable influence on the cost of capital. The next group of questions will explore some of the differences between Canadian and U.S. bond markets with respect to interest and other costs.

A) Interest Costs

6. Interest rate differentials observable between the Canadian and the U.S. capital markets do not truly reflect the actual difference in interest costs as far as borrowing by a Canadian corporation is concerned. In many cases, American investors seem to demand a higher yield on Canadian bonds denominated in U.S. dollars than on American bonds of comparable quality. Has this been your experience? YES NO

Do you think it makes any difference in interest costs whether you approach the U.S. bond market regularly or not? YES NO
Please comment:

7. Forecasting capital market conditions is a very difficult task. When you were choosing the exact date of issue for your U.S. dollar bonds, was your timing influenced (in the sense of advancing or postponing the date of issue by a month or more) by

a) your expectations with regard to potential changes in long-term interest rates in the U.S.? YES NO

b) Your expectations with regard to short-term interest rates at home? YES NO

B) Underwriters' Discounts

8. Almost no evidence exists on underwriting compensations payed by Canadian firms issuing U.S.-pay bonds. In your opinion, are underwriters' discounts on issues of Canadian firms usually higher in the U.S. than in the Canadian market

a) On public offerings? (higher in the U.S. market) YES NO, THE SAME NO, LOWER

b) On private placements? (higher in the U.S. market) YES NO, THE SAME NO, LOWER

9. Sometimes U.S.-pay issues by Canadian firms are underwritten by New York investment bankers. Was the investment banker who was the principal underwriter of your U.S. dollar issue the same who usually underwrites your Canadian bond issues? YES NO

If YES:

Why did you not choose a U.S. underwriter?

If NO:

Why did you choose a U.S. underwriter?

10. Often a firm can choose between a public offering and a private placement when issuing new bonds. What determines your choice between a public offering and a private placement when issuing bonds in Canada? Please comment.

Have you ever considered a public bond offering in the United States? YES NO

In your opinion, what are the advantages and/or disadvantages of a public offering in the U.S. bond market compared to a public bond offering in the Canadian bond market?

C) Other Transaction Costs

11. Apart from underwriters' discounts, do you think that other flotation costs like printing of bonds and prospectuses, trustee's fees, legal fees, and so on are higher for a U.S.-pay issue than for a comparable issue denominated in Canadian dollars when the issue is

a) a public offering? (higher in the U.S.) YES NO, THE SAME NO, LOWER

b) a private placement? (higher in the U.S.) YES NO, THE SAME NO, LOWER

12. When issuing the U.S.-pay bond in question, did you prepare an estimate of the costs your company incurred with regard to your company's officials' time, travelling costs, and other company resources? YES NO

Can you provide me with a rough estimate of these costs? YES NO

$_____

Were these costs higher than for a comparable Canadian-pay issue? YES NO

III. EXCHANGE RATE RISK

When issuing a bond denominated in a foreign currency, a firm faces two peculiar problems. (1) The proceeds of the issue have to be converted into Canadian dollars, and the exchange rate prevailing at the time of conversion determines the amount of Canadian dollars actually obtained. (2) Changes in exchange rates during the bonds' lifetime may change the actual costs of foreign borrowing considerably. I would like to explore these two problem areas.

A) Exchange Rate Risk At Time of Issue

13. The timing of a bond issue is usually affected by a host of factors. When you chose the exact date of issue for the U.S.-pay bond, was your timing influenced (in the sense of advancing or postponing the date of issue by a month or more) by your expectations with regard to potential exchange rate changes? YES NO

If YES:

a) Were these expectations with regard to short-term fluctuations around the exchange rate level prevailing during that time period? YES NO

b) Were these expectations with regard to changes in the parity of the Canadian dollar (during times of a fixed exchange rate) or long-term changes in the exchange rate level prevailing before that particular time period (during times of a floating exchange rate?) YES NO

14. Did you deliver the U.S.-pay bonds to your underwriter (or the lender)

a) Against payment in U.S. dollars? YES NO

b) Against Canadian funds representing the Canadian dollar equivalent of the proceeds? YES NO

If you obtained U.S. dollars, did you convert part or all of those U.S. funds into Canadian Funds? YES NO

If YES:

a) Immediately in the spot exchange market? YES NO

b) Immediately in the forward exchange market? YES NO

c) Or did you negotiate at an earlier date a forward exchange contract maturing at the time of delivery of the bonds? YES NO

15. Sometimes the possibility of a devaluation of the Canadian dollar is regarded as a serious risk which may lead to higher costs of foreign borrowing than anticipated. On the other hand, it is argued that foreign borrowing will usually turn out to be cheaper than borrowing in Canada. When you were contemplating the issuance of U.S. dollar bonds, did you regard the possibility of a devaluation of the Canadian dollar as a serious risk influencing your choice of where to float the new bonds? Please comment. YES NO

If YES:

Forecasting future exchange rates is very difficult and few people attempt to make long-range forecasts. Did you attempt a quantitative evaluation of the exchange rate risk by

a) Forecasting the future trend of the exchange rate? YES NO

b) Or, by estimating future exchange rates and calculating whether they would eliminate any cost advantage derivable from lower interest rates abroad? YES NO

What information did you use when attempting to evaluate the exchange rate risk or to forecast exchange rates? Please comment.

Did the exchange rate risk influence your choice between sinking fund bonds and bonds where the principal becomes due only at maturity? YES NO

Or are other considerations relevant for such a choice? Please comment.

16. Some people argue that the larger the size of a U.S. dollar issue the greater is the firm's exposure to exchange rate risk. Was the size of your U.S.-pay bond issue solely determined by your financial needs, or did your view of the exchange rate risk influence the size?

The size of the issue was solely determined by our financial needs. YES NO

If NO:

a) If, in your view, the exchange rate risk had been lower, would you have issued more U.S.-pay bonds? YES NO

b) If, in your view, the exchange rate risk had been <u>higher</u>, would you have issued

i) fewer U.S.-pay bonds and substituted Canadian-pay bonds? YES NO

ii) Or would you have issued no U.S.-pay bonds and only Canadian-pay bonds? YES NO

Please comment.

B) Exchange Rate Risk Management During Term of the Issue

17. As long as U.S. dollar bonds are outstanding, your firm has a continuous need for U.S. dollars to meet interest (and sinking fund) payments. Where and when do you usually obtain the necessary U.S. funds?

a) Usually in the spot exchange market approximately _____days before payments become due. YES NO

b) Usually in the forward market by negotiating a forward contract for delivery of U.S. dollars. Please comment on the length and other matters including availability. YES NO

c) Usually Company revenue denominated in U.S. dollars is available to meet these payments. YES NO

18. When the international monetary scene is unsettled and/or when you expect an international monetary crisis, do you cover your U.S. dollar commitments at an earlier date than usual by buying the needed U.S. dollars in advance? YES NO

If YES:

Do you buy those U.S. dollars in

a) the spot exchange market approximately _____days before payments become due? YES NO

b) Or, in the forward market by negotiating a _____day forward contract for delivery of U.S. funds? YES NO

(Please indicate the number of days in each case.)

19. If most or all of the principal of an issue were to become due at maturity (that is, if there were a large balloon payment), would this influence your evaluation of the exchange rate risk involved in borrowing in the U.S. market compared to a sinking fund bond? YES NO

If YES:

a) How would it influence your evaluation of the exchange rate risk involved? Please comment:

b) Would you expect to be able to refund the bond issue by another U.S.-pay issue? YES NO

20. Have you ever considered diversifying the exchange rate risk by denominating a new bond issue in a currency other than the Canadian or U.S.? Please comment: YES NO

20a. Does the exchange rate risk influence the call features you negotiate for U.S.-pay bonds? YES NO

If YES, please comment.

If NO:

What usually determines the call features on your bonds?

IV. MISCELLANEOUS QUESTIONS

Finally, I have some miscellaneous questions dealing with the attitude of shareholders toward foreign borrowing, the influence of the Bank of Canada on foreign borrowing and with the frequency (or infrequency) at which your company approached the U.S. bond market.

21. Do you think that your company's stockholders/owners are indifferent with regard to foreign borrowing by your firm? YES, indifferent NO

If NO:

Or, do you assume that they are generally not in favour of foreign borrowing? YES, not in favour NO, in favour

How is your stock price affected, if at all?

22. Now and then, the Bank of Canada announces that it is in favor or against foreign borrowing by Canadian governments and corporations. Did the Bank of Canada's position on foreign borrowing influence your decision on where to float the bond issue in question? YES NO

Did you consult with the Bank of Canada before issuing your U.S. dollar denominated bonds? YES NO

IF YOUR FIRM WENT "REGULARLY" TO THE U.S. MARKET DURING THE LAST FIVE YEARS, THAT IS, ISSUED TWO OR MORE U.S.-PAY BONDS SINCE 1968, SKIP QUESTION 23; OTHERWISE, SKIP QUESTION 24.

23. (ANSWER THIS IF YOUR COMPANY HAS ISSUED NO BONDS/ONLY ONE ISSUE IN THE UNITED STATES SINCE 1968.) Why did you <u>not</u> approach the U.S. bond market more regularly?

a) There was no need for long-term debt capital. YES NO

b) Because interest rates payable by your Company in the U.S. were not sufficiently lower (relative to interest rates on your bonds in the Canadian market). YES NO

c) Because flotation costs (underwriters' discounts and other expenses) are too high for your firm in the U.S. market. YES NO

Continued ....

23. Cont'd.

d) Because conditions with respect to the following are, for your company, less attractive in the United States than in Canada?

i)	maturity	YES	NO
ii)	call features	YES	NO
iii)	sinking fund payments	YES	NO
iv)	other indentures?	YES	NO

e) Because you considered the exchange rate risk to be too high? YES NO

f) Because of other reasons? Please comment.

24. (ANSWER THIS QUESTION IF YOUR FIRM APPROACHED THE U.S. BOND MARKET MORE OR LESS REGULARLY DURING RECENT TIMES.) Why is the United States capital market attractive to your Firm?

a)	Call features are less restrictive.	YES	NO
b)	Underwriters' discounts and issuing expenses are lower.	YES	NO
c)	Interest rates are lower.	YES	NO
d)	Maturities are longer.	YES	NO
e)	Sinking fund requirements are less restrictive.	YES	NO
f)	Indentures are less restrictive in the U.S. than in the Canadian market.	YES	NO

Please comment on these and any other reasons which made you approach the U.S. bond market regularly.

V. POSITION OF INTERVIEWEE

Finally, may I ask some questions on your personal background?

25. a) First, what is your present position in this company?

b) For how long have you been in this position? _____years

c) For how long have you been associated with this firm? _____years

d) Are you usually involved in decisions regarding the issuance of Canadian-pay bonds? YES NO

e) Were you close to any U.S.-pay issue of your company? YES NO

f) How old are you? _____years

g) Would you briefly describe your experience and education to date?

EXHIBIT A2-3

SUMMARY OF ANSWERS OBTAINED FROM CANADIAN CORPORATIONS

Here we present a concise summary of the answers obtained from corporate managers with respect to the questions contained in the prece ding questionnaire. As interviewees usually responded to a question only if they could answer it with YES, only the number of YES answers will be given except where specifically noted. Not all managers answered all questions, and sometimes multiple answers were given. In some instances we summarize the results of our dis ussions only because quantitative data would be rather meaningless. It must also be borne in mind that in many cases simple "YES" or "NO" answers were qualified through additional comments.

Question:	Answer:
1. a)	YES: 5
b)	YES: 13
c)	YES: 0
d)	YES: 3
2. a)	YES: 2
b)	YES: 2
c)	YES: 10
d)	YES: 0
e)	YES: 8
f)	YES: 9, but it was generally agreed that "size is no longer a major consideration."
Why did you not split the issue?	Transaction costs increase; "U.S. investors stick to interest rate agreed upon even if contract has not yet been signed;" arrangement of private placements in the U.S. is faster than of public offerings in Canada.
Why did you split the issue?	Political considerations; availability of funds in Canada.

Question:	Answer:
Other reasons?	Availability of private placements and forward commitments: 5 (See also question 10) U.S. dollar income: 1
3. a)	YES: 5
b)	YES: 0
c)	YES: 1
d)	YES: 2
e)	YES: 3
f)	YES: 19
4. a)	YES: 5
b)	YES: 3
c)	YES: 7
d)	YES: 7; nobody indicated that exchange risk considerations influenced decisions regarding the term to maturity; several managers said that, depending on market conditions, they attempt to trade off interest costs and maturities in Canada.
5.	YES: 18
parent comp.:	4
U.S. subsidiary:	2
Exports to U.S.:	2
Earlier U.S. Issues:	14
Others:	Connections through shareholders or directors: 5
6. a)	YES: 11 NO: 10
b)	YES: 14 NO: 3 Don't know: 3
7. a)	YES: 11 NO: 8
b)	YES: 5 NO: 10 (Our general impression was that the need for funds rather than interest rate expectations is the main variable influencing the timing of a bond issue).
8. a)	YES: 0 NO, THE SAME: 4 NO, LOWER: 4 Don't know: 10
b)	YES: 0 NO, THE SAME: 11 NO, LOWER: 1 Don't know: 4

Question:	Answer:
9.	YES: 7 NO: 9
Why not U.S. underwriter?	Not required for private placement, U.S. investors know us: 5; "As a Canadian firm we use a Canadian underwriter, he has enough placement power;" "Our Canadian underwriter has a U.S. office, and the costs are the same."
Why U.S. underwriter?	Better placement power: 7; parent company decision: 2.
10.	Major reasons for choosing a public issue in Canada are: 1. "That's where money is available." There is a "continuous market" for such issues, even very large issues can be sold publicly, and future financing is easier. 2. It provides desired public exposure and offers an additional investment opportunity to stockholders. 3. Trust deeds are less stringent, and the borrower is not "at the mercy of a few lenders." Major reasons for choosing a private placement are: 1. They are regarded as overall cheaper, and as faster and easier to arrange. 2. Because of the small number of bond holders, they provide more flexibility, and trust deeds are easier to change. 3. Public exposure is avoided. Disadvantages of public offerings in the U.S.: 1. SEC requirements. 2. Bank of Canada discourages them. 3. The Canadian market for public offerings provides sufficient funds. Advantages of private placements in the U.S.: 1. Availability of forward commitments and delayed deliveries. 2. American lenders feel bound by verbal agreements. 3. Even very large amounts are usually readily available. 4. Small number of lenders. 5. Trust deeds are more stringent, but American lenders are more flexible and trust deeds are easier to change.

Question:	Answer:
11. a)	YES: 13 NO, THE SAME: 1 NO, LOWER: 1 Don't know: 4
b)	YES: 10 NO, The SAME: 6 NO, LOWER: 0 Don't know: 1
12.	YES: 0 NO: 21
Rough estimate?	YES: 0 NO: 21 (But one firm indicated that one officer spent three months full time on the preparation of the issue. Another manager said that three staff members spent almost a year on analyzing the two capital markets).
Costs higher than in Canada?	YES: 7 NO: 4
13.	YES: 3 NO: 18
If YES: a)	YES: 2 NO: 1
b)	YES: 1 NO: 2 (Those who answered "YES" were managers in the banking and finance industry. Usually they also borrow U.S. dollars on a short-term basis. In gerneral, managers pointed out that they find it difficult to forecast interest rates, and that forecasting exchange rates is almost impossible.)
14. a)	YES: 20
b)	YES: 1
Funds converted into Can. $$	YES: 18 NO: 3
a)	YES: 12 (Total amount: 9; only part of the funds: 3)
b)	YES: 0
c)	YES: 8 (Total amount: 4; only for part of the funds: 4) (Sometimes funds not needed immediately are invested in short-term U.S. dollar papers. In one case, the trust deed required this explicitly.)
15.	YES: 8 NO: 13
Evaluation of exchange risk:	
a)	YES: 1
b)	YES: 6
Information used:	Canadian and U.S. banks, underwriters, in-house economists, past history of exchange rates.

Question:	Answer:
Did exchange risk influence sinking funds?	YES: 0 NO: 5
16.	YES: 10 NO: 0
17. a)	YES: 9 (approximately 1 to 10 days beforehand).
b)	YES: 4 (length of contract is between 1 month and four years).
c)	YES: 10 (Two companies obtain U.S. dollars by contract to cover part of their U.S. debt obligations).
18.	YES: 3 NO: 18
If YES: a)	YES: 1 (approximately 15 days beforehand).
b)	YES: 2 (approximately 6 to 16 months forward).
19.	YES: 8 NO: 6 Don't know: 2
If YES: a)	All associated a higher risk with a large balloon payment, but only two managers were specific about the expected risk by indicating that sinking fund payments tend to spread exchange risk over time and by pointing out that a large payment may have a depressing effect on the exchange market.
b)	YES: 2 (5 others answered with a qualified YES: "It depends on the capital market situation.")
20.	YES: 5 NO: 16 (Several firms have looked at European capital markets, but interest rates turned out to be higher there. Also, the perceived exchange risk is considerably higher.)
20a.	YES: 0 NO: 14 (Because lenders insist on financial non-call clauses, other call features are of little interest and determined by standard market practice.)

Question:	Answer:
21.	YES: 12 NO: 9
If NO:	YES, not in favour: 5 NO, in favour: 4 (Widely held public corporations indicated that their stockholders are indifferent between domestic and foreign borrowing, and no effect on stock prices is expected. Managers of other firms said that major stockholders on the Board of Directors favoured domestic financing. In two cases, foreign parent companies preferred U.S. financing.)
22.	YES: 13 NO: 8
Consultation with Bank of Canada?	YES: 8 NO: 11 (Several companies that did not consult with the Bank of Canada indicated that, under the changed circumstances, they would now ask for the Bank's advice.)
23. a)	YES: 5
b)	YES: 8
c)	YES: 1
d) i)-iv)	YES: 0
e)	YES: 1
f)	Policy of the Bank of Canada: 3 "As a Canadian company we borrow in Canada," changed political climate: 3 Canadian bond market has improved, issues are easier to place now: 3
24. a)	YES: 0
b)	YES: 0
c)	YES: 5
d)	YES: 0
e)	YES: 0
f)	YES: 2 (One manager said that they were more concerned about the possibility of changing indentures if it became opportune. He pointed out that, as a matter of policy, one Canadian institution refuses changes in trust deeds.)
Other reasons:	Private placements, forward commitments available: 3 Increase financial flexibility by keeping in contact with both the Canadian and the U.S. capital market: 1

EXHIBIT A2-4

INTERVIEW QUESTIONNAIRE , UNDERWRITERS

Introduction to an Interview with a Canadian Underwriter of Canadian Corporate Bonds Denominated in U.S. Dollars

As you already know from your correspondence with Dr. Winiata, I am conducting a study on international bond financing by Canadian corporations. The purpose of this research is to gain a better understanding of the financial behavior of Canadian corporations, particularly with regard to foreign borrowing activities. It is hoped that these efforts will provide new insights into the determinants of international capital flows and the relationships between Canadian and international capital markets.

As part of its cultural exchange program with Germany the Canadian Government, through the Canada Council, is supporting my studies and providing most of the financing for this research.

Interviews will be conducted with several Canadian investment dealers who have underwritten U.S. dollar bonds issued by Canadian corporations. The underwriter's advice seems to play an important role in a firm's decisions as to where to float a bond and as to what the characteristics of the issue should be. Any information provided will be used in such a way so as not to reveal information about any particular company. The analyses will be in terms of Canadian corporate behavior in general.

The sequence of the questions to follow attempts to roughly trace in chronological order the considerations and decisions involved from planing a new issue to placing the bonds. You may give multiple answers to these questions whenever you think that this better highlights the factors that are relevant with respect to new U.S.-pay bond issues of Canadian corporations.

K. Stroetmann,
Ph.D. Candidate,
Faculty of Commerce and Business Administration,
University of British Columbia,
Vancouver, Canada.

I. WHY DO CANADIAN CORPORATIONS APPROACH THE UNITED STATES BOND MARKET?

In the main this group of questions will explore the reasons behind the decision by Canadian Corporations to float bonds denominated in United States dollars (and the underwriter's influence on these decisions).

1. When one of the firms with which you have underwriting relationships approaches the United States bond market, does it usually go because you have recommended this or is it usually the firm's management that first suggests that an issue be placed in the United States?

   a) Usually we advise the firm to approach the U.S. market. YES NO

   b) Usually the firm's management first suggests the U.S. market. Please comment. YES NO

2. When, or under what circumstances do you recommend to your clients to place a U.S.-pay issue in the United States?
   Please comment briefly as subsequent questions will enquire into specific aspects.

3. Does a Canadian company have to meet certain criteria before you would recommend the U.S. market for a bond issue? Or, in your opinion, are the U.S. and Canadian markets equally accessible?
   Please comment.

4. Quite different reasons are often mentioned as to why Canadian firms approach the U.S. bond market. In your opinion, what are the main reasons why Canadian companies take into consideration the floatation of an issue denominated in U.S. dollars?

a) Because the corporation's management thinks the Canadian market would not be willing to absorb another issue of their firm because of earlier issues by the same company? YES NO

b) Because the Canadian market is depressed and they think it would not absorb a straight bond issue without an equity sweetener? YES NO

c) Because their underwriter advised them to consider the U.S. market? YES NO

d) Because U.S. investors approached the firm with the intention of lending money to the firm? YES NO

e) Because of earlier successful U.S.-pay issues by the same company? YES NO

f) Because the firm's management considers the size of the bond issue as too large for the Canadian market? YES NO

If YES:

Why do they not choose to float part of the issue in Canada and part of it in the United States?

Indeed, some firms float part of an issue in Canada and part of it in the United States. In your opinion, what determines the size of the U.S.-pay issue relative to the size of the Canadian-pay issue?

Or do you think there are other reasons why Canadian corporations consider flotation of a U.S.-pay issue?

5. Typically, a firm would like to be free to specify the characteristics of a bond issue (including maturity, call features, and so on) according to its individual needs. Often, however, these characteristics are influenced by capital market conditions and lender behavior. When Canadian firms decide in favour of a U.S. dollar issue, do you think they are particularly attracted by

a)	Longer terms to maturing available in the U.S. market compared to maturities in the Canadian market?	YES	NO
b)	Less restrictive call features?	YES	NO
c)	More suitable sinking fund requirements?	YES	NO
d)	Less restrictive indentures?	YES	NO
e)	Lower underwriters' discounts and issuing expenses?	YES	NO
f)	Lower interest rates?	YES	NO

6. Speaking about the characteristics of U.S. dollar issues, what usually determines the maturity of these bonds:

a)	The longest maturities available in the U.S. market?	YES	NO
b)	The lenders' preferences with regard to maturity?	YES	NO
c)	The estimated life time of the investment project to be financed through that issue?	YES	NO
d)	The firm's preferences with regard to maturity? Please comment.	YES	NO

e) Do you think that the exchange rate risk influences your clients' choice of maturities, that is, do they prefer longer or shorter maturities than they would otherwise because of possible exchange rate changes? YES NO

Do they ask you for advise in this respect? YES NO
Please comment.

Are maturities on Canadian-pay bonds usually determined by the same factors, or are there significant differences between the two markets with respect to maturities available to Canadian corporations?
Please comment.

II. INTEREST AND TRANSACTIONS COSTS

We should expect a firm to try to minimize its cost of capital (percentage-wise). The yield required by investors will be the major factor determining the cost of debt capital to a company. However, underwriters' compensations and other transaction costs may also be considerable influence on the cost of capital. The next group of questions will explore some of the differences between Canadian and U.S. bond markets with respect to interest and other costs.

A) Interest Costs

7. Interest rate differentials observable between the Canadian and the U.S. capital markets do not truly reflect the actual difference in interest costs as far as borrowing by a Canadian corporation is concerned. In many cases, American investors seem to demand a higher yield on Canadian bonds denominated in U.S. dollars than on American bonds of comparable quality. Has this been your experience? YES NO

   Do you think it makes any difference in interest costs whether Canadian corporations approach the U.S. bond market regularly or not? YES NO
   Please comment.

8. Forecasting capital market conditions is a very difficult task. In your experience, when Canadian firms choose the exact date of issue for U.S. dollar bonds, is their timing usually influenced (in the sense of advancing or postponing the date of issue by a month or more) by

   a) Their expectations with regard to potential changes in long-term interest rates in the <u>U.S.</u>? YES NO

   b) By their expectations with regard to short-term interest rates <u>at home</u>? YES NO

Do you usually make particular recommendations in this respect? YES NO
Please comment.

B) Underwriters' Discounts

9. Almost no evidence exists on underwriting compensations payed by Canadian firms issuing U.S.-pay bonds. In your opinion, are underwriter's discounts on issues of Canadian firms usually higher in the U.S. than in the Canadian market?

a) On public offerings? (higher in the U.S. market) YES NO, the same NO, lower

b) On private placements? (higher in the U.S. market) YES NO, the same NO, lower

If, in your opinion, there are differences in underwriting costs, why do you think these differences exist?
Please comment.

For foreign-pay issues, underwriters sometimes demand reimbursement for additional expenses incurred besides the usual underwriters' discount. Do you sometimes charge your clients for additional expenses peculiar to U.S.-pay issues? YES NO

If YES: Could you itemize these costs?

10. Sometimes U.S.-pay issues by Canadian firms are underwritten by New York investment bankers. Why, in your opinion, do some Canadian companies prefer U.S. underwriters?
Please comment.

11. Often firms can choose between a public offering and a private placement when issuing new bonds. What usually determines their choice between a public offering and a private placement when issuing bonds in Canada?
Please comment.

In your opinion, what are the advantages and/or disadvantages to Canadian corporations of public offerings in the U.S. bond market compared to public bond offerings in the Canadian bond market?

C) Other Transaction Costs

12. Apart from underwriters' discounts, do you think that other flotation costs like printing of bonds and prospectuses, trustee's fees, legal fees, and so on are higher for a U.S.-pay issue than for a comparable issue denominated in Canadian dollars when the issue is

a) A public offering	(higher in the U.S.)	YES	NO, the same NO, lower
b) A private placement?	(higher in the U.S.)	YES	NO, the same NO, lower

III. EXCHANGE RATE RISK

When issuing a bond denominated in a foreign currency, a firm faces two peculiar problems. (1) The proceeds of the issue have to be converted into Canadian dollars, and the exchange rate prevailing at the time of conversion determines the amount of Canadian dollars actually obtained. (2) Changes in exchange rates during the bonds' lifetime may change the actual costs of foreign borrowing considerably. I would like to explore these two problem areas.

13. The timing of a bond issue is usually affected by a host of factors. When Canadian corporations choose the exact date of issue for their U.S.-pay bonds, do you think that their timing is influenced (in the sense of advancing or postponing the date of issue by a month or more) by expectations with regard to potential exchange rate changes? YES NO

    If YES:

    a) Are these usually expectations with regard to <u>short-term</u> fluctuations around the exchange rate level prevailing during that time period? YES NO

    b) Or are these usually expectations with regard to changes in the parity of the Canadian dollar (during times of a fixed exchange rate) or long-term changes in the exchange rate level prevailing before that particular time period (during times of a floating exchange rate)? YES NO

14. Do your clients sometimes ask you for an evaluation of the exchange rate risk involved in foreign borrowing? YES NO

    If YES:

    Forecasting future exchange rates is very difficult and few people attempt to make long-range forecasts. Do you attempt a <u>quantitative</u> evaluation of the exchange rate risk by

    a) Forecasting the future trend of the exchange rate? YES NO

    b) Or, by estimating future exchange rates and calculating whether they would eliminate any cost advantage derivable from lower interest rates abroad? YES NO

What information do you use when attempting to evaluate the exchange rate risk or to forecast exchange rates? Please comment.

15. The larger the size of a U.S. dollar issue the greater is the firm's exposure to exchange rate risk. Is the size of U.S.-pay bond issues usually determined by the financial needs of the issuing corporation, or is it your experience that the exchange rate risk influences the size? Do your clients ask you for specific recommendations in this respect?
Please comment.

16. In your opinion, do Canadian corporations exhibit a distinct preference for sinking fund bonds rather than for bonds where the principal becomes due only at maturity because of the exchange rate risk? YES NO

17. What usually determines the call features of U.S.-pay bonds?
Please comment.

18. Have you ever recommended to a Canadian corporation that it diversify the exchange rate risk by denominating a new bond issue in a currency other than the Canadian or U.S.? YES NO
Please comment.

IV. MISCELLANEOUS QUESTIONS

Finally, I have two questions dealing with the Bank of Canada's influence on foreign borrowing and with American buyers of Canadian U.S.-pay bonds.

19. Now and then, the Bank of Canada announces that it is in favor or against foreign borrowing by Canadian governments and corporations. Judging from your experience, does the Bank of Canada's position on foreign borrowing usually influence corporate decisions on whether to float U.S.-pay bonds? YES NO

    Do corporations or do you sometimes consult with the Bank of Canada before issuing U.S. dollar denominated bonds? YES NO

20. Judging from your experience in placing Canadian-pay and U.S.-pay bonds issued by Canadian corporations, why do American investors exhibit such a distinct preference for U.S.-pay bonds in spite of the fact that usually the yield on Canadian-pay bonds issued by the same corporations is significantly higher? Please comment.

V. POSITION OF INTERVIEWEEE

Finally, may I ask some questions on your personal background?

21.

a) First, what is your present position in this firm?

b) For how long have you been in this position _____ years.

c) For how long have you been associated with this firm? _____ years.

d) Are you usually involved in the underwriting of Canadian-pay corporate bonds? YES NO

e) Are you sometimes involved in the underwriting of U.S.-pay issues of Canadian governments? YES NO

f) How old are you?_____years

g) Would you briefly describe your experience and education to date?

EXHIBIT A2-5

INTERVIEW QUESTIONNAIRE, CANADIAN LIFE INSURANCE CORPORATIONS

Introduction to an Interview with an Investment Officer of a Canadian Life Insurance Company

As you already know from your correspondence with Dr. Winiata, I am conducting a study on international bond financing by Canadian corporations. The purpose of this research is to gain a better understanding of the financial behavior of Canadian corporations, particularly with regard to foreign borrowing activities, and of the functioning of the Canadian capital market. It is hoped that these efforts will also provide new insights into the determinants of international capital flows and the relationships between Canadian and international capital markets.

As part of its cultural exchange program with Germany the Canadian Government, through the Canada Council, is supporting my studies and providing most of the financing of this research.

There follow fifteen questions exploring your firm's investment policy with regard to corporate bond issues, the influence lender behavior has on the characteristics of such bond issues, and the alleged relationship that exists between Canadian lender behavior and corporate borrowing in the United States. These questions are only intended to guide our discussion. Please feel free to concentrate on any other problem area which you think will lead to a better understanding and illumination of your firm's investment behavior and the Canadian capital market's functioning in general.

Karl Stroetmann
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I. PORTFOLIO OBJECTIVES AND CONSTRAINTS

In this first group of questions, I would like to explore the objectives and basic principles behind your company's investment policy with regard to corporate bond issues.

A) Investment Objectives

1. To begin with, would you briefly describe your Company's objectives with respect to your investments in corporate bonds?

B) Government Influences: Legal and Public Policy Constraints

2. With respect to the size and quality of issuing firm, the variety of corporate bonds available for investment in the Canadian market is quite impressive. I understand that there are legal requirements a firm has to meet before you are allowed to invest in its bonds. Could you please shortly outline what the main legal provisions are which restrict your investments in corporate bonds?

Besides those legal requirements, are there other industry-wide (or by your company self-imposed) restrictions on investments in corporate bonds?

Could you (and would you be prepared to) invest in bonds issued by a newly established company like a new pipeline company or a new pulp mill if these bonds were guaranteed by a well-established parent corporation? YES NO

Would it make any difference whether the parent is a Canadian, an American, or a firm of another nationality? YES NO
Please comment:

3. Now and then, the Bank of Canada pursues a very restrictive monetary policy by limiting the credit facilities available to chartered banks and other financial institutions and thereby reducing the credit available to Canadian corporations. Does the Bank of Canada's policy influence your investment behavior in the sense that you do not buy corporate bonds which, given different capital market conditions, you would have invested in? YES NO
Please comment:

During those times, do you invest incoming funds in short-term paper? YES NO
Please comment:

C) Your Company's Investment Policies and Constraints

4. Assuming you have a wide selection of corporate bonds available for investment, which factors determine your company's choice of bonds to be acquired?

5. What determines how much of a single corporations's total debt you are prepared to invest in?

Do there exist limits as to the percentage of a single corporation's debt you may acquire? YES NO
Please comment:

To what extent are you prepared to invest above your usual limits in a certain corporation's bonds if they offer an interest rate above the market yield on other bonds of comparable quality? YES NO
Please comment:

6. What determines how much of a single corporate bond issue you would acquire for your firm's protfolio?

Do you sometimes take up smaller or even larger bond issues in their entirety? YES NO
Please comment:

7. Some corporations are able to plan their needs for long-term funds well into the future and enter into forward agreements with institutional investors. Also, corporations sometimes issue bonds in several closings which may stretch over a period from a few months to several years. Do you ever enter into such forward agreements with corporations? YES NO

If YES:

a) What factors determine how far in advance you will commit your funds?

b) Would you indicate what your commitment fee usually is? _____%

C) With respect to number and time period over which draw-downs occured, would you comment on your Company's experience with issues in which several closings were involved?

8. Extendable and prepayable bonds have become quite common instruments in the Canadian market. Are those bonds particularly attractive to you? YES NO
Please comment:

9. Do you prefer secured rather than unsecured corporate bonds for investment? YES NO
Please comment:

II. BORROWER PREFERENCES AND MARKET PRACTICES

Typically, a corporation would like to be free to specify the characteristics of a bond issue (including maturity, call features, and so on) according to its individual needs. Often, however, these characteristics are influenced by capital market conditions and lender behavior. The next group of four questions is intended to gain a better understanding of the factors influencing the characteristics of a corporate bond issue.

10. Judging from your experience, what usually determines the term to maturity of corporate bonds:

a) The estimated life time of the project to be financed by a particular issue? YES NO

b) The issuing firm's preferences with regard to maturity? YES NO

c) The lenders' preferences with regard to maturity? YES NO

P.T.O.

Question 10. cont'd.

When you acquire corporate bonds, does the term to maturity influence your investment decision? YES NO
Please comment:

In your opinion, would Canadian corporations be able to place bonds with rather long terms to maturity of, say, 30 years in the Canadian market if they wanted to do so? YES NO
Please comment:

11. Can a corporation usually freely choose between sinking fund bonds and a bond issue where the principal is to be repayed only at maturity? YES NO

Does the existence of a sinking fund provision influence your investment decisions? YES NO
Please comment:

12. Judging from your experience, are the call features of corporate bonds usually:

a) Open to negotiation between the issuing corporations and the lenders? YES NO

b) Are they usually determined by the lender? YES NO

c) Or are they usually determined by standard market practice? YES NO

Are there other factors that determine the call features of corporate bonds? YES NO
Please comment:

13. In your opinion, are there identifiable factors which determine a Canadian corporation's preferences with respect to public offerings versus private placement?

Do you prefer to acquire corporate bonds through the market or through private placements? Are there differences in net yield realizable by your firm?

III. LENDER BEHAVIOR AND CORPORATE BORROWING IN THE U.S.

Finally, I would like to concentrate on the relationship that, according to some people, exists between Canadian corporate borrowing in the United States and the investment behavior of Canadian institutional investors.

14. Again, judging from your experience and knowledge of the Canadian capital market, do you think that Canadian corporations (or their underwriters) approach the U.S. market only after they have convinced themselves that there is no "market" in Canada for the particular bond issue? YES NO

If YES:

Are you aware of an instance where you turned down a Canadian corporation which subsequently floated a bond issue in the U.S.? YES NO

15. With regard to the alleged inability of the Canadian market to provide sufficient long-term funds to certain corporations, in your opinion, is it in fact true that:

a) there are not sufficient funds available in Canada to well established and credit-worthy corporations? YES NO

b) Or, in your opinion, is it true that Canadian corporations are attracted to the U.S. market by more liberal conditions with respect to maturities, sinking fund requirements, and so on available there rather than being "forced" into the U.S. market by a scarcity of funds available in Canada? YES NO

c) Or, do you think <u>both</u> of the factors mentioned above cause Canadian firms to approach the U.S. market? YES NO

If YES:

Why would American investors demand less restrictive conditions for a Canadian corporate bond issue than Canadian lenders? Please comment:

IV. POSITION OF INTERVIEWEE

Before finishing this interview, may I ask some questions on your personal background?

15. a) First, what is your present position in this firm?

b) For how long have you been in this position? _____years.

c) For how long have you been associated with this firm? ____years.

d) Are you usually involved in decisions regarding investments in bonds in general ____, or do you specialize in investments in bonds issued by a certain group of borrowers ___?

Can you please identify this group?_____

e) How old are you? ____years.

f) Would you briefly describe your experience and education to date?