THE CANADIAN CONVERSION LOAN OF 1958

A STUDY IN DEBT MANAGEMENT

by

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ABSTRACT

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World War II was partially financed through the issue of Victory Bonds. By 1958, Victory Bonds amounting to roughly 50% of the public debt were still outstanding, maturing at discrete intervals over the following seven years. In September, 1958, the Canadian Government launched the Conversion Loan -- a successful attempt to refund the Victory Bonds. This enormous debt management operation raised the average term to maturity of the public debt from 8 to 14.75 years.

Debt management operations, and the Conversion Loan in particular, have received little attention in the Canadian context. The scant existing literature has not rigorously examined the effects of the Loan on the level and term structure of interest rates, nor has it investigated its impact on the real sector of the economy. In this thesis regression analysis and simulation -- using the Bank of Canada RDX2 model -- were used to investigate these problems.

The following conclusions were reached. There is convincing evidence that the Loan increased long rates and some less convincing evidence that it

decreased short rates. In contrast to the U.S. there is no doubt that, in Canada, debt management operations significantly affect the term structure of interest rates. Other determinants of the term structure are expectations, monetary policy, transactions requirements, private sector wealth and the U.S. term structure of interest rates. The Loan was contractionary. Its effect during 1958 is estimated at 1% of GNE, increasing to 5% between 1959 and 1961, and decreasing thereafter. The overall cumulative effect is likely to have exceeded $1 billion. Contrary to conventional wisdom, it was the interest sensitivity of investment rather than the reduction in Canada's competitive position in world markets -- the Loan raised interest rates, attracted "hot capital" and led to an exchange rate appreciation -- that engendered the depression.

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It is customary to exonerate all but the main author of a study from all responsibility, even when the author's debts are very large. My only hope is that when the Christofides Bonds reach maturity, I too will be able to reconvert them.

CHAPTER ONE

THE CANADIAN CONVERSION LOAN OF 1958

> "This is a tremendous operation requiring the enthusiastic co-operation of everybody concerned... I have received from all quarters pledges of enthusiastic and vigorous support...this is a great national undertaking. It is the concluding phase of the victory loan campaign of the war years..."
>
> D. Fleming,
> Then Minister of Finance.[1]

The period 1950 - 1957 was one of intense activity in the real capital markets. Unemployment, while slowly rising, was low in comparison to that of 1957 - 1962. With the exception of 1955, monetary policy was rather restrictive and after the Korean war prices rose very slowly. Partly because of monetary policy the capital account was in surplus, in contrast to the current account. The overall picture being usually one of a potential balance of payments surplus, the Canadian exchange rate was following an appreciating trend until 1957.

The government's financial picture was fairly "sound". Between 1947 and 1957 there was a budget deficit only twice and even then of small magnitude. The budget surpluses were disposed of by reducing the outstanding public debt. Parizeau[2] and Fullerton[3] indicate that government borrowing in this ten-year period both by means of note-issuing and otherwise was

modest. Coupled with the continual decrease in the public debt was a similar decline in the average maturity of the debt so that by 1957 the long bond market was quite thin.

Borrowing requirements for the year 1958 were expected to be heavy. During the fiscal year ending March 31, 1958, the federal government ran the first of a series of sizeable budget deficits. The deficit for the period April 1, 1958 - March 31, 1959 was as high as $609.3 million and the overall cash requirements were even higher at $1,273.3 million[4]. Table 1 gives further details. In addition, between 1959 and 1966 large quantities of World War II bonds were maturing. During the period 1941 - 1945 the federal government had borrowed funds in order to finance its war efforts. There were nine "Victory Loans", as they were called, amounting roughly to $12 billion. The funds had been supplied by corporations and individuals, the former being the somewhat larger creditors--Table 2 gives a detailed breakdown. By 1958 almost half the $12 billion had been repaid but there remained the 5th to 9th Victory Loans, involving some $6.5 billion and maturing at discrete intervals[5] between 1959 and 1966. To place matters in perspective it should be pointed out that in December 1957 the federal debt, excluding Canada Savings Bonds[6], held by the Public and chartered banks was only $8.6 billion. Thus the substantial cash requirements of the federal government and the "coming of age" of the Victory Bonds posed a new and serious problem to the authorities.

Many alternative courses of action were open to the government. The short planning horizon frequently attributed to governments would have indicated a "do-it-as-you-go-along" course of action, namely issuing bonds

and reducing cash balances as budget deficits were implemented and Victory Bonds matured. Instead, following April 1, 1958, the authorities issued bonds to finance successive budgetary deficits and pursued a monetary policy which was at variance with their fiscal convictions. Column four of Table 1 documents the validity of the first statement, while column five of Table 1 and Table 6 shows that of the second: In 1959, for example, overall cash requirements were $1.27 billion and they were met through the issue of $1.33 billion worth of bonds.[7] However, cash balances were increased[8] by $0.17 billion and the money supply declined.[9] Also between July 14 and September 15, 1958, the Conversion Loan was launched.

The Loan was an attempt to persuade the owners not only of the 5th and 6th Victory Bonds, but also those of the 7th, 8th and 9th to exchange their old bonds for the new Conversion Loan ones. While some of the Victory Bonds were callable as early as 1956, the authorities were not obliged to redeem them until their final maturity dates. That date for the 9th Victory Loan was as late as September 1, 1966! The ownership distribution of the Victory Bonds immediately before the Conversion Loan is not known with accuracy. But data on ownership when the Victory Bonds were first issued, Table 2, and other fragmentary evidence, suggest that a considerable number of these bonds were held by private individuals, often in remote parts of Canada. This fact, along with the Loan's size of some 49% of the federal debt[10] and the concurrent need for funds to finance budget deficits, made the Conversion Loan one of the most difficult financing operations ever undertaken in Canada. Considering how inexperienced at this kind of undertaking the authorities were one feels certain that they must have advanced impressive justification for their actions!

The government, in various public statements, suggested at least four reasons for the Conversion Loan. First, it was thought to be "... in every sense anti-inflationary"[11] since one alternative, namely redeeming maturing bonds, would involve increasing the money supply. This belief was quite well-founded but worrying about the price level during a flexible exchange rate regime is not all-important. Second, ironing out humps in the maturity structure of the public debt facilitates rolling over the debt. This, of course, is quite true but there may be a case for doing more with the debt than merely rolling it over, namely using its maturity structure to control economic activity through the term structure of interest rates. Third, another alleged merit of the Loan[12] was that it removed uncertainty. The uncertainty referred to consisted of not knowing what the government would do with the maturing Victory Bonds. Thus, while the Loan removed this kind of uncertainty so would any other publicly announced plan. Fourth, and the Prime Minister thought <u>therefore</u>, the Loan would

> "...add greatly to the strength of Canada's national economy...including the fullest development of our resources, more and better jobs and a higher standard of living for every Canadian."[13]

Straightforward application of Tobin's (67) model predicts the opposite outcome. It is noteworthy, however, that none of Tobin's papers had appeared prior to the Loan. One wonders whether other, more sound, arguments were not disclosed! It does not appear so.

Even if the reasons advanced for the Loan were sound it is difficult to see why the individual bond owner should cooperate. Cooperation was sought by various means. To begin with the government made a case for acting collectively, through its references to the resulting higher standard of living and through appeals to patriotism. The quotation at the begin-

ning of this chapter is indicative of the campaign undertaken. Where moral suasion could be used it appears to have been exercised. How else can one explain the management of the Unemployment Insurance Fund? Unemployment was expected to rise during the winter of 1958-1959 and hence the Fund should have held a relatively liquid portfolio in anticipation of large disbursements to its members. Yet the Fund converted its holdings of the highly liquid Victory Bonds, reducing the proportion of bonds with less than three years to maturity from just under 50% to a mere 0.8%.[14] Later on when the Fund was forced to liquidate securities at a loss it sold, not the 1961 Conversion Bonds which were relatively short, but other longer term ones! This mismanagement was pointed out by H. Scott Gordon (23). Finally, there was the unavoidable sugar-coating of the pill. All nine Victory Loans were struck at a common coupon rate of 3%. The Conversion issues had coupons ranging from 3% to 4½%. Also cash bonuses were paid. The owner of a $1000 bond, from the 5th Victory Loan, for example, received $25.00 upon converting it into Conversion Bonds maturing after 1965. Table 4 gives more details. Combining the information in Tables 4 and 5 the maximum cost to the government of the cash bonus programme can be estimated. It amounted to $93,862,500! With the exception of one firm, E. M. Saunders Ltd., all investment dealers participated in what, for them, was a very profitable venture.[15]

Just how the Loan was executed is a question that will not be discussed in detail here. Excellent expositions of this can be found in Binhammer (5), Officer and Smith (48), Wonnacott (69) and others. For all the reasons mentioned earlier around 90% of the bonds maturing were converted and the Loan was pronounced a "success"--Table 5 incorporates

all the information available on this score.

How did the Conversion Loan affect the distribution by term to maturity of the public debt? Table 7 gives the distribution of total holdings, which include the portfolios of the Bank of Canada and of the Government Accounts. Between 1958Q2 and 1958Q3 there is a small increase in the public debt--defined here so as to exclude consols and non-market issues--of about $395 million. There is no change in the par values of Treasury Bills outstanding and so the Conversion Loan manifests itself as a substantial increase in bonds with over ten years to maturity and a decrease in bonds with maturities under ten years. The former increased by $3,518 million and the latter decreased by $3,123 million. It can be shown that these changes can be attributed almost entirely to the Conversion Loan, rather than any other government issues -- $395 million shorts were issued.

However, looking at the maturity distribution of total debt outstanding may not be very informative because it contains the accounts of the Bank of Canada and the government--both traditionally regarded as "outside" the system. While the balance sheet of the Bank does contain its holdings of government bonds by maturity class[16] no such information is available in the government accounts reported.[17] Hence it is not possible to arrive at the maturity distribution of the government debt held "inside" the system, namely by chartered banks and the Public,[18] through this particular route. An alternative route involves aggregating the holdings of the Public and those of chartered banks by term to maturity. This is not possible either; while the necessary figures are available for the Public,[19] they are not for the banks.[20] We are therefore forced to use two alternative approximations

to the figures for the maturity distribution of the debt, Table 9, which includes the Government Accounts[21] and Table 12, which excludes the holdings of chartered banks. They will both be used in chapter three, where the effects of altering the relative supplies of debt with different terms to maturity on the term structure of interest rates will be investigated. Both series confirm the view that the Conversion Loan was a debt management operation increasing debt with more than ten years to maturity and decreasing debt under this mark. However, they also bring out two factors that Table 7 obscures. Treasury Bills held inside the system increased from $1,124 million in 1958Q2 to $1,425 million in 1958Q3 and to $1,771 million in 1959Q4, decreasing after that last date but never dropping below their 1958Q3 level. A similar pattern exists in the Treasury Bill holdings of the Public, as Table 12 shows. Secondly, bonds with less than two years to maturity decreased in 1958Q3, but by 1959Q1 they were above their pre-Conversion Loan level. Thus, while the Loan decreased the sum of all bonds with less than ten years to maturity and left Treasury Bills unaffected, this, paradoxically, is not reflected in the time profile of each and every maturity class under the ten year mark. To explain the two irregularities just mentioned it is necessary to delve into the activities of the Bank of Canada during the period 1958Q2 - 1959Q4.

Although 90% of the Victory Bonds maturing were converted, this figure was not accomplished without the active intervention of the Bank of Canada in the bond markets. More specifically, until November, 1958, the Bank supported bond prices. In the process it clearly had to cash all bonds that would not be held and it did so until it was realised that bond prices and quantities held by the Public could not both be pegged. The authorities

then chose to freeze the money supply, i.e. they bought no more bonds and they allowed interest rates to float. This choice indicates their determination to adhere to restrictive monetary policy as the Governor corroborates:

> "...by the beginning of November the strong downward movement of other bond prices...had made it clear that the prices of long-term Conversion issues could not be maintained...without a dangerous degree of monetary expansion and central bank purchases were discontinued."[22]

Table 6 shows that while bond prices were being pegged the money supply increased; the money supply was subsequently kept below its 1958Q4 peak until 1960Q4. Table 8 shows how the central bank "financed" its bond price support programme. Between 1958Q2 and 1958Q3 the Bank decreased its holdings of Treasury Bills and other bonds with less than two years to maturity by $1,076 million and increased those of bonds with over two to five, over five to ten and over ten years to maturity by $234 million, $89 million and $917 million respectively. It is worth noting that after the price support period was over the Bank did not dispose of the long-term bonds it had acquired. Rather, beginning in 1959Q1, it gradually increased its holdings of Treasury Bills and bonds with less than two years to maturity.

Quite apart from the Bank's price support programme other governmental agencies, e.g. the Unemployment Insurance Fund, were under pressure to convert their portfolios. It is therefore of interest to analyse the combined effects of the activities of these institutions. As already indicated, little is known about the maturity composition of securities held in the Government Accounts. So in Table 13 an attempt is made to disentangle the

effects of the Conversion Loan from those of the price support programme pursued by the Bank of Canada. On the assumption that the behaviour of the Accounts did not change during the Loan, the figures in Table 13 indicate the true pressures in the financial markets. The effect of dropping this assumption is indicated later.

Table 13 was constructed out of Tables 7 and 8. Each row gives the difference between the total federal government debt, Table 7, and that part of the debt held by the Bank of Canada, Table 8. This difference for 1958Q2, for example, is denoted by (Total: 58Q2)-(BOC: 58Q2) and it appears disaggregated by term to maturity. Thus row one of Table 13 gives the term to maturity structure of the debt held by the Public, the chartered banks and the Government Accounts[23] in 1958Q2. We now wish to investigate the Loan's effect on the term to maturity of the debt, abstracting from the price support activities of the Bank of Canada. It is, therefore, assumed that between 1958Q2 and 1958Q3 the Bank was completely inactive so that the 1958Q2 figures on bonds held by the Bank are also applicable in 1958Q3. Row two describes what would have happened had a "Pure Conversion Loan" been effected. The "Pure Loan" would have decreased maturities under ten years, except Treasury Bills, and increased bonds with over ten years to maturity.

However, the Bank did act: It pegged bond prices until November, 1958, thereby cashing all bonds that would not be held. This increased its holdings of long bonds and was financed through the sale of Treasury Bills and securities under two years to maturity. Row three describes the actual effect of the Bank's activities on holdings "inside" the system. Its sale of Bills and 0-2 year shorts increased the former above their 1958Q2 level

and moderated the decrease in the latter that would have occurred. Its purchase of bonds with maturities over two years accentuated the decrease in bonds with maturities between two and ten years--the Conversion Loan decreased those--and moderated the increase in bonds over ten years--the Conversion Loan increased those--that would have occurred under the circumstances of row two.

In 1959Q1, by which time the bond price support programme had been dropped, the Bank of Canada increased its holdings of Treasury Bills at the expense of bonds with less than two years to maturity. During the next few years[24] the Bank increased its liquid holdings relative to the long ones, gradually readjusting towards the portfolio composition it had prior to the price support period. Needless to say that this trend cannot be detected in the various maturity classes of the debt that was held "inside" the system because the total quantities outstanding of all bonds and Treasury Bills were changing. Thus, rows four to seven tell what the maturity distribution of the debt "inside" the system would have been during 1959, had totals remained at their 1958Q3 levels. The tendency for Treasury Bills and the shortest bonds to increase--row three--would have been substantially reversed during 1959. In this respect a more pure Loan would have been implemented.[25] This suggests that what the Bank's activities amounted to was merely delaying the Loan by a few quarters. This idea will be taken up later, as it turns out to be quite important. Finally, rows eight to eleven show what actually happened to holdings "inside" the system.

In the above discussion the explicit assumption was made that behaviour in the Government Accounts did not change following the Loan. Dropping

this assumption would mainly accentuate the effects of the behaviour of the Bank of Canada.[26] This argument cannot be pursued further given available data.

Since we will later be directing our attention to the effects of the Conversion Loan on the term structure of interest rates it is as well, at this point, to take a look at what other changes were taking place in the economy. Fiscal and monetary policy as well as changes in the quantities of Treasury Bills have already been discussed. Attention has also been drawn to the small changes in the size of the federal government debt. There remain at least two areas of interest: The size and composition of provincial, municipal and corporate debt and the size and composition of the U.S. federal government debt.

Table 14 more or less exhausts published information of relevance on the composition of the debts of provincial and municipal government and of corporations. The totals are dominated by a very large trend component with what appear to be few deviations from it. There is no published information on the term to maturity structure of these debts. However, reliable series are here constructed on the term to maturity composition of new bond issues made by the federal and provincial governments and by corporations. While in principle it is possible to calculate from these series the term to maturity of the outstanding stocks of provincial and corporate bonds this would be a very hazardous undertaking. Thus, we have concentrated on the composition of the flows. Tables 15, 16 and 17 tell the story. There are no striking changes in the behaviour of these variables. This conclusion for the case of provincial debt is corroborated by Table 18. It shows that the average term to maturity of all provin-

cial debt was 18.8 years in 1958 and 18.1 in 1960. Municipal debt poses many more problems. While micro data similar to the provincial and corporate ones are available the problem arose that municipalities issue a very large proportion of their debt in serial form. The term to maturity of a serial bond is not obvious and while an average term could conceptually be calculated that would require much more information than is at present available. However, we do have information on the amounts issued in serial form and those issued in sinking fund form. This is useful because that classification corresponds roughly to a term to maturity classification: A serial bond spreading over twenty years has an average term shorter than that of a twenty year sinking fund bond. Table 19 gives yearly data on the serial/sinking fund debt structure for all municipalities, by province.

It remains to consider the behaviour of some of the U.S. financial variables. In the appendix to chapter two it is shown that U.S. studies have found little relation between the maturity structure of the U.S. debt and the U.S. term structure of interest rates. Yet it is well known that there is some relation between U.S. and Canadian interest rates--possibly because of common influences emanating from the demand side. For this reason we concentrate[27] on the effects, if any, that the U.S. term structure of interest rates has on the Canadian one. Table 21 shows that during the period 1958Q1 - 1959Q4 all three U.S. rates rose.[28] This poses the problem: If Canadian long rates rose, was that because of the Loan or because U.S. rates were rising concurrently?

SUMMARY

In this chapter the background to the Conversion Loan was briefly considered and the extraordinary nature of the financing requirements for 1958 was brought out. The Conversion Loan was then discussed along with the publicly announced reasons for it. The Loan is the most important debt management operation ever carried out in Canada, nearly doubling the average maturity of the public debt. We are therefore interested in assessing its effects on interest rates and other economic variables. However, it was seen that other concurrent changes did occur.

i) There was the increase in Treasury Bills held by the Public and chartered banks due to the increase in the totals, the Bank's bond price support programme and its restrictive monetary policy.

ii) Also noteworthy is the increase in bonds with less than two years to maturity. The reasons for this are the same as in (i) immediately above.

iii) There may also have been changes in the maturity pattern of new issues of bonds by the federal, provincial and municipal governments and corporations. A detailed examination of this possibility is undertaken in chapter four.

iv) There were, finally, changes in the U.S. term structure of interest rates.

Before attributing to the Loan any changes in interest rates and/or in other variables it is necessary to evaluate the contribution to any such changes of the factors mentioned above. This task is taken up in chapter three. In the next chapter the existing studies of the Conversion Loan are examined.

NOTES TO CHAPTER ONE

1. Quoted in Fullerton (21), p. 242.

2. Parizeau (50), p. 24.

3. Fullerton (21), pp. 45 - 48.

4. It may be objected that these figures are ex post ones. However, there are indications that they are also good approximations to the ex ante figures. See Fullerton (21), p. 237.

5. See Table 3.

6. Of central importance to this thesis is the maturity composition of the public debt. Although Canada Savings Bonds are issued with a formal maturity date they are not marketable and the government will redeem them at face value on demand--there are some costs involved in cashing a bond prematurely, not in terms of loss of principal but rather in terms of the average effective interest rate earned. Because these bonds are redeemable on demand their term to maturity is ambiguous. It is presumably for this reason that published tables giving the term to maturity of the public debt exclude such bonds. Since these tables are extensively used here, the concept of the public debt embedded in them is also used for convenience.

7. See Table 1, columns three and four.

8. See Table 1, column five.

9. See Table 6.

10. In September, 1958, the total federal debt was $13,357 million (Table 7) while the Conversion Loan involved issues amounting to $6,416 million. (Table 5).

11. The Prime Minister. Quoted by Fullerton (21), p. 241.

12. Fullerton (21), p. 241, quotes the Minister of Finance as saying on July 14, 1958,

> "...This large volume of early maturities overhanging the market has made it very difficult to plan an orderly program of debt management and has contributed greatly to the general feeling of uncertainty which has prevailed in our bond market for the past few years."

13. The Prime Minister. Quoted by Fullerton (21), p. 243.

14. Figures are taken from Fullerton (21), p. 254.

15. In fact Fullerton mentions that most informed sources attribute the whole scheme to an investment dealer who apparently had no difficulty selling the idea to Mr. Coyne, the inflation-fearing Governor of the Bank of Canada. Professor Barber has privately suggested that one alternative to the Loan might have been conversion into bonds which, like Canada Savings Bonds, have guaranteed capital values.

16. See Table 8.

17. See Table 9.

18. This category includes all financial institutions other than chartered banks, non-financial enterprises as well as private individuals.

19. See Table 12.

20. Table 11 contains all the available information on this score. The reason for the particular disaggregation reported is simply that that is all the information banks are required to report.

21. The figures in this table will, somewhat loosely, be referred to as the debt held "inside" the system.

22. Quoted in Fullerton (21), p. 245.

23. i.e. "inside" the system. This row and all other starred rows, are the same as the corresponding ones in Table 9. They are reproduced in Table 13 for the reader's convenience.

24. See Table 8, particularly 1959Q1, 1959Q4, 1960Q3 and 1962Q3.

25. We say roughly because of the figure $2,123 million appearing under "over two to five" in row seven. This departure from row two was due to the Bank's adjustment towards a more liquid portfolio. By 1960Q3 the Bank was able to increase its holdings in this category at the expense of the "over five to ten" one and by 1962Q3 bonds in this last category were also increased, this time at the expense of bonds over ten years--see Table 8. This gradual increase in liquidity may have been effected by the passage of time alone. However, since no steps to reverse this "natural" process were initiated, we are entitled to assume that it was not objectionable.

26. Recall how the Unemployment Insurance Fund was managed.

27. Table 20 gives, for the record, the maturity structure of the U.S. debt. It is seen that during 1958 there are large changes but, if anything, the net changes are in the opposite direction from those effected by the Conversion Loan in Canada.

28. Note, however, that the spread between the U.S. long and medium rates fell.

TABLE 1

Financial Statement of the Government of Canada ($000's)

Fiscal Year	Budget surplus (+) or deficit (-)	Non-budgetary receipts (+) or disbursements (-) including changes in advances to Foreign Exchange Control Board and Exchange Fund	Overall cash requirements i.e. sum of first and second columns	Increase (+) in unmatured debt outstanding†	Decrease (+) in cash balances†
1954	+45,800	*	*	-234,400	-104,100
1955	-151,800	*	*	-79,700	+128,800
1956	-33,100	*	*	+911,100	-339,800
1957	+257,500	*	*	-1,039,200	+98,600
1958	-38,600	-126,300	-164,900	-123,300	+164,700
1959	-609,300	-664,000	-1,273,300	+1,329,000	-166,000
1960	-413,100	+37,600	-375,500	+316,000	+41,500
1961	-340,400	+46,100	-294,300	+177,800	+71,300
1962	-791,000	+313,400	-477,600	+877,800	-416,900
1963	-691,600	-772,300	-1,463,900	+1,016,100	+400,200
1964	-619,200	+336,700	-282,500	+778,300	-451,700
1965	-38,000	-384,200	-422,200	+238,100	+146,700
1966	-39,000	-120,900	-159,900	+131,600	+47,300

* = Not comparable
† = In Canadian and foreign funds

Source: Bank of Canada Statistical Summary Supplement (To be referred to as Supplement)

TABLE 2

Distribution of Victory Loan Purchases ($000's)

Victory loan	Date of issue	Purchased by		Total cash sales
		Individuals	Corporations	
1st	June 15, 1941	279,500	450,900	730,400
2nd	March 1, 1942	335,600	507,500	843,100
3rd	Nov. 1, 1942	374,600	616,800	991,400
4th	May 1, 1943	529,500	779,200	1,308,700
5th	Nov. 1, 1943	599,700	775,300	1,375,000
6th	May 1, 1944	641,500	763,500	1,405,000
7th	Nov. 1, 1944	766,400	751,200	1,517,600
8th	May 1, 1945	836,300	732,600	1,568,900
9th	Nov. 1, 1945	1,221,342	801,132	2,022,474

Source: Canada Yearbook 1957-58, p. 1162.

For the 1st, 2nd, 5th and 7th loans there is a small difference between the numbers given for the totals in this table and in Table 3. This may represent the difference between cash sales and total cash and non-cash sales.

TABLE 3

Victory and War Loan Issues: World War II

	Issued	Maturing	$ Millions Sold	Coupon Rate %
1st	1941	Dec. 15, 1946	193	2
		June 15, 1951	644	3
2nd	1942	Sept. 1, 1944	150	1 1/2
		March 1, 1948	270	2 1/4
		March 1, 1954	670	3
3rd	1942	May 1, 1946	144	1 3/4
		Nov. 1, 1956	847	3
4th	1943	Nov. 1, 1946	197	1 3/4
		May 1, 1957	1,111	3
5th	1943	May 1, 1947	373	1 3/4
		Jan. 1, 1959	1,197	3
6th	1944	March 1, 1948	240	1 3/4
		June 1, 1960	1,165	3
7th	1944	Nov. 1, 1948	344	1 3/4
		Feb. 1, 1962	1,316	3
8th	1945	Nov. 1, 1949	268	1 3/4
		Oct. 1, 1963	1,296	3
9th	1945	Nov. 1, 1950	336	1 3/4
		Sept. 1, 1966	1,692	3

Source: Fullerton [21], Table 4.2

TABLE 4

Dollar Bonuses Paid to Victory Bond Owners Participating in the Conversion Loan

		Conversion Loans	3% 1961	3 3/4% 1965	4 1/4% 1972	4 1/2% 1983
Victory Loans						
5th	1959		15.00	25.00	25.00	25.00
6th	1960		12.50	22.50	22.50	22.50
7th	1962		*	12.50	12.50	12.50
8th	1963		*	*	17.50	17.50
9th	1966		*	*	15.00	15.00

*The 1962 issue of Victory Bonds was not eligible for exchange into the shortest conversion issue and the 1963 and 1966 Victory bonds were not eligible for conversion into either of the two shortest conversion issues. Figures are dollars paid to bond owners converting $1,000 worth of Victory Bonds provided certain interest certificates had not been cashed.

Source: Canada Yearbook 1959, p. 1131.

TABLE 5

Results of Conversion Loan
(Par Values in $ Millions)

	Victory Loans: Issues eligible for conversion	Converted into 3% Dec. 1 1961	3 3/4% Sept. 1 1965	4 1/4% Sept. 1 1972	4 1/2% Sept. 1 1983	Residual Uncovered	Total Victory Loan Issues
5th	3% Jan. 1, 1956/59	654	94	58	100	42	947
6th	3% June 1, 1959/60	366	447	172	133	46	1,165
7th	3% Feb. 1, 1959/62	*	726	238	298	54	1,316
8th	3% Oct. 1, 1959/63	*	*	489	584	223	1,296
9th	3% Sept. 1, 1961/66	*	*	410	1,037	245	1,692
	Total	1,021	1,267	1,367	2,152	610	6,416

Notes: *The 1962 issue of Victory Bonds was not eligible for exchange into the shortest conversion issue and 1963 and 1966 Victory Bonds were not eligible for conversion into either of the two shortest conversion issues.

Source: Bank of Canada. Annual Report of the Governor, 1958, p. 28.

TABLE 6

Canadian Narrow Money Supply = Notes and Coin Outside Banks + Demand Deposits + Non-Personal Term and Notice Deposits ($ Millions)

Year	Q1	Q2	Q3	Q4
1955	4,901	5,234	5,370	5,243
1956	5,007	5,141	5,209	5,204
1957	4,847	5,057	5,081	5,333*
1958	5,213	5,508	5,959	6,035
1959	5,685	5,714	5,800	5,789
1960	5,541	5,742	5,952	6,073
1961	6,035	6,211	6,612	6,822
1962	6,390	6,677	6,747	7,071
1963	6,882	7,189	7,329	7,510
1964	7,355	7,695	7,789	8,187
1965	8,229	8,877	9,267	9,433

*Major Series Revision

Before 1962 the last item cannot be distinguished from the last but one.
Average of Wednesday series, end of quarter.

Source: Supplement.

TABLE 7

Classification by Term to Maturity
of Total Government of Canada Securities Outstanding

	Unmatured Direct and Guaranteed securities (ex. non-market issues and perpetuals)											
	2 years and under											
	Treasury Bills & notes & deposit certificates	Other	Over 2-5 years	Over 5-10 years	Over 10 years	Total	Average term to maturity	Perpetuals	Non-market issues	Matured and outstanding market issues	Total outstanding
	Millions of Dollars, Par Value						Yrs. Mos.	Millions of Dollars, Par Value			
End of											
1955-Q1	1,590	1,666	2,302	4,290	3,448	13,296	6 11	55	2,031	53	15,435
Q2	1,705	1,665	3,468	3,076	3,448	13,362	6 8	55	1,960	41	15,418
Q3	1,775	1,129	4,104	3,076	3,448	13,532	6 6	55	1,900	35	15,522
Q4	1,725	1,829	3,404	3,076	3,448	13,482	6 4	55	2,433	30	16,000
1956-Q1	2,100	1,769	3,403	3,111	3,358	13,741	5 11	55	2,387	30	16,213
Q2	1,690	2,714	2,406	3,108	3,358	13,276	5 11	55	2,293	35	15,659
Q3	1,730	2,320	2,150	4,800	1,916	12,916	6 7	55	2,210	29	15,210
Q4	1,575	2,170	2,150	4,800	1,916	12,611	6 7	55	2,541	27	15,234
1957-Q1	1,625	3,152	2,518	3,500	1,866	12,661	6 4	55	2,436	20	15,172
Q2	1,625	3,002	2,518	3,499	1,866	12,510	6 2	55	2,315	21	14,901
Q3	1,655	2,938	2,518	3,499	1,866	12,476	6 -	55	2,213	17	14,761
Q4	1,625	2,538	2,918	3,496	1,866	12,443	6 -	55	2,649	18	15,165
1958-Q1	1,525	2,538	3,168	3,246	2,166	12,643	6 2	55	2,556	15	15,268
Q2	1,495	3,303	2,402	3,596	2,166	12,962	6 4	55	2,471	15	15,503
Q3	1,495	1,824	2,184	2,170	5,684	13,357	10 6	55	2,387	12	15,810
Q4	1,495	2,324	2,006	1,947	5,684	13,456	10 3	55	2,895	10	16,416
1959-Q1	1,595	2,297	2,105	1,947	5,684	13,628	10 -	55	2,855	22	16,560
Q2	1,955	2,512	1,703	2,007	5,774	13,951	9 9	55	2,767	18	16,791
Q3	2,024	2,437	1,702	2,077	5,704	13,944	9 6	55	2,662	15	16,676
Q4	2,077	2,867	1,131	2,075	5,702	13,852	9 6	55	3,212	16	17,135

Table 7 - Continued

	Unmatured Direct and Guaranteed securities (ex. non-market issues and perpetuals)								Perpetuals	Non-market issues	Matured and outstanding market issues	Total outstanding
	2 years and under											
	Treasury Bills & notes & deposit certificates	Other	Over 2-5 years	Over 5-10 years	Over 10 years	Total	Average term to maturity					
	Millions of Dollars, Par Value						Yrs.	Mos.	Millions of Dollars, Par Value			
End of												
1960-Q1	2,125	2,755	1,343	2,075	5,802	14,100	9	5	55	3,143	12	17,310
Q2	1,965	2,259	1,731	2,355	5,724	14,033	9	6	55	3,059	27	17,174
Q3	1,965	2,259	2,997	1,088	5,724	14,033	9	3	55	3,002	20	17,110
Q4	1,985	2,226	2,806	1,160	5,895	14,072	9	5	55	3,594	25	17,747
1961-Q1	1,935	2,476	2,741	1,165	5,804	14,120	9	3	55	3,562	16	17,753
Q2	1,885	2,961	2,402	1,165	5,804	14,217	9	-	55	3,473	17	17,762
Q3	1,885	2,935	2,869	1,054	5,648	14,391	8	7	55	3,537	14	17,997
Q4	1,885	3,165	2,770	978	5,527	14,325	8	4	55	4,237	19	18,636
1962-Q1	1,885	3,222	2,820	1,028	5,440	14,395	8	-	55	4,121	29	18,600
Q2	1,885	3,140	2,633	955	5,652	14,265	8	1	55	4,016	23	18,359
Q3	2,030	2,855	2,633	2,322	4,485	14,325	8	1	55	3,929	19	18,327
Q4	2,165	2,526	2,443	2,472	5,048	14,655	8	5	55	4,719	19	19,448
1963-Q1	2,165	2,651	2,568	2,202	5,090	14,677	8	4	55	4,600	16	19,347
Q2	2,345	2,587	3,058	1,838	5,190	15,018	8	3	55	4,464	16	19,553
Q3	2,245	3,837	1,792	1,838	5,190	14,902	8	1	55	4,414	14	19,385
Q4	2,240	3,548	2,183	1,838	5,188	14,997	7	11	55	5,199	25	20,276
1964-Q1	2,230	3,609	2,053	2,042	5,038	14,972	7	10	55	5,099	19	20,145
Q2	2,145	3,013	2,283	2,373	5,113	14,927	8	-	55	4,988	17	19,987
Q3	2,130	3,284	2,433	2,043	5,098	14,987	7	10	55	4,948	16	20,006
Q4	2,140	3,000	2,413	2,313	5,096	14,961	7	10	55	5,701	16	20,733

Table 7 - Continued

	Unmatured Direct and Guaranteed securities (ex. non-market issues and perpetuals)										
	2 years and under										
	Treasury Bills & notes & deposit certificates	Other	Over 2-5 years	Over 5-10 years	Over 10 years	Total	Average term to maturity	Perpetuals	Non-market issues	Matured and outstanding market issues	Total outstanding
	Millions of Dollars, Par Value						Yrs. Mos.	Millions of Dollars, Par Value			
End of											
1965-Q1	2,140	2,510	2,363	2,588	5,095	14,696	7 11	55	5,600	14	20,365
Q2	2,140	2,657	2,390	2,394	5,086	14,668	7 9	55	5,467	13	20,204
Q3	2,150	2,212	2,660	2,436	5,145	14,603	7 11	55	5,431	31	20,120
Q4	2,150	2,388	2,410	2,796	4,830	14,574	7 9	55	6,034	18	20,681

End of Quarter.

Source: Supplement.

TABLE 8

Bank of Canada's Holdings of Government of Canada
Direct and Guaranteed Securities ($ Millions)

	2 years and under					
	Treasury Bills	Other	Over 2-5 years	Over 5-10 years	Over 10 years	Total
1955-Q1	165	1,161	398	265	151	2,139
Q2	297	1,155	392	271	163	2,278
Q3	235	868	597	386	202	2,290
Q4	263	1,021	355	517	213	2,368
1956-Q1	456	510	449	624	200	2,239
Q2	456	585	799	329	149	2,318
Q3	535	506	673	448	216	2,377
Q4	505	520*	630*	507*	232*	2,394*
1957-Q1	477	628	612	314	236	2,256
Q2	519	694	608	325	230	2,376
Q3	428	781	615	323	231	2,378
Q4	467	779	667	301	213	2,428
1958-Q1	480	894	664	240	131	2,409
Q2	371	1,126	371	374	296	2,537
Q3	70	351	605	463	1,213	2,701
Q4	36	245	552	463	1,326	2,622
1959-Q1	161	92	521	452	1,325	2,551
Q2	251	162	388	467	1,351	2,619
Q3	297	257	361	434	1,322	2,672
Q4	306	515	61	425	1,315	2,621
1960-Q1	399	417	29	386	1,315	2,546
Q2	392	449	93	491	1,185	2,609
Q3	336	518	377	207	1,187	2,625
Q4	404	353	527	218	1,187	2,690
1961-Q1	304	331	576	215	1,184	2,610
Q2	277	438	550	213	1,184	2,662
Q3	327	424	607	273	1,181	2,812
Q4	312	514	548	266	1,186	2,826
1962-Q1	232	437	564	342	1,185	2,760
Q2	178	338	419	370	1,187	2,493
Q3	399	301	335	805	639	2,478
Q4	455	447	507	791	683	2,883

Table 8 - Continued

	2 years and under		Over 2-5 years	Over 5-10 years	Over 10 years	Total
	Treasury Bills	Other				
1963-Q1	370	510	572	630	698	2,779
Q2	434	503	696	571	684	2,887
Q3	338	837	442	571	752	2,939
Q4	466	688	559	570	752	3,035
1964-Q1	476	603	552	621	707	2,957
Q2	403	390	549	875	708	2,925
Q3	519	375	810	611	702	3,017
Q4	479	349	779	711	747	3,064
1965-Q1	483	263	715	731	773	2,965
Q2	470	393	847	628	833	3,170
Q3	426	364	917	628	834	3,169
Q4	608	478	820	643	868	3,417

*Major Series Revision

Last Month in Quarter

Source: Supplement.

TABLE 9

Total Minus Bank of Canada's Holdings of Government of Canada Direct and Guaranteed Securities ($ Millions)

	2 years and under					
	Treasury Bills	Other	Over 2-5 years	Over 5-10 years	Over 10 years	Total
1955-Q1	1,425	505	1,904	4,025	3,297	11,157
Q2	1,408	510	3,076	2,805	3,285	11,084
Q3	1,540	261	3,507	2,691	3,246	11,242
Q4	1,462	808	3,049	2,560	3,235	11,114
1956-Q1	1,644	1,259	2,954	2,487	3,158	11,502
Q2	1,234	2,129	1,607	2,780	3,209	10,958
Q3	1,195	1,814	1,477	4,352	1,700	10,539
Q4	1,070	1,650	1,520	4,293	1,684	10,217
1957-Q1	1,148	2,524	1,906	3,186	1,630	10,405
Q2	1,106	2,308	1,910	3,174	1,636	10,134
Q3	1,227	2,157	1,903	3,176	1,635	10,098
Q4	1,158	1,759	2,251	3,195	1,653	10,015
1958-Q1	1,045	1,644	2,504	3,006	2,035	10,234
Q2	1,124	2,177	2,031	3,222	1,870	10,425
Q3	1,425	1,473	1,579	1,707	4,471	10,656
Q4	1,459	2,079	1,454	1,484	4,358	10,834
1959-Q1	1,434	2,205	1,584	1,495	4,359	11,077
Q2	1,704	2,350	1,315	1,540	4,423	11,332
Q3	1,727	2,180	1,341	1,643	4,382	11,272
Q4	1,771	2,352	1,070	1,650	4,387	11,231
1960-Q1	1,726	2,338	1,314	1,689	4,487	11,554
Q2	1,573	1,810	1,638	1,864	4,539	11,424
Q3	1,629	1,741	2,620	881	4,537	11,408
Q4	1,581	1,873	2,279	942	4,708	11,382
1961-Q1	1,631	2,145	2,165	950	4,620	11,510
Q2	1,608	2,523	1,852	952	4,620	11,555
Q3	1,558	2,511	2,262	781	4,467	11,579
Q4	1,573	2,651	2,222	712	4,341	11,499
1962-Q1	1,653	2,785	2,256	686	4,255	11,635
Q2	1,707	2,802	2,214	585	4,465	11,772
Q3	1,631	2,554	2,298	1,517	3,846	11,847
Q4	1,710	2,079	1,936	1,681	4,365	11,772

Table 9 - Continued

	2 years and under					
	Treasury Bills	Other	Over 2-5 years	Over 5-10 years	Over 10 years	Total
1963-Q1	1,795	2,141	1,996	1,572	4,392	11,898
Q2	1,911	2,084	2,362	1,267	4,506	12,131
Q3	1,907	3,000	1,350	1,267	4,438	11,963
Q4	1,774	2,860	1,624	1,268	4,436	11,962
1964-Q1	1,754	3,006	1,501	1,421	4,331	12,015
Q2	1,742	2,623	1,734	1,498	4,405	12,002
Q3	1,611	2,909	1,623	1,432	4,396	11,970
Q4	1,661	2,651	1,634	1,602	4,349	11,897
1965-Q1	1,657	2,247	1,648	1,857	4,322	11,731
Q2	1,670	2,264	1,543	1,766	4,253	11,498
Q3	1,724	1,848	1,743	1,808	4,311	11,434
Q4	1,542	1,910	1,590	2,153	3,962	11,157

Last Month in Quarter

Source: Tables 7 and 8 above.

TABLE 10

Government of Canada Accounts (i.e. Securities Investment Account; Purchase Fund; Unemployment Insurance Fund and Other) ($ Millions)

	Treasury Bills	Other	Total
1955-Q1	32	1,204	1,236
Q2	1	1,209	1,210
Q3	6	1,355	1,361
Q4	36	1,455	1,491
1956-Q1	0	1,950	1,950
Q2	3	1,604	1,607
Q3	3	1,419	1,422
Q4	40	1,478	1,518
1957-Q1	0	1,490	1,490
Q2	13	1,348	1,361
Q3	11	1,370	1,381
Q4	59	1,308	1,367
1958-Q1	1	1,286	1,287
Q2	1	1,129	1,130
Q3	6	1,215	1,221
Q4	89	1,170	1,259
1959-Q1	28	916	944
Q2	9	998	1,007
Q3	8	982	990
Q4	30	893	923
1960-Q1	13	820	833
Q2	13	766	779
Q3	57	850	907
Q4	56	810	866
1961-Q1	6	721	727
Q2	2	731	733
Q3	1	729	730
Q4	4	640	644
1962-Q1	62	474	536
Q2	181	558	739
Q3	6	613	619
Q4	47	623	670

Table 10 - Continued

	Treasury Bills	Other	Total
1963-Q1	41	428	469
Q2	36	408	444
Q3	34	433	467
Q4	51	465	516
1964-Q1	73	402	475
Q2	16	398	414
Q3	20	558	578
Q4	61	708	769
1965-Q1	10	454	464
Q2	16	496	512
Q3	16	484	500
Q4	12	544	557

Last Month in Quarter.

Source: Supplement.

TABLE 11

Chartered Banks: Holdings of Government of Canada Direct and Guaranteed Securities ($ Millions)

	Treasury Bills	2 years and under	Over 2 years
1955-Q1	435	681	2,482
Q2	376	665	2,579
Q3	369	401	2,775
Q4	427	475	2,157
1956-Q1	593	398	1,922
Q2	772	557	1,398
Q3	786	526	1,322
Q4	740	406*	1,269*
1957-Q1	805	538	1,227
Q2	784	493	1,251
Q3	915	479	1,241
Q4	805	410	1,425
1958-Q1	800	403	1,643
Q2	882	710	1,736
Q3	1,096	757	2,024
Q4	950	826	1,736
1959-Q1	902	856	1,756
Q2	1,009	619	1,532
Q3	919	420	1,475
Q4	974	657	1,169
1960-Q1	968	658	1,270
Q2	959	569	1,399
Q3	1,076	540	1,443
Q4	967	615	1,472
1961-Q1	1,112	827	1,371
Q2	1,141	915	1,325
Q3	1,217	911	1,554
Q4	1,157	1,089	1,551
1962-Q1	1,164	1,150	1,567
Q2	1,013	1,080	1,384
Q3	1,018	569	1,335
Q4	1,127	754	1,487

Table 11 - Continued

	Treasury Bills	2 years and under	Over 2 years
1963-Q1	1,272	825	1,502
Q2	1,318	922	1,554
Q3	1,233	1,408	1,127
Q4	1,282	1,335	1,325
1964-Q1	1,226	1,421	1,279
Q2	1,240	1,219	1,357
Q3	1,193	1,269	1,213
Q4	1,257	1,126	1,336
1965-Q1	1,294	991	1,539
Q2	1,262	1,077	1,399
Q3	1,382	907	1,439
Q4	1,357	955	1,423

*Major series revision

Last Month in Quarter

Source: Supplement.

TABLE 12

General Public Holdings of Government of Canada Securities
by Term to Maturity

	Unmatured Direct and Guaranteed securities (ex. Canada Savings Bonds and Perpetuals)								Perpetuals	Canada Savings Bonds	Matured and outstanding market issues	Total outstanding
	2 years and under		Over 2-5 years	Over 5-10 years	Over 10 years	Total	Average term to maturity					
	Treasury Bills	Other										
	Millions of Dollars, Par Value						Yrs.	Mos.	Millions of Dollars, Par Value			
End of												
1955-Q1	286	390	873	2,128	2,555	6,232	9	3	52	2,031	53	8,369
Q2	352	418	1,357	1,518	2,515	6,160	8	11	52	1,960	41	8,212
Q3	486	306	1,511	1,470	2,455	6,227	8	5	52	1,900	35	8,214
Q4	494	677	1,389	1,462	2,433	6,455	7	11	52	2,433	30	8,969
1956-Q1	546	713	1,429	1,477	2,371	6,536	7	6	51	2,387	30	9,004
Q2	453	1,150	1,056	1,485	2,368	6,511	7	4	52	2,293	35	8,890
Q3	401	1,088	1,006	2,630	1,198	6,324	7	6	51	2,210	29	8,614
Q4	285	1,079	985	2,612	1,186	6,146	7	6	51	2,541	27	8,766
1957-Q1	337	1,676	1,182	1,978	1,157	6,329	7	2	51	2,436	20	8,836
Q2	304	1,649	1,169	1,966	1,141	6,288	6	11	51	2,315	21	8,616
Q3	297	1,498	1,165	1,965	1,139	6,064	6	11	51	2,213	17	8,345
Q4	289	1,223	1,340	1,970	1,153	5,975	7	-	51	2,649	18	8,693
1958-Q1	239	1,113	1,336	1,910	1,470	6,067	7	11	51	2,556	15	8,689
Q2	239	1,341	939	2,060	1,354	5,933	8	-	51	2,471	15	8,470
Q3	319	487	446	720	3,534	5,507	14	9	51	2,387	12	7,956
Q4	415	1,010	413	666	3,509	6,012	13	4	50	2,895	10	8,968
1959-Q1	501	1,325	517	692	3,537	6,572	12	3	50	2,855	22	9,499
Q2	670	1,619	475	738	3,596	7,098	11	4	50	2,767	18	9,934
Q3	786	1,687	543	815	3,573	7,404	10	10	51	2,662	15	10,132
Q4	755	1,610	671	838	3,572	7,446	10	10	51	3,212	16	10,725

Table 12 - Continued

	Unmatured direct and guaranteed securities (ex. Canada Savings Bonds and Perpetuals)								Perpetuals	Canada Savings Bonds	Matured and outstanding market issues	Total outstanding
	2 years and under		Over 2-5 years	Over 5-10 years	Over 10 years	Total	Average term to maturity					
	Treasury Bills	Other										
	Millions of Dollars, Par Value						Yrs.	Mos.	Millions of Dollars, Par Value			
End of												
1960-Q1	735	1,657	824	880	3,669	7,765	10	7	51	3,143	12	10,971
Q2	591	1,212	1,059	1,027	3,774	7,663	11	-	51	3,059	27	10,800
Q3	488	1,047	1,523	545	3,790	7,393	11	2	51	3,002	20	10,466
Q4	549	1,147	1,200	559	3,954	7,409	11	6	51	3,594	25	11,080
1961-Q1	504	1,255	1,171	568	3,928	7,426	11	3	51	3,562	16	11,055
Q2	459	1,537	896	580	3,922	7,394	11	1	51	3,473	17	10,935
Q3	333	1,536	1,014	525	3,856	7,264	11	-	51	3,398	14	10,728
Q4	405	1,503	952	485	3,828	7,173	10	10	51	4,080	19	11,323
1962-Q1	420	1,578	968	467	3,809	7,241	10	5	51	4,059	29	11,380
Q2	505	1,650	1,077	435	3,870	7,537	10	-	50	3,988	23	11,599
Q3	591	1,936	1,204	1,236	3,369	8,335	9	5	50	3,851	19	12,255
Q4	523	1,276	862	1,337	3,784	7,782	10	9	50	4,620	19	12,472
1963-Q1	470	1,272	868	1,307	3,880	7,797	10	11	50	4,588	16	12,451
Q2	546	1,120	1,168	1,028	3,985	7,847	11	-	50	4,464	16	12,377
Q3	628	1,535	655	1,008	3,888	7,713	10	8	50	4,385	14	12,163
Q4	430	1,471	746	1,008	3,873	7,528	10	8	50	5,133	25	12,736
1964-Q1	444	1,518	700	1,108	3,809	7,579	10	7	50	5,099	19	12,747
Q2	476	1,355	888	1,147	3,873	7,738	10	6	50	4,988	17	12,793
Q3	388	1,481	884	1,113	3,868	7,734	10	5	50	4,905	16	12,705
Q4	332	1,255	937	1,155	3,786	7,465	10	6	50	5,613	16	13,144

Table 12 - Continued

	Unmatured direct and guaranteed securities (ex. Canada Savings Bonds and Perpetuals)								Perpetuals	Canada Savings Bonds	Matured and outstanding market issues	Total outstanding
	2 years and under		Over 2-5 years	Over 5-10 years	Over 10 years	Total	Average term to maturity					
	Treasury Bills	Other										
	Millions of Dollars, Par Value						Yrs.	Mos.	Millions of Dollars, Par Value			
End of												
1965-Q1	342	1,195	881	1,289	3,759	7,465	10	4	50	5,557	14	13,086
Q2	381	1,076	885	1,224	3,691	7,256	10	3	50	5,426	13	12,746
Q3	313	912	1,072	1,265	3,726	7,289	10	3	50	5,324	31	12,695
Q4	157	921	964	1,550	3,404	6,995	10	4	50	5,866	18	12,929

End of Quarter

Source: Supplement.

TABLE 13

Total Debt Minus Bank of Canada Holdings by Term to Maturity (Under Different Assumptions About the Behaviour of the Bank of Canada. Starred row numbers give actual figures, non-starred ones hypothetical figures). ($ Millions)

Row No.		2 years and under Treasury Bills	2 years and under Other	Over 2-5 years	Over 5-10 years	Over 10 years	Total
1.*	(Total:58Q2) - (BOC:58Q2) =	1,124	2,177	2,031	3,222	1,870	10,425
2.	(Total:58Q3) - (BOC:58Q2) =	1,124	698	1,813	1,796	5,388	10,820
3.*	(Total:58Q3) - (BOC:58Q3) =	1,425	1,473	1,579	1,707	4,471	10,656
4.	(Total:58Q3) - (BOC:59Q1) =	1,334	1,732	1,663	1,718	4,359	10,806
5.	(Total:58Q3) - (BOC:59Q2) =	1,244	1,662	1,796	1,703	4,333	10,738
6.	(Total:58Q3) - (BOC:59Q3) =	1,198	1,567	1,823	1,736	4,362	10,685
7.	(Total:58Q3) - (BOC:59Q4) =	1,189	1,309	2,123	1,745	4,369	10,736
8.*	(Total:59Q1) - (BOC:59Q1) =	1,434	2,205	1,584	1,495	4,359	11,077
9.*	(Total:59Q2) - (BOC:59Q2) =	1,704	2,350	1,315	1,540	4,423	11,332
10.*	(Total:59Q3) - (BOC:59Q3) =	1,727	2,180	1,341	1,643	4,382	11,272
11.*	(Total:59Q4) - (BOC:59Q4) =	1,771	2,352	1,070	1,650	4,387	11,231

Source: Tables 7 and 8.

TABLE 14

Bonds Outstanding on December 31 by Issuer and Currency ($ Millions)

	Government of Canada Direct and Guaranteed			Provinces Direct and Guaranteed			Municipalities Direct and Guaranteed			Corporations		
	Cdn. $	Other	Total	Cdn. $	Other	Total	Cdn. $	Other	Total	Cdn. $	Other	Total
1955	15,449	551	16,000	3,161	913	4,074	1,790	413	2,203	3,594	833	4,427
1956	14,799	435	15,234	3,509	1,107	4,616	1,930	497	2,427	4,178	1,045	5,223
1957	14,798	367	15,165	4,014	1,156	5,170	2,111	599	2,710	4,750	1,443	6,193
1958	16,051	365	16,416	4,484	1,304	5,788	2,318	720	3,038	5,225	1,633	6,858
1959	16,922	213	17,135	4,815	1,556	6,371	2,529	841	3,370	5,320	1,650	6,970
1960	17,535	212	17,747	5,263	1,593	6,855	2,793	947	3,740	5,636	1,549	7,186
1961	18,479	157	18,636	6,594	1,617	8,211	3,129	928	4,058	5,446	1,662	7,108
1962	19,184	264	19,448	7,205	1,846	9,051	3,339	1,024	4,363	5,706	1,967	7,673
1963	19,893	383	20,276	7,986	2,220	10,206	3,726	1,027	4,753	5,869	2,113	7,982
1964	20,350	383	20,733	8,577	2,578	11,155	4,050	1,142	5,193	6,433	2,322	8,755
1965	20,303	378	20,681	9,063	2,826	11,889	4,302	1,162	5,464	7,310	2,652	9,963

Source: Supplement.

TABLE 15

Federal Government Gross New Issues of Direct and Guaranteed Bonds
Par Values ($ Millions)

	0-2 years	Over 2-5 years	Over 5-10 years	All under 10 years	Over 10 years	Total Cdn.$ only micro-series	Total U.S. $ micro-series	Total Cdn. $ only Supple-ment series	Total U.S. $ Supple-ment series
	1	2	3	4	5	6	7	8	9
1955-Q1	0	0	0	0	0	0	0	0	0
Q2	0	700	0	700	0	700	0	0	0
Q3	0	0	0	0	0	0	0	700	0
Q4	0	0	0	0	0	0	0	670	0
1956-Q1	0	0	0	0	0	0	0	32	0
Q2	0	0	0	0	0	0	0	19	0
Q3	0	0	0	0	250	250	0	260	0
Q4	400	0	0	400	0	400	0	1,216	0
1957-Q1	0	0	0	0	0	0	0	21	0
Q2	0	0	0	0	0	0	0	10	0
Q3	0	0	0	0	0	0	0	6	0
Q4	950	400	0	1,350	0	1,350	0	2,566	0
1958-Q1	0	0	0	0	300	300	0	300	0
Q2	200	400	0	600	350	950	0	950	0
Q3	400	1,021	1,267	2,688	3,519	6,207	0	6,206	0
Q4	900	0	0	900	0	900	0	1,744	0
1959-Q1	200	100	0	300	0	300	0	350	0
Q2	0	0	60	60	90	150	0	170	0
Q3	238	0	0	238	0	238	0	247	0
Q4	260	450	0	710	0	710	0	2,126	0

Table 15 - Continued

	0-2 years	Over 2-5 years	Over 5-10 years	All under 10 years	Over 10 years	Total Cdn. $ only micro-series	Total U.S. $ micro-series	Total Cdn. $ only Supple-ment series	Total U.S. $ Supple-ment series
	1	2	3	4	5	6	7	8	9
1960-Q1	0	300	0	300	100	400	0	457	0
Q2	0	389	80	469	0	469	0	502	0
Q3	0	0	0	0	0	0	0	31	0
Q4	300	300	75	675	175	850	0	1,676	0
1961-Q1	175	250	0	425	0	425	0	494	0
Q2	390	110	0	500	0	500	0	540	0
Q3	225	0	175	400	0	400	0	913	0
Q4	175	250	100	525	0	525	0	1,480	0
1962-Q1	300	0	100	400	0	400	0	489	0
Q2	100	0	100	200	0	200	0	267	0
Q3	0	0	80	80	120	300	0	274	0
Q4	0	400	250	650	135*	785	135	2,277	135
1963-Q1	125	225	0	350	135*	350	135	442	135
Q2	475	175	0	650	100	750	0	811	0
Q3	0	0	0	0	0	0	0	71	0
Q4	500	391	0	901	0	901	0	1,977	0
1964-Q1	170	130	0	300	50	350	0	447	0
Q2	250	0	325	575	75	1,350	0	707	0
Q3	200	0	0	200	50	250	0	334	0
Q4	325	200	350	875	0	875	0	1,894	0

Table 15 - Continued

	0-2 years	Over 2-5 years	Over 5-10 years	All under 10 years	Over 10 years	Total Cdn. $ only micro-series	Total U.S. $ micro-series	Total Cdn. $ only Supple-ment series	Total U.S. $ Supple-ment series
	1	2	3	4	5	6	7	8	9
1965-Q1	175	0	275	450	0	450	0	539	0
Q2	175	0	0	175	0	175	0	241	0
Q3	405	270	0	675	100	775	0	876	0
Q4	150	100	50	200	0	200	0	1,218	0

*U.S. $

Notes on the construction of Table 15

Supplement Series, i.e. Columns 8 and 9.

"Series cover all publicly announced issues and some private placements not publicly announced. New issues are based on delivery rather than offering dates. Foreign currencies have been converted to Canadian dollars at market noon rates on the date of delivery." Bank of Canada Statistical Summary Supplement, 1960, p. 84.

Treasury bills are not included but Canada Savings Bonds are. The reasons for the slight difference between the Supplement series and the micro-series are:

1. The micro-series was built from offering dates - consistent with the issuers intentions.
2. The private placements are not reported hence could not be included in the micro-series.
3. Canada Savings bonds are included in the Supplement series but not the other one.

Micro-series, i.e. Columns 1 to 7.

Built from the reports on new issues contained in various issues of the Supplement.

They exclude Treasury bills and Canada Savings Bonds - hence 3 above.

TABLE 16a

Provincial Gross New Issues of (Direct and Guaranteed) Bonds
Par Values ($000's)

	0-2 years	Over 2-5 years	Over 5-10 years	Other under 10 years	All under 10 years Cols. 1+2 +3+4	Over 10 years	Other	Total: 1 to 7 Cdn. $ only micro-series	Total U.S. $ micro-series
	1	2	3	4	5	6	7	8	9
1955-Q1	0	6,849	28,000	0	34,849	121,000	1,024	156,873	0
Q2	2,500	0	23,250	0	25,750	36,000	8,174	69,924	0
Q3	3,000	0	50,000	4,115	57,115	63,000	253	120,368	0
Q4	0	0	0	0	0	10,000	0	10,000	75,000
1956-Q1	0	0	16,700	0	16,700	62,000	230	78,930	0
Q2	0	0	0	0	0	67,400	800	68,200	95,000
Q3	0	0	0	0	0	78,500	4,456	82,956	0
Q4	550	0	35,950	0	36,500	154,970	482	191,952	15,750
1957-Q1	0	13,957	0	0	13,957	139,869	1,051	154,877	0
Q2	0	0	18,400	0	18,400	142,600	7,654	168,654	2,000
Q3	0	20,646	31,731	0	52,377	85,523	956	138,856	0
Q4	0	1,591	13,700	0	15,291	162,208	9,736	187,235	0
1958-Q1	0	5,000	38,500	6	43,506	40,500	177	84,183	70,000
Q2	0	11,375	40,000	0	51,375	53,625	2,544	107,544	100,000
Q3	74,000	10,000	0	0	84,000	18,000	0	102,000	0
Q4	25,000	40,000	5,000	4,276	74,276	98,001	1,900	174,177	0
1959-Q1	6,500	15,000	0	5,000	26,500	95,500	2,551	124,551	75,000
Q2	0	0	250	0	250	32,250	5,774	38,274	50,000
Q3	2,350	35,616	36,000	0	73,966	94,000	9,399	177,365	65,000
Q4	0	5,580	25,000	0	30,580	75,600	645	106,825	59,000

Table 16a - Continued

	0-2 years	Over 2-5 years	Over 5-10 years	Other under 10 years	All under 10 years Cols. 1+2 +3+4	Over 10 years	Other	Total 1 to 7 Cdn. $ only micro-series	Total U.S. $ micro-series
	1	2	3	4	5	6	7	8	9
1960-Q1	0	5,000	16,000	0	21,000	42,721	1,250	64,971	37,000
Q2	1,850	6,000	28,500	18	36,368	150,026	2,030	188,424	40,000
Q3	10,000	25,000	16,100	0	51,100	118,900	170	170,170	0
Q4	20,000	15,019	2,301	1,250	38,570	67,472	4,728	110,770	0
1961-Q1	0	13,000	27,800	1,828	42,628	194,047	2,389	239,064	15,000
Q2	0	13,000	25,700	0	38,700	139,300	1,150	179,150	0
Q3	6,000	153,000	8,000	243	167,243	71,657	29	238,929	0
Q4	0	18,460	36,425	0	54,885	183,875	6,882	245,642	0
1962-Q1	0	20,000	45,600	0	65,600	197,184	0	262,784	0
Q2	10,000	0	31,500	1,544	43,044	132,200	665	175,909	0
Q3	0	53,976	10,000	0	63,976	69,500	8,480	141,956	8,000
Q4	0	0	43,500	0	43,500	171,500	5,804	220,804	96,500
1963-Q1	15,000	0	13,500	0	28,500	58,500	0	87,000	373,000
Q2	2,000	0	177,289	0	179,289	130,000	4,673	313,962	6,225
Q3	5,000	65,000	0	0	70,000	57,500	273	127,773	0
Q4	15,000	12,000	0	0	27,000	180,600	0	207,600	0
1964-Q1	0	0	39,861	5,000	44,861	131,500	2,968	179,329	34,225
Q2	15,000	0	26,532	0	41,532	103,000	1,620	146,152	30,000
Q3	0	20,000	0	0	20,000	70,500	1,428	91,928	10,000
Q4	15,000	0	0	0	15,000	212,000	0	227,000	107,500

Table 16a - Continued

	0-2 years	Over 2-5 years	Over 5-10 years	Other under 10 years	All under 10 years Cols. 1+2 +3+4	Over 10 years	Other	Total 1 to 7 Cdn. $ only micro-series	Total U.S. $ micro-series
	1	2	3	4	5	6	7	8	9
1965-Q1	0	0	0	0	0	162,000	77,688	239,688	47,000
Q2	15,000	0	0	0	15,000	178,500	0	193,500	65,000
Q3	0	0	0	100,000	100,000	100,000	0	200,000	35,000
Q4	0	0	0	0	0	126,000	455	126,455	0

Notes on the Construction of Table 16a

Micro-series

1. Built from individual issues reported in three sources: The Financial Post, confidential data made available by the Bank of Canada and Moody's annual statements. The Bank's data series include more issues than the Financial Post, hence the usual understatement of columns 1 and 2. The Financial Post series, being the only apparently unchanged series (and from 1955-57 the only one available), was used as the basis from which the series reported here was constructed. The data from the Bank and Moody's were used to check and enrich the reports in the Financial Post.

2. With the exception of two quarters the Financial Post does not report Treasury bill issues by Manitoba and Saskatchewan - they each issue (before 1962, the Bank's data consist of handwritten sheets and make no mention of Treasury bill issues) roughly $ 4 M per month. Note that it is a constant for the period after 1962.

3. Some issues in more than one currency would appear under Cdn. $. It is not clear what the Bank does in this respect.

4. Information on coupons and yields is available.

TABLE 16b

Provincial Gross New Issues of (Direct and Guaranteed) Bonds
Par Values ($000's)

	Cdn. $ only Supplement series	Other currencies Supplement series
	1	2
1955-Q1	159,000	0
Q2	76,000	0
Q3	114,000	0
Q4	23,000	0
1956-Q1	79,000	92,000
Q2	79,000	50,000
Q3	94,000	39,000
Q4	168,000	34,000
1957-Q1	126,000	63,000
Q2	148,000	46,000
Q3	108,000	0
Q4	252,000	24,000
1958-Q1	101,000	69,000
Q2	119,000	97,000
Q3	141,000	0
Q4	199,000	0
1959-Q1	125,000	104,000
Q2	100,000	57,000
Q3	193,000	81,000
Q4	155,000	81,000
1960-Q1	111,000	42,000
Q2	230,000	41,000
Q3	221,000	11,000
Q4	122,000	0
1961-Q1	272,000	23,000
Q2	214,000	0
Q3	382,000	0
Q4	275,000	10,000
1962-Q1	284,000	0
Q2	282,000	0
Q3	172,000	9,000
Q4	466,000	104,000

Table 16b - Continued

	Cdn. $ only Supplement series	Other currencies Supplement series
	1	2
1963-Q1	134,000	186,000
Q2	462,000	81,000
Q3	172,000	61,000
Q4	339,000	2,000
1964-Q1	233,000	84,000
Q2	322,000	146,000
Q3	182,000	30,000
Q4	356,000	156,000
1965-Q1	299,000	21,000
Q2	310,000	121,000
Q3	208,000	83,000
Q4	348,000	46,000

Notes on the Construction of Table 16b

Supplement series

1. Before 1960 they exclude provincial Treasury Bills, e.g. Manitoba and Saskatchewan. Beginning in 1960 they include those sold publicly.

2. They include some bonds issued in exchange for shares, e.g. when B. C. took over B. C. Electric Co.

3. The series is not available by term to maturity.

4. Retirements and, therefore, Net New Issues are also available in the Supplement.

TABLE 17a

Gross New Issues of Bonds by Canadian Corporations
Par Values ($000's)

	0-2 years	Over 2-5 years	Over 5-10 years	Other under 10 years	All under 10 years Cols. 1+2 +3+4	Over 10 years	Other	Total: 5 to 7 Cdn. $ only micro-series	Total U.S. $ micro-series
	1	2	3	4	5	6	7	8	9
1951-Q1	0	0	1,650	15,950	17,600	74,900	0	92,500	0
Q2	0	0	15,000	35,375	50,375	227,715	7,240	285,330	0
Q3	0	0	11,898	8,600	20,498	40,450	7,625	68,573	600
Q4	0	0	47,500	23,600	71,100	125,750	0	196,850	0
1956-Q1	0	0	8,500	1,500	10,000	187,525	0	197,525	0
Q2	10,000	0	20,750	15,600	46,350	108,350	0	154,700	132,500
Q3	0	7,000	24,250	0	31,250	55,350	0	86,600	0
Q4	0	750	34,000	0	34,750	158,125	0	192,875	50,500
1957-Q1	0	0	53,845	250	54,095	246,509	15,000	315,604	137,165
Q2	0	10,500	13,650	0	24,150	210,000	0	234,150	137,450
Q3	0	0	1,526	0	1,526	50,600	102,500	154,626	27,250
Q4	0	1,201	2,500	0	3,701	100,020	20,050	123,771	0
1958-Q1	0	0	7,000	0	7,000	189,790	850	197,640	50,000
Q2	0	2,900	10,400	26,900	40,200	182,250	1,200	223,650	37,000
Q3	0	2,000	0	600	2,600	96,726	800	100,126	9,600
Q4	0	0	1,150	400	1,550	63,250	0	64,800	0
1959-Q1	0	0	0	13,000	13,000	109,600	2,500	125,100	0
Q2	0	0	1,550	2,650	4,200	43,700	0	47,900	28,500
Q3	0	0	3,000	450	3,450	42,325	0	45,775	0
Q4	0	0	2,675	250	2,925	109,350	0	112,275	0

Table 17a - Continued

	0-2 years	Over 2-5 years	Over 5-10 years	Other under 10 years	All under 10 years Cols. 1+2 +3+4	Over 10 years	Other	Total: 5 to 7 Cdn. $ only micro-series	Total U.S. $ micro-series
	1	2	3	4	5	6	7	8	9
1960-Q1	0	1,000	1,550	250	2,800	174,050	4,142	180,992	45,000
Q2	0	0	6,500	500	7,000	129,816	500	137,316	10,260
Q3	0	0	500	1,350	1,850	101,825	460	104,135	30,000
Q4	0	1,150	850	600	2,600	46,975	0	49,575	0
1961-Q1	0	0	500	750	1,250	98,825	6,050	106,125	5,000
Q2	0	4,500	1,410	6,650	12,560	243,500	23,240	279,300	98,000
Q3	0	0	950	1,040	1,590	68,750	500	71,040	13,000
Q4	0	2,000	750	2,500	5,250	66,725	6,100	78,075	0
1962-Q1	0	0	8,650	300	8,950	96,025	2,800	107,775	3,000
Q2	0	0	2,900	17,200	20,100	136,757	9,000	165,857	100,000
Q3	0	1,000	1,250	0	2,250	175,580	1,000	178,830	21,000
Q4	0	2,000	20,000	5,325	27,325	85,600	0	112,925	39,000
1963-Q1	0	20,000	0	0	20,000	96,234	6,000	122,234	93,009
Q2	0	800	10,050	11,600	22,450	241,571	11,000	275,021	86,250
Q3	500	0	1,500	2,000	4,000	23,950	1,500	29,450	37,000
Q4	0	8,000	8,800	0	16,800	89,300	6,400	112,500	0
1964-Q1	0	7,500	5,250	1,500	14,250	130,350	5,000	149,600	22,000
Q2	0	0	6,000	8,100	14,100	212,964	5,005	232,069	97,000
Q3	0	0	0	300	300	96,550	12,000	108,850	0
Q4	0	12,072	1,950	5,000	19,022	221,824	0	240,846	112,500

Table 17a - Continued

	0-2 years	Over 2-5 years	Over 5-10 years	Other under 10 years	All under 10 years Cols. 1+2 +3+4	Over 10 years	Other	Total: 5 to 7 Cdn. $ only micro-series	Total U.S. $ micro-series
	1	2	3	4	5	6	7	8	9
1965-Q1	0	400	2,550	0	2,950	220,225	2,000	225,175	44,600
Q2	0	0	10,000	1,800	11,800	403,620	5,500	420,920	113,000
Q3	0	1,000	2,000	2,800	5,800	98,500	3,500	107,800	125,000
Q4	0	10,000	35,000	0	45,000	123,450	12,000	180,450	112,000

Notes on the Construction of Table 17a

Micro-series

1. Built from individual issues in three sources: The Financial Post, confidential data made available from the Bank of Canada and Moody's annual statements. The Bank's data series include more issues than the Financial Post until 1962. At that time the Bank series changes somewhat so that while less issues (only large ones) are reported, a residual containing smaller issues is also reported, thereby inflating the totals. In most cases issues reported in the Financial Post were also reported in the Bank's series. This series builds on the reports in the Financial Post, uses Moody's and the Bank's data to enrich these reports, but in the few cases where agreement could not be reached the Financial Post "wins."

2. Some issues in more than one currency would appear under mainly Cdn. $. The reports on each issue are not sufficiently detailed for a more accurate series to be constructed. These issues are believed to be of little significance.

3. Some issues enable the lender to acquire company stock, etc. Such information is ignored.

4. Information on coupons and yields is usually available too.

Table 17a - Continued

Micro-series - Continued

5. Some issues by non-Canadian corporations are included in the Financial Post. They are not incorporated in these series.

6. There are a handful of issues that were reported as Cdn. $ in the Financial Post and as U.S. $ in Bank's data. Experience indicated that the Bank was always right (Moody's was also consulted), and therefore this was the data used.

TABLE 17b

Gross New Issues of Bonds by Canadian Corporations
Par Values ($000's)

	Total Cdn. $ only Supplement series	Total Other currencies Supplement series
	1	2
1955-Q1	190,000	0
Q2	207,000	0
Q3	72,000	9,000
Q4	218,000	0
1956-Q1	228,000	22,000
Q2	202,000	50,000
Q3	167,000	66,000
Q4	215,000	90,000
1957-Q1	238,000	130,000
Q2	324,000	189,000
Q3	74,000	66,000
Q4	165,000	25,000
1958-Q1	199,000	61,000
Q2	276,000	93,000
Q3	153,000	40,000
Q4	158,000	13,000
1959-Q1	92,000	9,000
Q2	131,000	7,000
Q3	74,000	27,000
Q4	123,000	18,000
1960-Q1	206,000	33,000
Q2	198,000	41,000
Q3	136,000	18,000
Q4	81,000	13,000
1961-Q1	118,000	53,000
Q2	192,000	91,000
Q3	163,000	78,000
Q4	139,000	28,000
1962-Q1	134,000	17,000
Q2	198,000	152,000
Q3	116,000	13,000
Q4	174,000	83,000

Table 17b - Continued

	Total Cdn. $ only Supplement Series	Total Other currencies Supplement series
	1	2
1963-Q1	91,000	31,000
Q2	360,000	225,000
Q3	53,000	11,000
Q4	150,000	42,000
1964-Q1	145,000	14,000
Q2	330,000	73,000
Q3	132,000	40,000
Q4	380,000	172,000
1965-Q1	233,000	48,000
Q2	509,000	144,000
Q3	258,000	146,000
Q4	255,000	161,000

Notes on the Construction of Table 17b

Supplement series

The source of Table 17b is the Bank of Canada Statistical Summary Supplement. The reader should compare Table 17b with cols. 8 and 9 of Table 17a. The comparison gives an indication of the accuracy of the micro-series. The Supplement gives information on retirements and hence net new issues but in no case is there a disaggregation by term to maturity made available.

TABLE 18

Average Term of Provincial Debt as at Fiscal Year Ends

(in years)

1954	19.5
1956	19.5
1958	18.8
1960	18.1
1962	19.8
1963	19.6
1964	19.7
1965	19.8

Source: DBS Annual Provincial Government Finance: Debt for the Year 1967 (68-209).

TABLE 19

Municipal Debt by Province Disaggregated into Serial and Sinking Fund.
The former is the first entry under each year and province,
while the latter is the second.
($000's)

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
Nfld.	6,165	6,890	8,930	10,036	10,573	11,404	13,305	14,600	15,476	17,298	18,120
	4,600	4,600	6,100	5,565	5,580	5,481	5,310	5,068	4,960	4,804	4,585
P.E.I.	2,026	2,417	2,747	2,645	2,832	2,722	2,972	3,841	3,728	3,358	3,410
	3,959	3,918	4,894	4,721	5,029	5,608	6,379	7,651	8,431	8,804	8,937
N.S.	49,451	53,882	57,075	63,269	69,377	78,519	89,206	98,517	107,239	110,241	111,410
	13,451	13,262	12,350	11,837	10,945	10,592	7,254	7,004	6,479	6,507	5,655
N.B.	36,897	38,523	58,899	62,681	68,137	74,523	77,042	71,344	76,206	76,533	76,115
	16,164	17,660	16,322	18,814	17,016	16,374	16,096	14,173	14,358	14,236	13,159
Ont.*	728,234	759,840	814,438	884,218	938,515	1,015,257	1,078,358	1,133,128	1,180,798	1,253,548	1,323,456
	39,063	120,115	203,590	285,302	366,488	446,573	499,634	567,100	650,112	731,507	790,591
Man.*	46,173	48,206	52,884	54,180	60,506	65,960	76,844	88,997	105,799	119,718	128,738
	33,678	43,718	44,571	47,432	51,245	58,118	57,269	53,042	54,460	63,063	69,969
Sask.*	32,601	38,467	44,186	47,283	52,683	60,348	67,035	75,078	82,763	87,968	99,734
	17,248	21,288	27,973	36,126	42,101	46,744	51,899	55,557	60,526	66,555	68,071
Alta.*	154,137	180,844	216,078	237,600	274,606	291,722	316,549	338,299	355,129	365,236	391,606
	10,601	10,596	10,596	10,596	10,596	10,512	9,150	9,142	9,467	9,467	9,467
B. C.	195,500	205,640	224,205	238,219	267,824	303,025	322,694	353,174	388,539	407,888	441,420
	90,170	97,599	104,223	113,017	127,647	140,673	148,137	149,959	151,464	151,034	154,297

Table 19 - Continued

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
Que.*		238,004 †	253,401 12,717	297,052 11,717	327,693 10,306	386,730 40,306	445,264 94,108	488,040 117,722	532,115 114,269	52,786 110,993	49,579 106,626
Yukon		† †	1,046 0	1,004 0	1,016 0	987 0	955 0	924 0	890 0	856 0	820,000 0
N.W.T.		† †	105 0	101 0	203 0	218 0	212 0	186 0	213 0	193 0	227,000 0

† Not reported.

* There remains some portion of total indebtedness of starred provinces which could not be classified.

Source: DBS Municipal Government Finance (68-204).

TABLE 20

U.S. Government Marketable Securities Based on Treasury Survey Data. Par Values ($ Millions)

Public Holdings
U.S. Government agencies + trust funds + FRB excluded

	Within 1 year	1-5 years	5-10 years	Over 10 years	Total
1955-Q1					
Q2	32,224	34,216	32,167	29,269	127,876
Q3	39,335	30,382	32,165	30,010	131,892
Q4	39,467	36,320	29,925	28,518	134,230
1956-Q1	37,329	35,481	29,945	28,505	131,260
Q2	37,545	30,410	29,864	28,485	126,304
Q3	42,814	28,874	27,647	28,464	127,799
Q4	45,516	39,940	16,562	28,436	130,454
1957-Q1	45,700	40,875	16,556	28,419	131,550
Q2	49,649	37,293	13,687	26,550	127,179
Q3	50,395	41,843	13,679	26,532	132,449
Q4	51,705	43,334	10,955	27,621	133,615
1958-Q1	50,045	38,276	15,207	29,213	132,741
Q2	43,873	38,492	21,991	30,235	134,591
Q3	45,584	45,482	14,881	30,135	136,082
Q4	50,900	46,741	17,267	27,710	142,618
1959-Q1	47,168	54,920	13,402	28,441	143,931
Q2	51,341	51,253	16,680	25,709	144,983
Q3	54,194	52,917	16,658	25,687	149,456
Q4	54,867	53,176	21,066	21,219	150,328
1960-Q1	54,711	61,812	18,233	17,722	152,478
Q2	48,527	64,472	18,490	18,056	149,545
Q3	53,297	60,566	19,517	18,024	152,204
Q4	57,125	59,156	15,903	21,331	153,515
1961-Q1	57,703	51,398	23,441	18,982	151,524
Q2	63,287	47,924	21,718	18,463	151,392
Q3	65,151	51,404	18,062	21,124	155,741
Q4	65,526	55,763	15,961	21,350	158,600

Table 20 - Continued

	Within 1 year	1-5 years	5-10 years	Over 10 years	Total
1962-Q1	67,843	49,463	19,365	21,653	158,324
Q2	68,508	47,378	21,564	20,389	157,839
Q3	66,047	46,686	27,297	18,752	158,782
Q4	67,952	49,381	29,158	16,061	162,552
1963-Q1	62,056	49,231	32,831	17,931	162,049
Q2	61,955	48,073	32,299	18,034	160,361
Q3	62,296	45,424	33,843	18,942	160,505
Q4	64,979	47,919	30,525	18,666	162,089
1964-Q1	63,175	49,326	30,792	19,156	162,449
Q2	61,573	48,814	30,090	19,098	159,575
Q3	61,055	42,689	37,758	20,048	161,550
Q4	65,331	48,021	31,477	18,435	163,264
1965-Q1	62,162	47,490	32,509	20,121	162,282
Q2	59,222	43,782	34,174	20,043	157,221
Q3	61,458	43,992	30,234	19,726	155,410
Q4	67,198	43,349	30,214	19,639	160,400

End of quarter figures. The first and second columns should and do agree with Okun's [49] data - they only extend till 1959-Q4. Treasury Bills are included in column 1.

Source: Federal Reserve Bulletin.

TABLE 21

U.S. Federal Government Bond Rates

	90 day Treasury Bill	Medium term bond yield	Long term bond yield
1955-Q1	1.23	2.06	2.69
Q2	1.48	2.34	2.76
Q3	1.86	2.60	2.89
Q4	2.34	2.67	2.85
1956-Q1	2.33	2.72	2.86
Q2	2.57	3.03	2.96
Q3	2.58	3.28	3.10
Q4	3.03	3.47	3.30
1957-Q1	3.10	3.40	3.26
Q2	3.14	3.60	3.43
Q3	3.35	3.96	3.63
Q4	3.30	3.55	3.56
1958-Q1	1.76	2.56	3.25
Q2	0.96	2.07	3.15
Q3	1.68	2.92	3.57
Q4	2.69	3.59	3.75
1959-Q1	2.77	3.90	3.91
Q2	3.00	4.26	4.06
Q3	3.54	4.70	4.16
Q4	4.23	4.89	4.17
1960-Q1	3.87	4.67	4.22
Q2	2.99	4.22	4.11
Q3	2.36	3.48	3.82
Q4	2.31	3.54	3.91
1961-Q1	2.35	3.40	3.83
Q2	2.30	3.38	3.80
Q3	2.30	3.80	3.97
Q4	2.46	3.61	4.00
1962-Q1	2.72	3.61	4.06
Q2	2.71	3.37	3.89
Q3	2.84	3.49	3.98
Q4	2.81	3.32	3.88

Table 21 - Continued

	90 day Treasury Bill	Medium term bond yield	Long term bond yield
1963-Q1	2.91	3.39	3.91
Q2	2.93	3.53	3.98
Q3	3.29	3.77	4.01
Q4	3.50	3.90	4.10
1964-Q1	3.53	4.03	4.16
Q2	3.48	4.05	4.16
Q3	3.50	3.96	4.14
Q4	3.68	4.06	4.14
1965-Q1	3.89	4.17	4.15
Q2	3.87	4.14	4.14
Q3	3.86	4.19	4.20
Q4	4.16	4.53	4.35
	Source: RDX1 Data Tape	Source: IMF Financial Statistics	Source: IMF Financial Statistics

The IMF data are quarter averages.

CHAPTER TWO

THE CONVERSION LOAN: A SURVEY OF THE LITERATURE

The current paradigm on the effects of the Conversion Loan is as follows: The Loan caused an outward shift in the demand for money which, given the rather restrictive monetary policy of the time, led to an increase in the interest rate. This development may have discouraged domestic investment expenditures but it had its greatest effect by attracting foreign capital which in turn led to an exchange rate appreciation. At a time when the current account was not particularly healthy this was quite undesirable. And so it is concluded that

> "An addition to our GNP amounting to several billion dollars has been lost forever."[1]

The widespread acceptance of this view would lead one to believe that many long and involved studies of the Loan have been undertaken, all of which point to the same conclusion. What is the evidence on which current opinion[2] is based? Although there exists a large body of literature which pertains to the Loan, there appear to be only two papers that concern themselves with this episode directly: Barber's submission to the Royal Commission of 1962 (4) and Shearer's 1964 paper (57). Part of the circumstantial evidence has been noted in chapter one, the remaining being mainly Shearer (56), Wonnacott (68), Johnson and Winder (34), Breton (8), Goodhart (22), Shearer (58) and Miles (43). The discussion will be centred around the two papers directly concerned with the Loan.

The paper by Barber is really the foundation for the current paradigm and so it is necessary to examine it in detail. The evidence for the rise in interest rates is contained in a table[3] which gives time series on interest rate differentials between specific, long, issues of Canadian and U.S. Government securities. What should this increase in rates be attributed to?

> "It seems clear that one of the important effects of the conversion loan was to increase substantially the public's demand for cash. Individuals and financial institutions who were induced to exchange short term securities for the much longer term and less liquid conversion loan bonds would naturally want to hold more cash in their portfolio to prevent a serious decline in their liquidity position. This need not have resulted in a serious rise in interest rates had the Bank of Canada been willing to allow a substantial increase in the money supply. But except for a short period during, and immediately after, the loan, the Bank of Canada was not willing to provide the basis for such an increase."[4]

How does Barber substantiate his claims of a shift in the demand for money function? He plots the yield on long-term government securities against the ratio of money supply to GNP, where money is defined both narrowly and widely. The observations for the period 1958Q4 - 1961Q3 lie above those for the pre-Loan time span. This is more pronounced when the money component in his independent variable, the inverse of velocity, is defined narrowly.

Barber strengthens his argument that an excess demand for money, caused by a shift in the demand curve, is responsible for the increase in interest rates by attempting to discount two other possibilities. He simply dismisses[5] the possibility that the alleged excess demand for money may

have been caused by restrictive monetary policy, i.e. a shift in the supply curve rather than the demand curve. The possibility that the alleged shift in the demand curve for money may have been caused by expectations of inflation is also examined. He reasons:[6]

> "It has sometimes been suggested that the rise in interest rates during this period reflected a shift in investor preferences away from bonds and towards equities as a result of a fear of continued inflation and that higher interest rates in effect today contain a premium to offset an expected long term rise in the price level. If this view were correct one would expect to find a similar development in the United States."

To test his conjecture Barber inspects graphs similar to those discussed above but constructed using U.S. data and concludes that, although post-Loan observations lie above the pre-Loan ones, we would not be justified in concluding that the U.S. demand curve for money shifted too.[7] Therefore, it is concluded that the Conversion Loan has been identified as the cause of the rise in interest rates.

The view that high interest rates led to exchange rate appreciation by developing a balance of payments surplus through the capital account is also dealt with briefly in Barber's paper.[8]

It is my contention that:

A. Some of the empirical assertions made in Barber's paper have not been statistically validated.

B. The model used by Barber is not made explicit. When a suitable model is explicitly employed some of Barber's arguments would appear to be of doubtful validity.

C. Barber implicitly accepts the Expectations Hypothesis of the term structure of interest rates as evidenced by his concern for the behaviour of the rate of interest. This approach prevented him from exploring some interesting and important issues.

To be more specific; concerning point A, the following observations can be made.

A(i) The rise in interest rate differentials between Canada and the U.S. has not been shown to be statistically significant.

A(ii) Also, the rise in the Canadian rate has really been taken for granted.

A(iii) The extent to which increases in Canadian rates, such as there occurred, are due to a shift in the demand curve for money is questionable. Presumably the mechanism Barber had in mind runs somewhat like this: An increase in the average maturity of the outstanding debt of the federal government held by the Public, m, increases the price variability of portfolios[9] and hence decreases liquidity.[10] Then, if m is an argument in the demand for money function, the Conversion Loan could exert an influence in the money market by changing m. This is all fairly plausible but Barber does not present empirical evidence on such a demand for money function. It is, therefore, necessary to turn to other sources for evidence on this score. Such evidence is not unambiguous.

Breton (8), provides what would appear to be pertiment evidence. He estimates, using Canadian data for 1935 - 1959,[11]

$$V = 1.983 + 0.3236R - 0.0973m^{*} \qquad R = 0.859$$
$$(0.0606) \quad (0.0166)$$

where $V \equiv Y/M$, $Y \equiv$ Roughly as GNP, $M \equiv$ Currency in circulation + demand and savings deposits held by the Public as well as by federal, provincial and municipal governments, $R \equiv$ Rate of Interest on long-term federal government bonds and $m^{*} \equiv$ Average maturity of the outstanding debt of the federal government. The significance of m^{*} indicates that, when plotting 1/V against R and an increase in m^{*} occurs, the relationship between 1/V and R shifts out, as Barber has found. However, Breton's results have been effectively criticised. Goodhart's attempts (22) to extend the estimation period after 1959 failed disasterously. Moreover, Johnson and Winder (34) pointed out that the choice of the interest rate variable is not without consequences: Using Barber's data wherever possible they concluded that r, the Treasury Bill rate, is more appropriate. They thereby highlighted the dilemma that any study using one interest rate must face: Which interest rate? No respectful reference to Keynes, or the work of previous researchers, can resolve the problem! In their study Johnson and Winder used m, rather than m^{*}. Finally, Shearer (58), using r, pointed out that the definition of M is an issue of substance. Thus, the function implicitly used by Barber is at least controversial. So much for observation A(iii).

A(iv) Finally, Barber produces no empirical evidence to support his important point that the increase in Canadian rates led to increased capital inflows which appreciated the exchange rate and led to a loss in potential GNP. This omission is particularly important: Since Barber's argument does not rest on the usual mechanism, that increases in interest

rates decrease investment and income, the argument for a loss in potential GNP must rely heavily on the link between exports and imports and the exchange rate.

Turning to point B, we note that, even if we accept Barber's test for establishing the presence of inflationary expectations, namely examining whether there was a shift in the U.S. relationship between 1/V and R, Barber's conclusion that there was no such shift may be unwarranted -- he presents no evidence on this score. But, more importantly, the whole argument that inflationary expectations shift outwards the demand[12] function for money is unconvincing when viewed from the viewpoint of the models proposed by Tobin in (65), (66) and (67). In the usual Keynesian model, which Barber is presumably using, money is juxtaposed with bonds and real capital, as Tobin clearly points out.[13] If bonds and capital are perfect substitutes then it would appear pointless for an investor to get out of bonds and into equity. Additional to this is the difficulty that lies with the Keynesian model itself, rather than Barber's usage of it: Neither bonds nor money will immunise their holder from inflation, while real capital will. Tobin's model, in which money and bonds are juxtaposed with capital[14], would seem more appropriate, but then the shift in the 1/V function would be towards the origin, not outwards.

The above objections deal with the assertion that an excess demand

for money developed because of a shift in the demand curve. It is also possible, however, that such an excess demand may have arisen because of supply considerations. The quotation from Barber on page 60, and the evidence in chapter one, indicate that monetary policy was restrictive after the price support programme was abandoned. Thus, the interest rate may have risen because the supply curve for money shifted to the left. If so, we should be discussing a movement along the demand curve for money, not a shift in it.

Point C relates to what is, perhaps, the most serious criticism that can be made of the analysis in Barber's paper. The survey of theories of the term structure of interest rates in the next chapter contains two well-known predictions of the Expectations Hypothesis: Firstly, that the "effective rate of return" on assets with different terms to maturity is the same,and, secondly, that the relative supplies of such assets have no effect on the term structure of interest rates -- unless they affect the way in which expectations are formed. Then we need only concern ourselves with the determination of the "effective rate" and this is essentially what Barber does -- he is implicitly using a mechanism that determines the effective rate. However, it is conceivable that the degree of market segmentation is far more serious than Barber assumes. If so, the Conversion Loan may have led to increases in long rates and decreases in short ones, leaving an average rate unaffected. It is also conceivable that short and long rate elasticities in investment and capital flow functions differ substantially so that, given an average rate, different yield curves imply

different levels of income and employment. Thus an examination of the behaviour of rates on bonds with different terms to maturity becomes essential.

It is concluded that while the Barber paper raised some fascinating issues it did not go far enough. This, of course, is hardly surprising given the state of the art in the 1950's. The paper by Shearer (57), the only other study explicitly dealing with the Conversion Loan, will now be examined.

Shearer (57) argues that at least part of the interest rate increase was due to the highly restrictive monetary policy. He quotes Smith's (59) views on debt management operations, namely that such policies are unlikely to have liquidity effects which bear on expenditures directly and that small quantitative differences in the importance of short and long rates on the real sector can be found. Rather, wise debt management operations that maintain a long debt -- leaving few highly liquid assets -- improve the potency of monetary policy. This is precisely what the Conversion Loan did and hence, Shearer concludes, post-Loan monetary policy may have been highly effective. It is worth noting, however, that monetary policy was not restrictive until after the abandonment of the bond price support programme of the Bank of Canada, i.e. until after 1958Q4. The reader will recall that Barber simply dismissed this alternative explanation.

Another line of argument in Shearer revolves around the performance of the Bank of Canada following the Conversion Loan. It was noted in chapter one that bond prices were pegged throughout October 1958, an action that

involved the Bank in purchases of securities. In the following months, however, bond prices were left free to fluctuate and the Bank started increasing its holdings of longs relative to shorts. Shearer treats this as something distinct from the Conversion Loan but the question could conceivably be viewed as one of timing. In other words, the Conversion Loan was spread over the last two quarters of 1958 and possibly 1959Q1. This will be the approach taken here.

This discussion has covered the two most direct contributions to the problem and has found that widely accepted views on the effects of the Loan are largely based on circumstantial evidence and the bare minimum of analysis. Important questions remain unanswered: Did interest rates increase significantly? Do rates on bonds with different terms to maturity behave differently following the Loan? What determines the spread between long and short-term rates? Is it the relative supply of assets, monetary policy, or some other factor? Does a change in the term structure of government bond yields lead to adjustments in the issuing patterns ofother debtors e.g. provinces, municipalities and corporations? Did the Loan really forestall an addition to our GNP, as Barber contends? What were the channels through which the Loan led to an economic contraction? The reader will concede that such questions must be examined. Before proceeding it will be instructive to consider how the effects of Operation Twist, a close relative of the Conversion Loan, have been examined. This will provide guidance and a standard against which Canadian experience can be compared. A survey of all studies on Operation Twist known to this writer appears as an appendix to this chapter, on pages 205 - 209.

NOTES TO CHAPTER TWO

1. Barber (4), p. 3.

2. It is as well to give some examples of such opinion. Barber takes the position stated in the opening paragraph of this chapter -- see Barber (3) and (4). Officer and Smith (48) state that the Conversion Loan increased interest rates and, therefore, contributed to the exchange rate appreciation -- see p. 35. Boreham et al (7), take essentially the same view but specifically attribute some of the capital inflows to provincial and municipal borrowing in the U.S., p. 578. Like Barber, they believe that the Conversion Loan led to an increase in unemployment. O'Brien and Lermer (47) draw our attention to the possibility that the Loan may have discouraged new investment projects by increasing the interest rate on long bonds -- p. 336. Finally, Bond and Shearer (6), rather cautiously, report Barber's views.

3. Barber (4), Table 2, p. 4.

4. Barber (4), p. 5.

5. Barber (4), p. 5.

6. Barber (4), p. 6.

7. Barber (4), p. 6.

8. Barber (4), p. 9.

9. This is because
   "For a given change in yield from the nominal yield, changes in bond prices are greater the longer the term to maturity."
   Malkiel (39), p. 54, gives a simple proof that follows from the mathematics of bond pricing.

10. A liquid asset is one whose par value is, according to Keynes
    "More certainly realisable at short notice without loss."
    Keynes (36), Vol. II, p. 67.
    Since long bonds fluctuate in price more than short ones the probability of realising the par value of a long bond without--or alternatively with a given--loss is smaller than that of a short one. Hence, long bonds are less liquid.

11. Breton (8), p. 453. Unfortunately he does not report any other statistics.

12. So is, therefore, Barber's test.

13. See Tobin (66), pp. 158 - 167.

14. See Tobin (66), pp. 159 - 160.

CHAPTER THREE

EFFECTS OF THE CONVERSION LOAN ON THE TERM STRUCTURE OF INTEREST RATES

INTRODUCTORY

Chapter one showed that the Conversion Loan affected significantly the maturity composition of the public debt, increasing bonds with more than ten years to maturity and decreasing those under that mark. The survey of the literature in the second chapter indicated that, while concern has been expressed about the effects of the Loan on interest rates, little has been statistically established about their behaviour. More specifically, the following questions remain unanswered.

i) Did interest rates rise over and above trend values?

ii) Are we to attribute increases such as there occurred to the Loan --Barber's contention--or to restrictive monetary policy--Shearer's argument -- or to some other factors?

iii) Finally, since the Loan was a debt management operation, did it affect the term structure of interest rates?

This chapter attempts to answer these questions. The discussion opens with section one in which the behaviour of time series of various interest rates is considered. The second and third issues are also considered there, albeit rather briefly. A more extensive treatment of

them can be found in sections three and four which follow a brief survey of the literature on the determinants of the term structure of interest rates in section two. The results obtained en route to answering questions two and three above do not conform to those obtained in the U.S. The differences are so striking that it was felt necessary to deal with this paradox separately--in section five. There, two explanations of the paradox are considered.

SECTION ONE: THE CONVERSION LOAN AND TIME SERIES OF INTEREST RATES

Following the Conversion Loan did interest rates increase, as often alleged? The answer to this question is in the affirmative but it is hardly illuminating: It is well-known that in the post-war era there has been a marked upward trend in all interest rates. Under those circumstances a more appropriate question would be: Following the Conversion Loan, did interest rates increase above trend levels?

To obtain an answer a number of interest rates were in turn regressed against time. The ensuing residuals $Y-\hat{Y}$ became time series that could be visually inspected. Moreover, this procedure made available the usually useful notion of a confidence interval for $Yij-\hat{Y}ij$, where i stands for the ith observation in the equation for the jth rate. We say usually because a confidence interval is of little value when the estimated equation j, for example, is not reliable in terms of goodness of fit.[1] Both intra-sample and extra-sample confidence intervals were constructed for a large number of interest rates in the periods 1951Q1 - 1967Q4 and 1951Q1 - 1958Q2 respectively. These calculations[2] indicated that:

i) The simple average of rates for all maturities, SA4, increased above its trend values[3] during 1959Q2 - 1960Q1, thus confirming the view that following the Conversion Loan interest rates in general increased. It is noteworthy that this interest rate did not significantly increase until well after the Bank of Canada had stopped supporting bond prices.

ii) When interest rates on bonds with varying terms to maturity were examined some interesting patterns emerged. In view of the substantial changes in the maturity composition of the debt effected by the Conversion Loan it would be reasonable, according to some theories of the term structure of interest rates, to expect the yield curve to change. Since longs were increased at the expense of shorts some theorists and most market analysts would expect long rates to rise and short ones to fall. This belief was partially corroborated by experience. For approximately five quarters, i.e. between 1958Q2 and 1959Q3, short rates rose significantly above their trend values, but they declined significantly during and following 1959Q4. This decrease below trend after 1959Q3 was evidenced most clearly in the behaviour of the Treasury Bill rate, the most volatile of the short rates. Long rates rose significantly when the Loan was implemented.

iii) There is some evidence that the bond yield on securities with five to ten years to maturity behaves like the over ten rate. This may suggest that although the quantities of bonds in the five to ten year category were decreased, the movement in the five to ten year rate does not reflect this because bonds in the two categories are close substitutes--recall that the increase in bonds in the over ten slot is larger than the decrease in bonds with five to ten years to maturity. However, too much can be made of this point since the evidence for it comes from

the regression of r_{5-10} on time for the period 1951Q1-1958Q2. When the estimation period is extended to 1967Q4 and the intra-sample confidence intervals constructed the post 1959Q4 observations lie below trend.

Thus, the view in the literature that the Conversion Loan increased the interest rate is true but overly simplistic. When time trends have been accounted for there is some evidence that, after 1959Q3, short rates decreased while long ones rose. During the five-quarter period between the announcement of the Loan and 1959Q3 both short and long rates increased. This may be due to changes in variables other than supply ones, as Shearer (57) has suggested.

Question (i) above has now been dealt with and the issues raised by the second and third ones given some airing. In the following sections they are considered explicitly. Before doing so it is necessary to review the existing literature on the determinants of the term structure of interest rates. This review will establish just how to proceed in answering questions two and three. More specifically, we will see whether and how debt management, monetary policy and other factors can affect the level and term structure of interest rates. Then in sections three and four an attempt will be made to quantify the relative importance of such influences.

SECTION TWO: DETERMINANTS OF THE TERM STRUCTURE OF INTEREST RATES

A. FORWARD RATES: THE HICKSIAN FORMULATION

This survey begins with Hicks' (29) treatment of the problem. He analyses the functioning of an economy from the general equilibrium point

of view. There are naturally the commodity and money markets, as always, but in addition Hicks considers the markets for short-term bonds and the forward markets for short loans ranging from two to n periods into the future. Given a numeraire, the system of demand and supply equations determines commodity prices, and the variables of particular interest to us, namely the short rate and the n-1 forward rates. However, the task is not yet complete in that there exist variables such as the market rate on a loan which extends over i periods, R_i, about which little has been said.

At this point the reader should recall that the assets corresponding to loans of duration i periods are treated as identical in all respects except maturity, a convenient assumption. Hicks also makes the useful point that a long loan can be conceptually decomposed into a short one-period loan plus a number of forward loans of the same length. If so, an investor should be indifferent as to whether he holds a two-year bond, which in two years pays him $(1+R_{2t})^2$, or a one-year bond paying, in a year's time, the sum $(1+R_{1t})$, which he immediately reinvests according to a forward contract to reap $(1+R_{1t})\ (1+{}_2r_{1t})$ at the end of the two periods. The symbol ${}_2r_{1t}$ represents, in the usual notation, the forward rate on a one-year loan, agreed upon in period one, but not commencing till period two. In fact, there is more to it than that: If

$$[1]\quad (1+R_{2t})^2 \neq (1+R_{1t})\ (1+{}_2r_{1t})$$

there are gains to be made through arbitrage and the market will ensure that in equilibrium an equality holds. In general,

$$[2] \quad (1+R_{nt})^n = (1+R_{1t})\ (1+{}_2r_{1t})\ (1+{}_3r_{1t})\ldots(1+{}_nr_{1t})$$

The last n-1 equations complete the Hicksian system since they determine the n-1 long rates $R_{2t}, R_{3t}\ldots R_{nt}$.

It is important to note that the only statement about behaviour that equations [2] make is that investors are profit maximizers, ready to engage in arbitrage should the opportunity arise. However, this is often assumed. In that case equations [2] become merely equilibrium conditions. The only behavioural relations are to be found in the determination of R_{1t} and ${}_2r_{1t}\ldots{}_nr_{1t}$. In what follows it will be assumed that investors are profit maximizers.

It should be emphasized that a concise statement of the problem is not to be found in Hicks. Rather, the discussion above condenses his treatment in chapters 10, 11 and 12 of (29) in a manner that hopefully does not misrepresent him. An important implication of this analysis is that the term structure depends crucially on demand and supply considerations since it is such influences that determine the short rate R_{1t} and the n-1 forward rates ${}_2r_{1t}\ldots{}_nr_{1t}$. Also associated with Hicks is the argument that investors may require a premium in order to hold long bonds. This issue will be examined later on.

B. EXPECTED RATES: PERFECT FORESIGHT

While Hicks' construct as presented above appears internally consistent and appealing, formulations that have evolved from that model have recently gained more currency. Although it is entirely possible to engage in a forward lending contract through a judicious combination of borrowing

and lending, forward markets for loans do not in fact exist. It is possibly for this reason that attempts have been made to replace the use of forward rates by expected ones in theoretical discussions on the matter. We now turn to these.

Here again we are considering securities identical in all respects except maturity and, as before, transactions costs involved in getting in and out of specific maturities are assumed not to exist. These assumptions will be made throughout what follows. If now we also assume perfect foresight then, it is widely agreed, the term structure will be determined according to the principle that all assets should yield the same rate of return--inclusive of capital gains. Given that no coupon payments are made until maturity, i.e. interest is compounded, equations [2] describe the term structure. The meaning of the small r's is slightly changed. There are now no forward markets but investors happen to know what the rate on a one-period security will be one year, two years...n years into the future--this is the meaning of perfect foresight.

Note that mere foreknowledge of these rates is sufficient to make equations [2] hold; the process through which this happens is the same as in the Hicksian model. No behavioural statement is to be found in the perfect foresight model if we assume, as we have, profit maximizing investors. This was pointed out by Meiselman.[4]

When the assumption of perfect foresight is dropped, opinions on how the term structure is determined begin to diverge. At this point it is usually assumed that imperfect foresight can be associated with uncertainty

about the future level of short rates.[5] In the presence of such uncertainty the term structure is thought to be determined according to one of five hypotheses: Expectations, Liquidity Premia, Segmented Markets, Preferred Habitat and the General Equilibrium Approach. As Meiselman put it[6]

> "Alternative hypotheses of the determination of the term structure revolve about the central analytical and empirical problem of how the market copes with interest rate uncertainty."

C(i). THE EXPECTATIONS HYPOTHESIS (≡ EH)

When deprived of the omniscience implicit in the perfect foresight model we must supply a mechanism that generates ${}_2r_{1t}$, ${}_3r_{1t} \cdots {}_nr_{1t}$. At this point it is usually assumed that investors hold "firm and uniform" expectations about these rates.[7] A number of hypotheses concerning the formation of such expectations have been advanced in the literature and they are considered later. If investors generate firm and uniform expectations, then the EH predicts that equations [2] hold in equilibrium. It should be noted that the symbol ${}_ir_{1t}$ now stands neither for the forward rate, nor the divinely known one, but for the one-year bond rate firmly expected by all now to prevail in the ith period.

The EH infuses economic content into equations [2] over and above what was to be found there before. It asserts that expected rates are unbiased estimators of the rates in models A and B. This prediction is very difficult to test. To begin with, the rates ${}_ir_{1t}$ of models A and B are not known. Also, if we were to compare ${}_2r_{1t}$ with next year's short

rate, i.e. R_{1t+1}, we would, according to Meiselman, not be conducting a proper test of the hypothesis because

> "...anticipations may not be realised yet still determine the structure of rates in the manner asserted by the theory."[8]

Mieselman's statement makes some sense when it is recalled that in Hicks' framework R_{1t} is determined through the juxtaposition of money and bonds, a process quite different from that generating the ${}_ir_{1t}$, as will be seen below.

It may be instructive at this point to count equations and unknowns. The problem is to determine n-1 rates $R_{2t}...R_{nt}$. To that end the EH introduces n-1 short rates ${}_2r_{1t}...{}_nr_{1t}$ and then uses them along with R_{1t} and equations [2] to determine $R_{2t}...R_{nt}$.

How are these expected rates determined? The literature on this issue is relatively limited in scope and volume. Two issues have been been raised. The first one revolves around the concept of the elasticity of expectations discussed by Hicks (29). It gives the percentage change in expected future short rates given a percentage change in the current short rate, i.e. given functions

$$[3] \quad {}_ir_{1t} = f(R_{1t}) \qquad i = 2...n$$

the elasticity of expectations is given by

$$[4] \quad \epsilon_i = \frac{\partial_i r_{1t}}{\partial R_{1r}} \frac{R_{1t}}{{}_ir_{1t}} \qquad i = 2...n$$

The discussion pertaining to this concept appears in "The Working of the

Dynamic System", the last part of (29), and it compliments the discussion with which this survey opened.

The elasticity of expectations provides a good way of summarizing what has been called the Keynes-Duesenberry controversy on the formation of expectations. Associated with Keynes is the hypothesis that the market expects rates to return to some normal level N should they chance to move away from it -- regressive expectations. In symbols

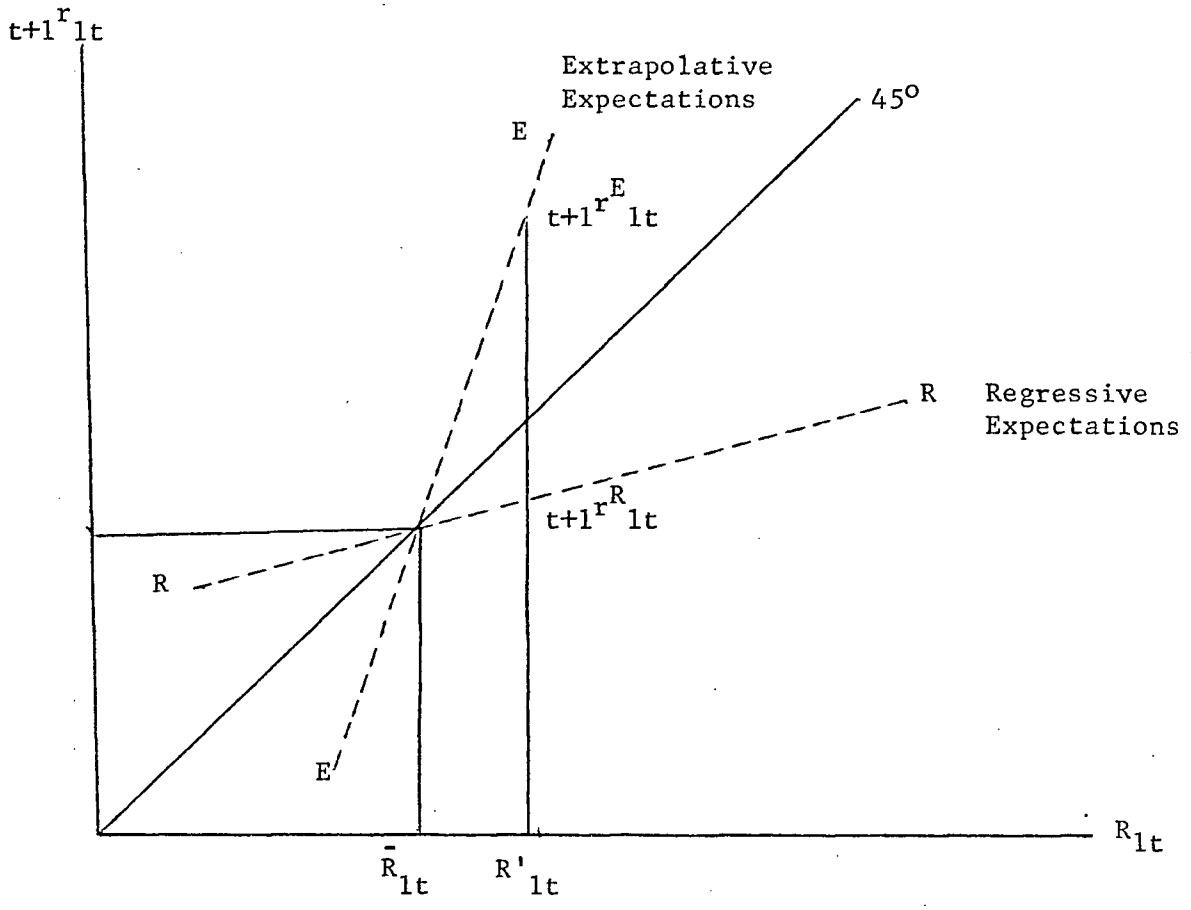
$$[5] \qquad {}_{t+1}r_{1t} = R_{1t} + k(N-R_{1t}) \qquad 0 < k < 1$$

By contrast, associated with Duesenberry is a statement to the effect that the market expects movements in interest rates away from an expected rate E to continue in the same direction -- extrapolative expectations. One possible formalization is

$$[6] \qquad {}_{t+1}r_{1t} = R_{1t} + d(R_{1t}-E) \qquad 0 < d < 1$$

Clearly the two types of expectations require different values of the elasticity of expectations. For extrapolative expectations $\varepsilon_i > 1$, while regressive expectations require $\varepsilon_i < 1$ regardless of the value of R_{1t}. The figure below illustrates this. When R_{1t} increases[9] from $\bar{R}_{1t}$ to R'_{1t}, extrapolative expectations give ${}_{t+1}r^{E}_{1t} > R'_{1t}$ while regressive expectations would lead to ${}_{t+1}r^{R}_{1t} < R'_{1t}$.

FIGURE 1: Extrapolative and Regressive Expectations



A word about the constants k and d is in order. These may be viewed, somewhat heretically, as speed of adjustment coefficients. To illustrate, if k is close to unity, the line RR, whose slope is (1-k), will be relatively flat. The flatter the RR line

i) the smaller the changes in $_{t+1}r_{1t}$ given a change in R_{1t} and

ii) if $_{t+1}r_{1t} = R_{1t+1}$ i.e. anticipations are realised, the faster the return of R_{1t} to its normal level, N.

Turning to the constant d, the larger d is the steeper EE will be, since

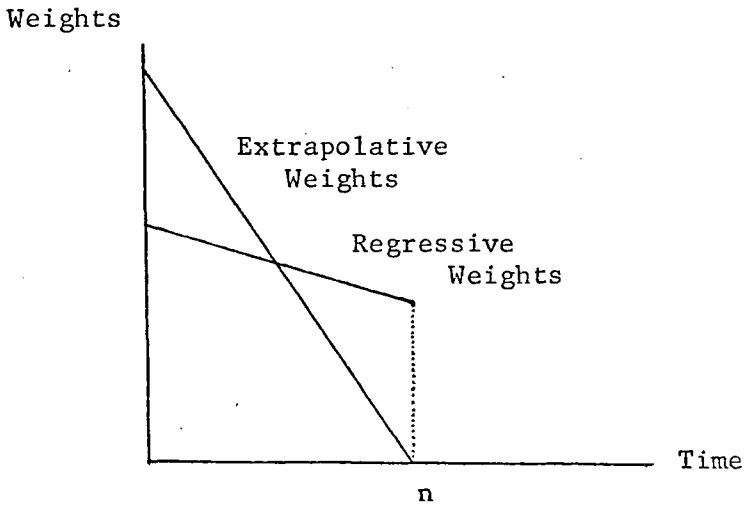
its slope is (1+d) and hence

i) the larger the change in $_{t+1}r_{1t}$ given a change in R_{1t} and

ii) if anticipations are realised, the more quickly will R_{1t} explode.

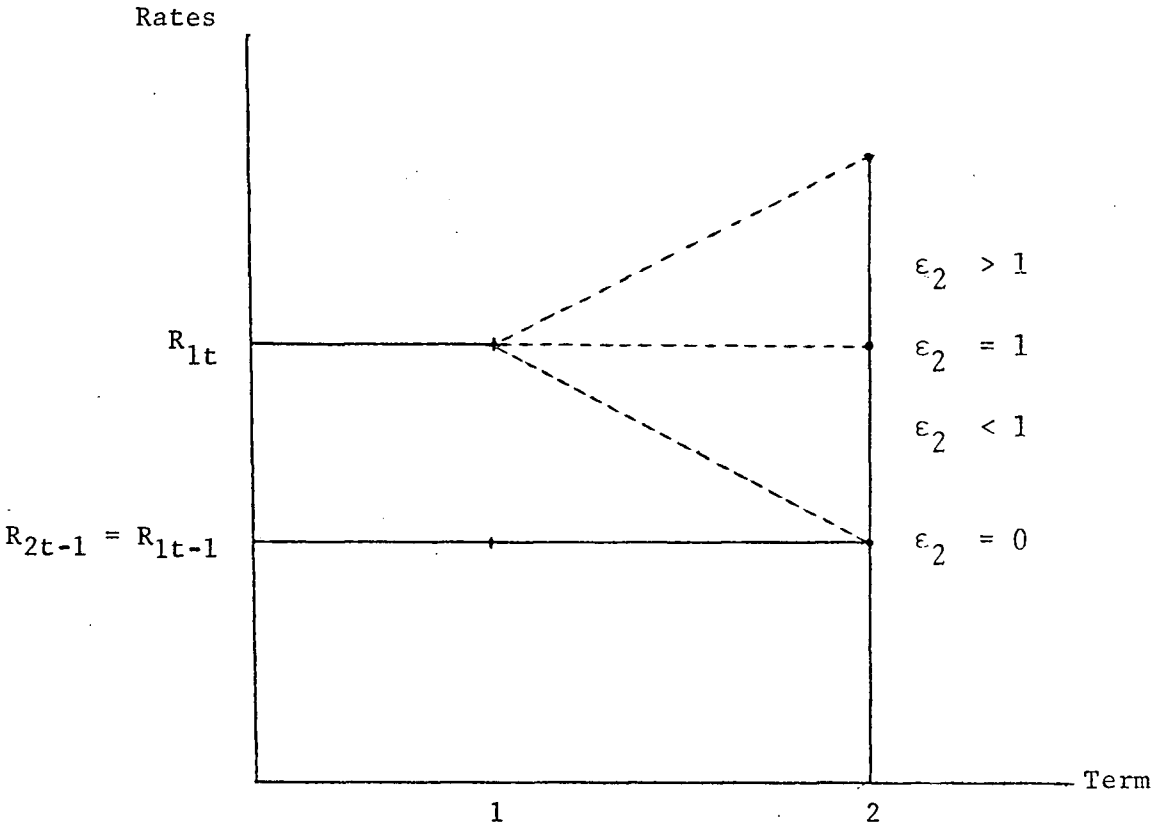
It is sometimes argued that the normal rate involved in the regressive case is a weighted average of R_{1t-i}, i = 1...n with roughly equal weights assigned to each R_{1t-i}. In the extrapolative case, however, the more recent R_{1t-i} the greater its weight is assumed to be. Figure 2 illustrates one possibility.

FIGURE 2: Extrapolative and Regressive Weights



It is now necessary to examine briefly the effects of the two mechanisms on the term structure of interest rates. The following assumptions are made: The yield curve is flat to begin with, there exist only two periods, expectational machanisms are common to all and anticipations are not necessarily realised. Let there be an increase in R_{1t}. Then extrapolative expectations lead to an upward sloping yield curve while regressive expectations lead to a downward sloping one, as figure 3 illustrates.

FIGURE 3: Expectations and the Yield Curve



Note that if we, rather unreasonably, assume that anticipations <u>are</u> realised then the yield curve shifts up parallel to itself and stays there if $\varepsilon_2 = 1$, it becomes steeper as time elapses if $\varepsilon_2 > 1$ and conversely for $\varepsilon_2 < 1$. When the two-period assumption is dropped and we allow ε_i to have a different value depending on i the yield curve could take any shape.

The second issue concerning the formation of expectations was raised by Meiselman who investigated how expectations are revised. He considered the hypothesis that

[7] $({}_{i}r_{1t} - {}_{i}r_{1t-1}) = f(R_{1t} - {}_{t}r_{1t-1})$

While this approach may say something about how expectations are revised its empirical verification or falsification has no bearing on the validity of the EH per se despite Meiselman's and others' assertations to the contrary.

It was mentioned earlier that the n-1 expected rates, along with R_{1t} and equations [2] determine the term structure of interest rates. We have as yet said nothing about the process that determines R_{1t}. It is usually presumed that, if we assume a short enough period so that no appreciable change in the capital value of the shortest asset can occur, R_{1t} will be Conard's "effective yield". This is the rate of return that includes capital gains and losses and, given the EH, it is the same for all assets. It is then argued that the general theory of interest determines R_{1t} through the juxtaposition of money and bonds. Thus, given expected rates and R_{1t} the rate structure is determined through equations [2].

What predictions does the EH make? Given arbitrage they are

i) That expected future short rates are unbiased predictors of forward rates.

ii) The "effective yield" on all assets is the same[10].

iii) The hypothesis is consistent with any shape for the yield curve.[11]

iv) Abstracting from the problem of how expectations are formed, when short rates are expected to rise the yield curve will be upward sloping.

v) The relative supplies of assets do not influence the term structure.

vi) However, the position and shape of the yield curve will be affected by monetary policy. This follows from the mechanism that is supposed to determine R_{1t} and from prediction 5. A decline in the money supply, for example, will increase R_{1t}. But, since longs fluctuate less than shorts, assuming that expectations remain unchanged, R_{2t} will increase by less than ΔR_{1t}. Thus, the yield curve will be displaced upward and the spread between longs and shorts decrease algebraically.

This is a fairly lengthy list of predictions but the theory is difficult to test. This may appear curious in view of the large number of empirical studies undertaken, but there is no doubt that such studies either assume that anticipations are realised, or they conduct a joint test of the EH and a particular expectations formation mechanism. Even testing for the significance of supply variables will not do as a test of the EH. Should they prove significant, as they are in Canada, that may be because they affect the way in which expectations are formed--not because equations [2] do not hold.

C(ii). LIQUIDITY PREMIA HYPOTHESIS (≡ LPH)

Hicks qualified the analysis presented earlier on by an argument that is by now well-known.[12] While the expectations theory argues that in the presence of uncertainty investors behave as if they are indifferent to risk, Hicks maintained that they are risk averters. Since a long contract can be decomposed into a short contract and a series of forward short ones it is easy to see that more risk is involved in a long contract than in a short one. This is because future short rates are unknown, though uniform

and firm expectations about them may be held. Hicks then asserts that

> "...The forward market for loans may be expected to have a constitutional weakness on one side...If no extra return is offered for long lending, most people... would prefer to lend short...But this situation would leave a large excess of demands to borrow long which would not be met. Borrowers would thus tend to offer better terms in order to persuade lenders to switch over into the long market."[13]

The explicit recognition of demand and supply forces in the argument is worth emphasizing. Forward rates are higher than they would be and hence, through equations [2], long rates are higher than the corresponding ones in the absence of risk aversion. The modern statement of the argument is somewhat different, consistent with the use of the term expected rates rather than forward ones. It is then argued that we should rewrite equations [2] as

$$[8] \quad (1+R_{nt})^n = (1+R_{1t})(1+{}_2r_{1t}+L_2)\ldots(1+{}_nr_{1t}+L_n)$$

where L_i, $i = 2,\ldots n$ are liquidity premia. The economic content of [8] is now that the expected future short rates are biased estimators of the true, or forward rates, where now

$$[9] \quad {}_i\rho_{1t} = {}_ir_{1t}+L_i \qquad i = 2\ldots n$$

are the forward rates under risk aversion and a constitutional weakness.

While the Hicks statement is quite consistent all the problems discussed in the section on the expectations hypothesis carry over to this one. There are, however, certain implications buried in the modern statement of the LPH which one does not see treated in the literature. It is

often implied that just as demand and supply were unimportant forces under the EH, they are of no consequence in the LPH either. This would appear to be quite wrong. The idea that there exist L_i was lifted right out of Hicks but with them goes the mechanism through which they are determined. One of the predictions of the LPH would then be that the extent to which expected rates underestimate the ${}_i\rho_{1t}$'s depends, given i, on demand and supply for forward, or, equivalently, long loans. Moreover, given demand and supply considerations, expected rates will increasingly underestimate the ${}_i\rho_{1t}$'s as i varies from 2 to n. The popular statement of this is $L_2 < L_3 < \ldots L_n$. Of course, if Meiselman's rules of the game are accepted this too is an untestable hypothesis. Particularly since the severity of the constitutional weakness argument is an empirical matter--Meiselman, for example, makes an empirical statement[14] contrary to Hicks'.

C(iii). SEGMENTED MARKETS HYPOTHESIS (≡ SMH)

It has been argued by Culbertson (18), that in the presence of risk, investors in general, but certain important financial institutions in particular, hedge rather than speculate: An institution committed to a stream of payments at future dates can only insure itself against income and capital loss risk by holding assets which expire on the date on which future payments are due. If it were to hold shorter term assets it would be taking an income risk since funds can only be reinvested at what now is an uncertain rate. If, on the other hand, it invested in assets maturing after the payment dates it would have an assured income but not an assured capital value.

An implication of the SMH is that changes in the structure of bond supplies outstanding will affect the yield curve. The SMH predicts the shape and position of the yield curve, ascribes the variability of short rates relative to longs to the more frequent and substantial intervention of the authorities at the short end, e.g. Bills Only and, finally, disagrees with the EH on the latter's prediction that the effective rate of return on all assets will be the same. The SMH is appealing in that, for a change, we now have an hypothesis that makes testable statements about the state of the world.

C(iv). PREFERRED HABITAT HYPOTHESIS (≡ PHH)

According to the authors of this theory (44), this is a blend of the preceding three. It basically accepts the LPH but introduces elements of market segmentation in the process by which the yield curve is determined. The most satisfactory way of presenting the PHH, and this is not the procedure used by Modigliani and Sutch, is to recall earlier comments that in Hicks, demand and supply determine the L_i. Hicks made his theory rather specific by assuming that, on the whole, people preferred to lend short and, hence, the subsequent convention that $L_2 < L_3 < \ldots < L_n$. More generally, however, there are investors who have funds available for i periods and who, in pursuit of insurance against both income and capital value risk, would prefer to hold a bond with exactly i periods to maturity. Then the structure of the L_i will depend on demand and supply in each of the n-1 markets. In a sense the PHH, as interpreted here, is really the SMH applied not to the ${}_i\rho_{1t}$'s but to part of them, namely the L_i. The expectation formation mechanisms discussed in C(i) are relied upon to produce the ${}_ir_{1t}$'s in a

somewhat roundabout way.[15]

C(v). THE GENERAL EQUILIBRIUM APPROACH (≡ GEA)

This theory has not been advanced as an explanation of how the term structure is determined but rather as a way of examining the workings of an economy at the macro level. However, it does involve a theory of the term structure which in a sense has much to share with the preceding hypotheses. It is useful to proceed by way of an example which, while not given by the proponents of this approach, namely Tobin and Brainard, is undoubtedly in the spirit of the GEA.

We are now considering a financial sector which contains for simplicity money M, shorts S and long securities L, all of which are the liabilities of sectors "outside" the system and are treated as exogenous. Money is regarded as demand debt bearing a fixed nominal rate of return r'_M. Income and the price level are treated as exogenous to this sector and the latter is normalized at unity. We may then write the following demand functions:

$$[10] \quad X_i = X_i\,(R,Y,W) \qquad \begin{aligned} r_M &= r'_M - \rho^e \\ r_S &= r'_S - \rho^e \\ r_L &= r'_L - \rho^e \\ i &= M, S, L \end{aligned}$$

where R is the vector of real rates of return r_M, r_S and r_L, ρ^e is the expected rate of inflation, r'_M, r'_S, r'_L are nominal rates. All nominal rates, ρ^e and Y are exogenous. Also

[11] $W = M + S + L$

where W is to be understood as the wealth of the private sector. We have two independent equations in [10] and two unknowns r_S and r_L. The system essentially determines the term structure and the predictions of the model are given in Table 1. Supply and demand forces are clearly important.

TABLE ONE: Signs of Partial Derivatives in the Reduced Forms for r_S and r_L

Exogenous / Endogenous	M	S	L	L-S	Y	r_M
r_S	-	+	?	-	+	+
r_L	-	?	+	+	+	+

The following assumptions are sufficient to yield these results.

i) Partials with respect to own rates are positive, cross ones are negative subject to the condition

ii) $\sum_i \frac{\partial Xi}{\partial Z} = 0$ where X stands for an asset, i = M, S, L and Z = r_M, r_S, r_L

iii) $\frac{\partial M}{\partial Y} > 0$, $\frac{\partial S}{\partial Y} < 0$, $\frac{\partial L}{\partial Y} < 0$ subject to $\sum_i \frac{\partial Xi}{\partial Y} = 0$

iv) Partials with respect to wealth are positive subject to $\sum_i \frac{\partial Xi}{\partial W} = 1$

v) The wealth variable in the individual and hence aggregate demand functions for the three assets is defined at market values. This usual assumption leads to conceptual difficultues,[16] which are ignored here. Doing so does not change the results qualitatively.

We now turn to the connections between the GEA and the other theories of the term structure. The strongest and most obvious connection is to be found with the SMH and PHH: The common reliance on market forces to determine wholly, or for the PHH partially, the yield curve. The relation to the LPH is less obvious but still strong. The income variable in the demand functions for assets carries with it the notion of liquidity. Suppose, for example, that originally the yield curve was flat, i. e. $r_M = r_S = r_L$. Let there be an increase in Y. This increases an asset holder's demand for liquidity and hence his demand for money. The resulting "constitutional weakness" forces r_S and r_L above their previous levels, as the last column in Table 1 indicates. Finally, on expectations: This link is not entirely clear. Nevertheless, one of the features of the EH was its treatment of the various assets as perfect substitutes. While the GEA does not go that far, it does allow for the cross elasticity of demand to be large subject, of course, to the condition contained in assumption (ii) above.

Other hypotheses or emendations of the ones already discussed have been proposed but no attempt will be made to cover them, primarily because the common denominator between them and the five above is not large. There is also the vast empirical literature on the matter. It is not examined here because the primary concern is with the Conversion Loan, not testing

the various hypotheses advanced.

The preceding discussion provides guidance in the following attempts to examine the effects of the Conversion Loan on the level and term structure of interest rates. The two most general hypotheses, namely the GEA and the PHH will be used to examine the effects of the Conversion Loan and other contemporary changes on interest rates.

SECTION THREE: ESTIMATING THE GENERAL EQUILIBRIUM MODEL

In this section we report on an attempt to estimate the model described earlier as belonging to the GEA. The results presented will, subject to the difficulties discussed below, shed some light on the behaviour of time series of interest rates examined in the previous section. It was seen there that, while both short and long rates increased substantially between 1958Q2 - 1959Q3, following the last date, long rates increased and short rates decreased.[17] This section investigates why that might be so and in the process appraises Barber's and Shearer's contentions concerning the behaviour of interest rates. It also implicitly deals with question (iii) of the introduction to this chapter. That issue is dealt with more explicitly in section four.

It is now appropriate to discuss some of the difficulties encountered while estimating the GEA model. The first question is the extent to which the constraints ought to be applied. Does private wealth equal M + S + L alone or are there any other assets involved? One may decide that chartered banks should be treated as being, along with the government, outside

the system, exogenously supplying just demand deposits to the private sector which holds them, i.e. M, along with the liabilities of the government namely S and L[18]. Even so, there still remains the point that data limitations force us to treat financial institutions other than banks as "inside" the system. They issue near moneys which are very similar to the liabilities of banks. To the extent that the authorities are able to affect the size of these near moneys they might best be treated as exogenous along with the other policy instruments M, S and L. Also there are other assets such as real capital which should be part of the portfolio of the "inside" sector and which are not taken into account. The exclusion of all other assets may be justified on the following grounds. Consider Tobin's model (67) where the portfolio of the "inside" sector consists of M, B, and K, where B stands for all government bonds and K for real capital. Let there be a partition of this portfolio into (M+B) and K. Now suppose that the term structure of rates within the (M+B) class does not affect the choice between (M+B) and K, although it does affect the choice within (M+B). The choice between (M+B) and K may be affected by the level of the average rate in the (M+B) class. It could then be argued that model 2C(v) describes the choice within the (M+B) part of the portfolio. Clearly, this imposes stringent conditions on the nature of the asset demand functions, but they are necessary given the terms of reference of this thesis.

There is another problem that must be dealt with before we can proceed. We are concerned with rates of return and, therefore, in empirical estimation we should be concerned with reduced form rather than structural equations. Yet the constraints on the partial derivatives of the demand functions, discussed in section 2C(v), cannot be computationally implemen-

ted unless complex programming is resorted to. An alternative is to estimate the constrained demand functions[19] and then solve two independent equations for r_S and r_L. This was one of the methods used.

Because of all the above difficulties it was felt necessary to also estimate the reduced forms implied by the GEA model without any constraints. Thus, a measure of the importance of all the problems mentioned above can be had.

The results obtained are reported in Tables 2 and 3. Table 2(a) gives the results from constrained estimation of structural equations while Table 2(b) reports the reduced form equations implied by those in Table 2(a). Table 3 gives the reduced form equations that were estimated directly. The following comments can be made about these results:

i) All variables in Tables 2(a) and 3 have the expected signs and are on the whole significant.

ii) The goodness of fit in all equations is fairly good, as the above point implies.

iii) Since no quantitative restrictions were placed on the partial derivatives in the model of section 2C(v), it follows that the implied reduced forms will also have the expected signs. This is borne out as a comparison of Tables 1, 2(b) and 3 shows.

iv) The coefficients in the estimated reduced forms of Table 3 are considerably smaller than those in the implied reduced form equations.[20]

v) It is possible to have both income and wealth variables in the demand functions for assets with signs that make sense. Whether income, wealth, or both variables should be included in the demand for money func-

tion is a question that has received considerable attention in the literature. Meltzer (42), Brunner and Meltzer (9), Hamburger (24), Laidler (37) and others explicitly examined this problem for the U.S. and they all concluded that

a) there was no scope for both variables in the demand for money function in the sense that when both were used one was insignificant.

b) the wealth variable somehow measured--permanent income is considered as a proxy for wealth in the literature--is the most important of the two variables.

Unless the concept of transactions demand for cash balances is empirically unimportant in the U.S., both income and wealth should be significant in an appropriate demand for money function.[21] It is, therefore, gratifying to find that, at least in Canada, both variables are important.

vi) Turning to the quantitative aspect of the results three points are noteworthy.

a) The short rate appears to be more important than the long one[22] in the demand for money function--equation 19. The performance of supply variables in equations 24 and 25 is on the whole poor.

b) The coefficient on the income variable in the demand function for shorts is, in absolute terms, smaller than its counterpart in the demand function for longs. It would be more plausible to see shorts rather than longs used as a buffer against changes in transactions requirements. No evidence exists on the matter. See, however, the result (X) obtained below.

c) It is not always true that the own coefficients in equations 20 and 21 are larger than the cross ones in absolute terms. There has been some U.S. evidence to the contrary.[23] In the implied reduced form

equations 22 and 23, and in equation 25, the partial

$$\left|\frac{\partial Xi}{\partial ri}\right| > \left|\frac{\partial Xi}{\partial rj}\right| \quad \text{where } i, j = S, L \text{ and } i \neq j$$

vii) There is evidence of positive serial correlation in all equations.

Concerning point (vii) above, in studies of asset demand functions a partial adjustment mechanism is often incorporated.[24] This is theoretically appealing and it has the property of reducing serial correlation in the calculated residuals. However, incorporating such a mechanism in the model of section 2C(v) is not straightforward: Suppose that there is an increase in W which leads to new asset demand levels. In the present model such increases in wealth are exhausted by the requirement that

$$\sum_i \frac{\partial Xi}{\partial W} = 1 \quad \text{for } i = M, S, L.$$

But, if people adjust slowly what happens to that part of the wealth which is not immediately "desired"? A consistent re-specification of the model emerges if[25] we assume that the change in the holdings of an asset depends on the difference between desired and actual stocks, with a common speed of adjustment for all assets, and a term that decides the temporary allocation of remaining changes in wealth i.e.

$$[12] \quad (X_{jt}-X_{jt-1}) = d(X^*_{jt} - X_{jt-1}) + \lambda_j(W_t-W_{t-1})$$

where, as before

$$[13] \quad X^*_{jt} = \alpha^*_j + \sum_i \beta^*_{ij} r_{it} + \gamma^*_j Y_t + \delta^*_j W_t + U_{jt} \quad \text{with } U_{jt} \sim N(0,\sigma^2_j)$$

so that

$$[14] \quad X_{jt} = \alpha_j + (1-d)\, X_{jt-1} + \sum_i \beta_{ij} r_{it} + \gamma_j Y_t + (\delta_j + \lambda_j)\, W_t - \lambda_j W_{t-1} + V_{jt}$$

with $\alpha_j \equiv \alpha_j^* d$, $\beta_{ij} \equiv \beta_{ij}^* d$, $\gamma_j \equiv \gamma_j^* d$, $\delta_j \equiv \delta_j^* d$, $V_{jt} \equiv U_{jt} d$, $V_{jt} \sim N(0, d^2\sigma_j^2)$, and the constraints

[15] $\sum_j \alpha_j = 0$

[16] $\sum_j \beta_{ij} = 0$ and $\sum_j \gamma_j = 0$

[17] $\sum_j (\delta_j + \lambda_j) = 1$ and

[18] $\sum_j \lambda_j = (1 - d)$

The estimated equations appear in Table 4(a). Table 5 gives the directly estimated reduced forms implied by this model, while Table 4(b) reports the reduced form equations implied by those of Table 4(a). The comments on the results made above hold here too with the following emendations.

viii) All variables have the expected signs except for the long rate in the demand for money equation. Its sign is positive but the coefficient itself is not significantly different from zero.

ix) The t statistics for most variables are absolutely higher. The goodness of fit of all equations is improved owing to the inclusion of more variables.

x) Short term bonds are now a better buffer against changes in transactions requirements than long term bonds are, as one would expect.

xi) The Durbin-Watson statistics in Table 4(a) indicate no positive serial correlation. This is not true of those in Table 5. However, in order to retain the comparability of equations 29, 30 and 31, 32, the matter was not pursued further, particularly since dw is not a very reliable indicator of serial correlation when lagged endogenous variables are included in an equation.

xii) Slow adjustments to desired asset positions are observed -- d = 0.39.

xiii) Supply variables in equations 31 and 32 are now more important.

The results reported in Tables 2 to 5 will now be used to account for the behaviour of interest rates during the post-Conversion Loan period and to assess the relative validity of the Barber and Shearer arguments. To that end equations 22 to 25 and 29 to 32 are decomposed by variable, thus making it possible to evaluate the importance of each argument individually. Changes in the debt held by the Public will, somewhat loosely, be referred to as the Conversion Loan.

Why did rates in general increase following 1958Q2? One answer can be had with the aid of Table 8. Consider the changes occurring between 1958Q2 and 1958Q3 in the long rate: The biggest single source of its increase to a predicted 5.06% was the Conversion Loan -- it contributed 1.94% to its rise. Column 3 of Table 8 shows that the bond price support programme of the Bank considerably relieved upward pressures on the long rate: Had the money supply remained at its 1958Q2 levels the long rate would have been higher by 0.66%. A minor source of upward pressure on the long rate was the behaviour of the maturity composition of the debt in the last quarter; as columns 6, 7 and 8 show, this force raised r_L by 0.27%.

The short rate fell by 1.23% to a predicted 2.62%.[26] Equation 29 ascribes a decrease in predicted r_S of 52 basis points to the Conversion Loan and a further decrease of 91 basis points to the expansionary monetary policy concomitant with the price-support programme of the Bank of Canada. The behaviour of the debt in the previous quarter mitigates the tendency of the short rate to fall -- columns 7 and 8 show that r_S would have risen by 0.34%.

Beyond 1958Q4, rates increased for several reasons:

i) The quantity of shorts outstanding was increased very fast indeed --

longs did not increase until 1960. The consequences of these changes can be seen in columns 4 and 5, Table 8 -- and of course Tables 6, 7 and 9. Had S remained at its 1958Q3 level, the short rate would have been lower by 1.44%, and the long rate would have been lower by 0.80% in 1959Q1.

ii) The nominal money supply expanded during the bond price support period, but it was subsequently held in the neighbourhood of its 1958Q2 level, until 1960Q3. The seasonally adjusted real money supply peaked in 1959Q1, declined for the next three quarters, and started increasing as early as 1960Q1 -- column 3, Tables 6, 7, 8, 9. Thus, after the temporary relief provided by the price support programme there is an upward pressure on $\hat{r}_S$ and $\hat{r}_L$ until 1960, when the money supply expanded. The effects of the Loan <u>without</u> the price support programme were, therefore, not fully felt until 1959.

iii) Increased transactions requirements due to increases in real income following 1959 also placed an upward pressure on interest rates. This force on estimated r_S and r_L amounted to 0.94% and 0.67% respectively during 1958Q4 to 1959Q1 -- column 3, Table 8.

Thus, the generally held view that the Conversion Loan alone accounted for the rise in interest rates requires qualification. The Loan <u>per se</u> only led to increases in the long rate -- it decreased the short rate. Over the longer haul, changes in the <u>size</u> of the debt, and increases in transactions requirements placed overwhelming upward pressures on both rates. Contractionary monetary policy over and above undoing the effects of the price support programme never really happened: At no time has the nominal seasonally unadjusted money supply -- -- Table 6, chapter one -- fallen below its 1958Q2 level. Though Table 8 has been used in this discussion, conclusions reached hold regardless of the table -- 6 to 9 -- used.

SECTION FOUR: ESTIMATING THE PREFERRED HABITAT MODEL

The survey of studies pertaining to "Operation Twist", i.e. the appendix to chapter two, indicated that little, if any, importance was to be attached to debt management operations. The preceding section gave ample evidence to the contrary. Because of this apparent paradox it is necessary to delve more deeply into this issue. In this section the analytical procedures used by Modigliani and Sutch (≡MS) (44), adapted to fit the peculiarities of our problem, are used.

The first point made by MS is that in assessing the effects of debt management operations on the term structure one ought to look at the spread between the yields of bonds in the relevant categories. In the present case the relevant spread is between long rates--over ten years--and short rates--under ten years--i.e. Spread ≡ $r_L - r_S$. Except[27] for the period till 1959Q3, this spread rises as one would expect.

The next step is to note the importance of the business cycle. In recessions, such as during 1958, the Spread increases because, while both rates fall, the short rate by virtue of its larger variance, declines more than the long one. For this reason it is necessary to purge the Spread from the influence of the cycle. To that end, the Spread is regressed against the short rate--this is equation 33 in Table 10. It is used to predict the Spread for the period 1958Q3 - 1965Q4. To the extent that the

business cycle is captured by the short rate, we may expect the predicted Spread to lie consistently below the observed one, since the Loan should increase the long and decrease the short rate. This is in fact the case. The residuals are in all cases greater than twice the standard error of estimate--a rough but indicative test. It is noteworthy that when MS carry out this test for "Operation Twist" they find no evidence that the spread, in that case, decreased below what it would have done during the course of the cycle.

One problem with these results is that the hypothesis of zero serial correlation in the residuals must be rejected. While coefficient estimators are unbiased, the usual formulae for the calculation of the variance-covariance matrix of the estimated coefficients are no longer appropriate. Moreover the estimator of the residual variance may be biased--a particularly serious problem here, since we are interested in prediction. To circumvent this problem iterative procedures are often resorted to--their rationale being that they maximise a likelihood function. However, these procedures can be abused if used in cases where there is a blatant omission of relevant independent variables. Thus, a second way out of the autocorrelation box is a better theory.

Modifying the MS specification somewhat it is hypothesized that the long rate r_L is a linear function of the short rate r_S, and the expected future short rate r^e_S

$$[34] \quad r_L = a + b'r_S + cr^e_S \qquad b > 0, \quad c > 0$$

Equation [2] is the analytical justification of the above specification. Moreover, r_S captures the influence of the business cycle. Using equations [5] and [6] of section two, we may argue that the market contains both regressive and extrapolative elements so that

$$[35] \quad r^e_S = r_S + k(N-r_S) + d(r_S-E)$$

where, in accord with the discussion in section two

$$[36] \quad N = \sum_{i=1}^{n} N_i r_{St-i}$$

$$[37] \quad E = \sum_{i=1}^{m} E_i r_{St-i}$$

Then

$$r^e_S = r_S + k\left(\sum_{i=1}^{n} N_i r_{St-i} - r_S\right) + d\left(r_S - \sum_{i=1}^{m} E_i r_{St-i}\right)$$

$$[38] \quad = qr_S + \sum_{i=1}^{p} Z'_i r_{St-i} \qquad \text{where} \quad q = 1 + d - k$$

$$Z'_i = kN_i - dE_i \text{ and}$$

$$p = \max(m, n)$$

substituting [38] into [34]

$$r_L = a + b'r_S + c\left(qr_S + \sum_{i=1}^{p} Z'_i r_{St-i}\right)$$

$$[39] \quad = a + br_S + \sum_{i=1}^{p} Z_i r_{St-i} \qquad \text{where} \quad b = b' + cq \text{ and}$$

$$Z_i = cZ'_i$$

Substracting r_S from both sides of [39]

$$[40] \quad \text{Spread} \equiv r_L - r_S = a + \sum_{i=0}^{p} W_i r_{St-i} \qquad \text{where} \quad W_i = b-1 \text{ for } i = 0$$

$$W_i = Z_i \quad \text{for } i \neq 0$$

A stochastic version of [40] was estimated using the Almon (1) technique of estimating distributed lags which constrains the W_i to lie on a polynomial of specified degree. A third degree polynomial was used and the first Almon variable was dropped thereby constraining the polynomial to have a $W_p = 0$, a zero slope at that point and a maximum of one peak. This last restriction was placed because theory justifies only one peak satisfactorily and because earlier work indicated that when a fourth degree polynomial is allowed for the coefficients W_i beyond the point where the function crosses the horizontal axis for the first time are not significantly different from zero. The estimated equation is reported as number 41 in Table 10, and the estimated polynomial appears as Graph 1. Here as in equation 33, all variables have the anticipated signs and are significantly different from zero. Moreover, in equation 41 the Durbin-Watson statistic indicates no serial correlation. Looking at the $Y-\hat{Y}$ values of Spread reveals that the post-Loan observations are greater than twice the standard error of estimate. Given the fit of the equation this test is telling. Note that it was partly on the basis of this test that MS had concluded that "Operation Twist" did not affect the term structure of interest rates.

To implicate the Conversion Loan more explicitly it is necessary to introduce supply variables[28] into equation [40]. The difficulties associated with doing so are well known and have been extensively discussed elsewhere.[29] Two supply variables were considered: D1 and D2. The former is the ratio of shorts to longs held by the public, financial interme-

diaries including the chartered banks and the Government Accounts. The latter is the ratio of federal government shorts to longs held by the public and financial intermediaries excluding the chartered banks. The corresponding ratio of assets held by the public alone--a preferable variable--cannot be obtained without making assumptions about the maturity composition of the federal government bonds held by chartered banks and the Government Accounts.[30]

Also included in estimated equations was the liquid asset ratio of chartered banks i.e. the ratio[31] of Canadian Liquid Assets to Canadian Dollar Deposit Liabilities times 100. This variable is a proxy for two important influences on interest rates, namely monetary policy and the portfolio adjustments of chartered banks. When monetary policy becomes tight, for example, banks are forced to liquidate short-term assets. This decreases prices and raises short rates, including r_s, thereby decreasing the Spread. There is also evidence[32] that chartered banks will adjust their portfolios away from short-term assets and into loans when it is safe and profitable for them to do so. Such responses, whilst motivated by interest rate differentials, in fact exaggerate them thereby affecting the Spread.[33]

The U.S. equivalent[34] of Spread, i.e. U.S.S., was included in the stochastic version of [40] in order to capture some of the open economy aspects of Canada. Doing so within the Tobin framework requires drastic respecification of the model and so it was not pursued there. One may conceive of this continent as one large economy in which all assets of the same class to maturity are perfect substitutes. Then it may be argued that it was a change in U.S.S. that caused the increase in the Spread following

1959Q3.

Equations 42 and 43 in Table 10 and Graphs 2 and 3 report the results obtained. The restrictions on the polynomial for the weights W_i in equation 41 apply here too. The following points are noteworthy.

i) There appear to be significant expectational forces at work. Regressive and extrapolative elements cannot be distinguished but both may be present. This comment is made because given the estimated weight patterns, a purely regressive, or a purely extrapolative mechanism i.e. $E_i=0$, all i or $N_i=0$ all i, appears implausible. Taylor, in a recent paper (64), attempts to make some inferences on the underlying expectational mechanisms but he should fail to convince the reader. No such attempt is made here.

ii) Supply variables D1 and D2 have the correct signs and are significant. Thus, the Canadian authorities can alter the term structure of interest rates.[35] There are, however, quantitative considerations here. To increase the Spread by about 20 basis points the authorities must decrease the D2 ratio by one unit--this ratio was decreased from 3.21 to 0.47 during the Conversion Loan thereby increasing the Spread by a predicted 58 basis points.

iii) The behaviour of certain financial institutions affects security prices importantly as indicated by the correctness in sign and significance of the liquid asset ratio.

iv) The variable U.S.S. has the correct sign but is only significantly different from zero at the 5% level. This is very curious. Under flexible exchange rates the exchange risk may effectively segment the two economies. Thus, the same equations were reestimated for the flexible and for the fixed exchange rate periods expecting to find the U.S.S. at least

more important during the latter period. This hypothesis did not square with the facts.

v) The Durbin-Watson test gave inconclusive results, as is often the case.

vi) Equations 42 and 43 remained essentially unchanged when different variable series and estimation periods were used.

Tables 11 and 12 correspond to Tables 6 to 9 of the previous section. They are of value in that they isolate the importance of each variable in affecting the Spread. Examining the absolute size of the coefficients in equations 42 and 43 clearly does not do that. The tables show that the immediate rise in predicted Spread in 1958Q3 was almost entirely due to the change in the composition of the debt. Expectational forces, i.e. anticipated rises in the short rate, which decrease the Spread, did not set in until the Bank stopped supporting bond prices. The predicted Spread was expected to fall by 10 basis points[36] during 1958Q4 when the Bank was changing its policy and by 17 basis points in 1959Q1. Further decreases in the Spread occurred because of the expected relative rises in short rates during 1959Q1 - 1959Q3. Column 5 in the two tables indicates the importance of the short rate. The fact that the Spread became negative during early 1959 appears to be entirely due to the influences contained in columns 5 and 6.

The above conclusions do not depend on whether Table 11 or 12 was chosen.

SECTION FIVE: WHY ARE SUPPLY VARIABLES IMPORTANT IN CANADA BUT NOT IN THE U.S?

In the previous two sections it was shown beyond doubt that supply variables do affect the term structure of interest rates in Canada, at least during the estimation period. This finding is in accord with fragmentary evidence in the Canadian economic literature.[37] However, it has been assumed by economists that debt management is not an important policy tool. This belief is based on the series of empirical studies surveyed in the appendix to chapter two.[38] Thus, the apparent paradox emerges that in Canada supply variables matter while in the U.S. they do not. This section offers an explanation.

One possible explanation of this paradox has been suggested, namely that the Federal Reserve and the Treasury often pursue conflicting policies. This argument was examined for the Operation Twist period, one of the most publicised debt management operations, in the appendix to chapter two. The result of such policies would be, the argument continues, to reduce the variability of quantities in the various maturity categories of the U.S. debt below what it would have been had either the Federal Reserve or the Treasury not existed. While the variance that would have prevailed under those hypothetical circumstances is not known, the implication is that the maturity composition of the debt does not vary a lot. But what is the meaning of "a lot" in this context? One answer is relative to the variability of the maturity composition of the Canadian public debt. We know that in Canada we have had large debt management operations, e.g. the Conversion Loan, while in the U.S. their existence is disputed. Are supply variables more important in Canada because the composition of the country's

debt varies more than that of the U.S.?

The answer can be found by calculating a measure of dispersion for the various maturity classes in the two debts. There is, of course, the question: What is the appropriate measure? If we believe that an increase in the amount of long debt of $X should have the same effect on the term structure in both countries, then the standard deviation of the relevant series would be a good measure. However, the U.S. economy is far larger than the Canadian one and so is its public debt. A $X increase in longs in both countries could have substantial effects on the small economy's term structure and no appreciable effect on that of the larger economy. Hence, the coefficient of variation, which takes this size factor into account, might be a more appropriate measure. Both are reported. Two alternative debt series are considered for each country: The Inside and Public series for Canada and the Sutch and FRB series for the U.S.

The data from R. Sutch's Ph.D. thesis were supplied to him by the Federal Reserve. The various maturity classes have been blurred somewhat by not assigning securities their full weight while in a particular class. Thus a bond with four years to maturity is partly included in the category Short, partly in Medium (I) and partly in Medium (II). When time comes for it to cross the boundary into the shorter class the transition is smoothed by

i) No longer including it partly in Medium (II),

ii) By still preserving part of it in Medium (I) and

iii) By assigning it a greater weight in Short, where it now properly belongs. Naturally the weights applied to a bond in different categories

must at each point in time sum up to one. These transformations clearly ought to reduce the variance of bonds outstanding in each class. Tables 13(a) to 13(d) corroborate this conjecture. For a more complete explanation of the construction of the Sutch series see (63), p. 336.

The series Inside was taken from Table 9, chapter one. Similarly the series Public appeared in Table 12 of the same chapter. The Federal Reserve Bulletin series was taken from that publication.

The various maturity classifications for the four series were made as comparable as they could possibly be. The observations from which measures of dispersion were calculated spanned the period 1955Q1 - 1965Q4. The ratio shorts/longs is, in fact, D1 and D2 for the two Canadian series. For the U.S. series Sutch and FRB they are [Short + Medium (I) + Medium (II)] / Long and [0 to 1 + 1 to 5 + 5 to 10] / Over 10 respectively. The results obtained appear in Tables 13 and 14. The following observations can be made.

i) The FRB series usually used by U.S. researchers has a higher standard deviation than either of the Canadian series for all four maturity classes and for the ratio of shorts to longs.

ii) The Sutch series, because of the method used in its construction, has a lower standard deviation than the FRB series. But even so, only in two cases, Table 13(c) and 13(d) is the standard deviation of a maturity class smaller than the corresponding number for the Canadian series. In Table 13(e) which contains the kind of variable used in the empirical studies of debt management, the standard deviation of the Sutch series is 1.30, equal to that of the Inside series and greater than that of the second Canadian series.

iii) While in absolute terms debt management operations in Canada and the U.S. were roughly equally strong, in percentage terms, as measured by the coefficient of variation, such operations were of far greater importance in Canada. This then may be one reason why in Canada supply variables "matter".

Another explanation may be that the assumption of perfect substitutability underlying the expectations hypothesis is more valid in the U.S. than in Canada. Hence, the predictions of the expectations hypothesis, one of which is that supply variables do not affect the term structure, are more likely to hold in the U.S. than in Canada.

To test this hypothesis the following procedure was used. First calculate the implied short rate expected last period to prevail in this current one, i.e. r^e_{t-1} using the formula

$$r^e_{t-1} = \frac{(1 + r_L)^2}{(1 + r_S)} - 1$$

i.e. assuming that the expectations hypothesis holds. The Canadian expected rate is denoted by r^e_{t-1}, while the U.S. one by R^e_{t-1}. Then run the regression of r_{St} on r^e_{t-1} and R_{St} on R^e_{t-1}. These regressions will tell how well the market is capable of anticipating the future short rate. In the extreme case where the market is capable of predicting perfectly well the estimated slope should be equal to unity and the constant should be equal to zero.

It is important to note at this point that this procedure is fairly

controversial. Meiselman, for example, has argued that anticipations may determine the term structure ex ante and yet not be realised ex post. Conard, however, took the opposite view[39] that

> "...It is unreasonable to presume the market is so consistently and grossly wrong in its expectations that poor foresight could wholly explain these observations."

The position taken here is that, in view of the difference in the mechanisms[40] determining r^e_t and r_{St}, it would be unreasonable to expect anticipations to completely materialise. This means that we cannot use the above regressions as tests of the expectations--and in this case the null --hypothesis.[41] But we can use it as a means of establishing the relative degree of substitutability between short and long federal government bonds in Canada and the U.S. if the following assumption is made: That the factors causing anticipations to depart from subsequent experience are of the same quantitative importance in Canada as in the U.S.

With the above caveats we turn to the results obtained. They are reported as equations 44 and 46 in Table 15. They show that

i) The estimated U.S. line--equation 46-- conforms much more closely to the 45^o line than the Canadian one--equation 44 --does.

ii) The explanatory power of equation 46 is considerably higher than that of equation 44 .

iii) Positive serial correlation is present in both equations but since we are merely interested in the estimated coefficients, which are unbiased, and $\bar{R}^2$ this problem is not very serious here.

The previous results show that in Canada the degree of substitution among shorts and longs is considerably smaller than in the U.S. That is another reason why supply variables are important in Canada but not in the U.S. To justify these differences in substitutability among assets between the two countries an examination of the effects of unit (=competitive) versus branch (=oligopolistic) banking and of other institutional differences is called for. That task is beyond the scope of this thesis.

NOTES TO CHAPTER THREE

1. For a discussion of these procedures see Christ (14), pp. 549 - 564.

2. The regression equations and plots of actual and predicted interest rates are not reported here in order to economize on space. The section on Data and Sources at the end of this chapter describes each rate used in detail.

3. That is, $Y-\hat{Y}$ was greater than -- roughly -- twice the standard error of estimate.

4. See Meiselman (41), p. 4.

5. See Conard (15), pp. 302 - 303.

6. See Meiselman (41), p. 9.

7. See Conard (15), p. 300.

8. See Meiselman (41), p. 12.

9. For simplicity let $\bar{R}_{1t} = N = E$.

10. See Conard (15), pp. 307 - 308 for a proof.

11. The discussion concerning diagram 3 is relevant here.

12. Hicks (29), pp. 146 - 147.

13. Hicks (29), pp. 146 - 147.

14. See Meiselman (41), pp. 14 - 16.

15. Modigliani and Sutch (44), pp. 185 - 187.

16. See Tobin (67), p. 18.

17. All references to "increases" and "decreases" in interest rates are in fact to increases above trend and decreases below trend. This less cumbersome terminology is used in what follows.

18. See the section on Data and Sources.

19. This can be effected by using a routine in Massager (40), a programme written by M.C. McCracken. This routine also utilizes the efficient features of Zellner's method of estimating seemingly unrelated regressions when disturbances across structural equations are contemporaneously correlated.

20. There are many reasons why the estimated reduced forms and the implied ones should differ, as the following discussion shows. There is, to begin with, a simultaneous equations problem because in the equation for each asset some of the independent variables, namely r_S and r_L, are not independent of the error term in the equation. This can be seen by finding the covariance of r_S and U_S, or r_L and U_L for that matter, where U_S and U_L are the error terms in the structural equations for S and L respectively. This amounts to multiplying the reduced form for r_S -- or r_L -- by U_S -- or U_L -- and taking the expected value of the resulting expression -- the usual assumption that $E(U_S) = 0$ and $E(U_L) = 0$ is made. The resulting covariance will not be equal to zero leading to bias and inconsistency.

    Given that, the OLS estimates in equations 19, 20 and 21 are inconsistent. Other characteristics of those estimates are that the constraints dictated by the GEA were implemented and that the Zellner method of estimating seemingly unrelated regressions was used. By contrast, in the exactly identified system of equations 19, 20 and 21, the reduced form equations 24 and 25 are consistent but do not have the second and third characteristics of the estimated structural equations. There are also the discrepancies that might arise in small samples.

    Turning to the system of equations 26, 27 and 28, we note that any two independent equations are overidentified. In this case the implied reduced forms have the advantage of satisfying a priori overidentifying restrictions, while equations 31 and 32 do not. Of course, had equations 27 and 28 -- say -- been estimated with 2SLS and had they then been used to solve for the implied reduced forms this argument would not apply. This latter procedure is more appropriate -- see Christ (14), pp. 464 - 481. The comments in the previous paragraph with respect to differences arising due to the use or not of the constraints and the Zellner procedure apply here too. Here again, discrepancies might arise due to small samples.

21. Feige (20), has argued that permanent income may be viewed as an optimal predictor of measured income -- à la Muth (46) -- rather than a proxy for wealth. While his argument is appealing it leaves his money demand function without a wealth variable. This leads to conceptual problems.

22. This is also the case in the U.S. -- See Laidler's discussion (37), p. 108.

23. See Hamburger (24), pp. 105 - 106.

24. See, for instance, Hamburger (24) and Feige (20).

25. We follow the way operation 57 in Massager (40) was constructed.

26. Although equation 29 predicts this turning point correctly, it exaggerates the fall in this rate somewhat -- by 44 basis points.

27. See the discussion in the previous section.

28. See Modigliani and Sutch (44).

29. Malkiel has a good exposition of these difficulties. See (39), pp. 221 - 226.

30. Chapter one contains a discussion of these problems. The model builders of RDX2 (27) have made one set of such assumptions. Use of their data indicated that the results obtained are very similar indeed. D1 and D2 are used here to preserve continuity.

31. See Data and Sources at the end of this chapter.

32. See, for example, the Annual Report of the Governor, Bank of Canada, particularly the 1958 and 1959 issues, pp. 36 - 38 and pp. 44 - 45 respectively.

33. To the extent that federal government bond rates are correlated with loan rates, a simultaneous equations problem may be present here.

34. See Data and Sources.

35. In the same paper, Taylor (64) also reports that he failed to identify any significant supply variables in the U.S. during the pre-Accord period. This, of course, is in line with other U.S. evidence. However, no investigator should expect to find such evidence during a period when bond prices were pegged!

36. See column 6, Table 11.

37. See, for example, chapter two, p.63 and the financial sector of RDX2 in (27), particularly equation 17.2, in Part 2, p. 107.

38. Paradoxically there has been a revival in theoretical interest on the matter which is most manifest in Tobin's writings. See particularly (67).

39. Conard (15), p. 339.

40. See section 2C(i).

41. Hickman (28) has used this procedure as a test of the expectations hypothesis <u>per se</u>. He essentially compared the results from regressions discussed above with those got from the inertia hypothesis that $r_{St} = a + br_{St-1} + U_t$. For curiosity's sake, equations 45 and 47 in Table 15 were also estimated. Their explanatory power, in both Canada and the U.S., is higher than that of equations 44 and 46. For reasons explained earlier we do not draw the conclusion that Hickman might have drawn, namely that the expectations hypothesis is not in accord with experience.

DATA AND SOURCES

SECTION ONE

The following interest rates were used for the period contained by the quarters 1951Q1 and 1967Q4:

Treasury Bill Rate. Bank of Canada Statistical Summary Supplement (≡ Supplement).

Government bond yield 0 - 2 years to maturity. This is the simple average of individual Direct and Guaranteed bond yields. They are reported in the Supplement.

Government bond yield 2 - 5 years to maturity. Constructed as the previous rate from data in the Supplement.

Government bond yields on bonds with 1 - 3, 3 - 5, 5 - 10 and over 10 years to maturity. All four rates were taken from the data tape for the RDX2 model of the Canadian economy (27) which is available at the University of British Columbia Computing Centre. These too are average rates of individual bond yields. This source will be referred to as RDX2 data tape.

Several simple averages were constructed out of the previous rates, for example:

SA4 is the simple average of rates on bonds with 0 - 2, 2 - 5, 5 - 10 and over 10 years to maturity and

r_S, often referred to as the short rate, is the simple average of rates with 0 - 3, 3 - 5 and 5 - 10 years to maturity.

r_L, often referred to as the long rate, is in fact, the rate on bonds with over 10 years to maturity.

SECTION THREE

In addition to r_S and r_L the following variables were used:

P, the Consumer Price Index, was used to deflate Y, M, S and L below. Its source is the RDX2 data tape.

Y ≡GNE/P. The source of GNE is the RDX2 data tape.

M, currency in circulation plus OTHER deposits with chartered banks, all divided by P. The source of the numerator is the Supplement.

S, quantity of short government bonds -- under 10 years -- held by the Public, deflated by P. The source of the numerator is the Supplement. See also the discussion in chapter one.

L, quantity of long government bonds -- over 10 years -- held by the Public, deflated by P. The source of the numerator is the Supplement.

$W \equiv M + S + L$.

SECTION FOUR

The following variables were used:

Spread $\equiv r_L - r_S$

D1, the ratio of short bonds held by all but the Bank of Canada to long bonds held by all but the Bank of Canada. Source, Table 9, chapter one.

D2, the ratio of short bonds held by the Public -- i.e. all but the Bank of Canada, the Government Accounts and the chartered banks -- to long bonds held by same. Source, Table 12, chapter one.

LAR, Liquid Asset Ratio for Canadian chartered banks. It is the ratio of Canadian liquid assets -- defined as cash reserves plus Day to Day Loans plus Treasury Bills -- to Canadian dollar liabilities times 100. Its source is the Supplement. Between 1955Q1 and 1956Q2 this ratio increased by about 4% following an informal agreement reached by the banks and the authorities. While this change followed a change in the constraints under which the banks operate, it nevertheless should exert the same influence on the Spread as when the ratio is changed following parametric changes under a given set of constraints.

USS, long U.S. Government bond yield minus a medium term bond yield. Source is the IMF Financial Statistics.

All the above variables are seasonally unadjusted with the exception of nominal M and GNE where strong seasonal factors exist.

TABLE 2(a): Regression Results for the Model of Section 2C(v)

Estimation Period	Dependent Variable	Constant	r_S	r_L	Y	W	W_{-1}	Lagged Dependent Variable	R^2	dw	Eqn. #
1955Q1 to 1965Q4	Real Money Stock M	-4.468 (-0.98)	-2.405 (-3.35)	-0.897 (-1.03)	0.563 (10.29)	0.225 (3.42)			0.96	0.65	19
1955Q1 to 1965Q4	Real Short Bonds S	51.068 (3.94)	11.477 (5.63)	-16.403 (-6.62)	-0.013 (-0.09)	0.096 (0.51)			0.59	0.64	20
1955Q1 to 1965Q4	Real Long Bonds L	-46.600 (-4.51)	-9.072 (-5.59)	17.300 (8.76)	-0.549 (-4.45)	0.680 (4.58)			0.81	0.75	21

TABLE 2(b): Implied Reduced Form Equations

	Endogenous Variable	Constant		Y	M	S	L	M_{-1}	S_{-1}	L_{-1}	Eqn. #
	Nominal Yield on Shorts (Under 10 Yrs) $\equiv r_S$	-2.394		0.186	-0.257	0.091	0.073				22
	Nominal Yield on Longs (Over 10 Yrs) $\equiv r_L$	1.471		0.129	-0.174	0.008	0.057				23

TABLE 3: Estimated Reduced Form Equations for the Model of Section 2C(v)

Estimation Period	Dependent Variable	Constant	Y	M	S	L				$\bar{R}^2$	See	dw	Eqn. #
1955Q1 to 1965Q4	r_S	1.983 (1.57)	0.129 (8.05)	-0.164 (-6.46)	0.001 (0.05)	0.015 (0.88)				0.68	0.44	0.92	24
1955Q1 to 1965Q4	r_L	2.024 (2.72)	0.102 (10.80)	-0.124 (-8.29)	-0.008 (-0.69)	0.036 (3.63)				0.88	0.26	1.02	25

TABLE 4(a): Regression Results for the Partial Adjustment Version of the Model of Section 2C(v)

Estimation Period	Dependent Variable	Constant	r_S	r_L	Y	W	W_{-1}	Lagged Dependent Variable	R^2	dw	Eqn. #
1955Q2 to 1965Q4	Real Money Stock M	3.185 (1.19)	-2.270 (-5.64)	0.297 (0.60)	0.322 (8.28)	0.338 (6.12)	-0.343 (-6.22)	0.612 (11.03)	0.99	1.65	26
1955Q2 to 1965Q4	Real Short Bonds S	-4.079 (-0.39)	9.161 (6.17)	-10.613 (-5.79)	-0.235 (-2.04)	0.477 (2.31)	-0.093 (-0.52)	0.612 (11.03)	0.80	2.09	27
1955Q2 to 1965Q4	Real Long Bonds L	0.894 (0.10)	-6.891 (-5.30)	10.316 (6.22)	-0.088 (-0.82)	0.185 (1.00)	-0.177 (-1.15)	0.612 (11.03)	0.89	2.09	28

TABLE 4(b): Implied Reduced Form Equations

	Endogenous Variable	Constant		Y	M	S	L	M_{-1}	S_{-1}	L_{-1}	Eqn. #
	Nominal Yield on Shorts (Under 10 Yrs) $\equiv r_S$	1.526		0.158	-0.322	0.161	0.175	0.133	-0.163	-0.171	29
	Nominal Yield on Longs (Over 10 Yrs) $\equiv r_L$	0.930		0.114	-0.233	0.089	0.196	0.106	-0.091	-0.157	30

TABLE 5: Estimated Reduced Form Equations for Model of Section 2C(v)

Estimation Period	Dependent Variable	Constant	Y	M	S	L	M_{-1}	S_{-1}	L_{-1}	$\bar{R}^2$	See	dw	Eqn. #
1955Q2 to 1965Q4	r_S	2.144 (1.55)	0.124 (7.73)	-0.201 (-5.77)	0.082 (2.34)	0.099 (2.30)	0.056 (1.91)	-0.092 (-3.24)	-0.099 (-2.52)	0.71	0.39	1.00	31
1955Q2 to 1965Q4	r_L	2.118 (2.23)	0.102 (9.28)	-0.139 (-5.82)	0.006 (0.25)	0.050 (1.71)	0.018 (0.90)	-0.018 (-0.93)	-0.018 (-0.68)	0.86	0.27	0.95	32

TABLE 6: Decomposition of Implied Reduced Form Equations 22 and 23

$$\text{Col. } 6 = \sum_{i=1}^{5} \text{col. } i$$

SHORT RATE	Constant 1	0.186 Y 2	-0.257 M 3	0.091 S 4	0.073 L 5	Predicted r_S 6
1958Q1	-2.39	15.80	-14.76	4.14	1.12	3.91
Q2	-2.39	15.97	-14.77	4.08	1.02	3.91
Q3	-2.39	15.82	-15.50	1.55	2.66	2.15
Q4	-2.39	15.59	-15.23	1.95	2.62	2.54
1959Q1	-2.39	16.70	-15.85	2.37	2.65	3.48
Q2	-2.39	16.78	-15.26	2.65	2.70	4.48
Q3	-2.39	16.59	-14.93	2.83	2.66	4.76
Q4	-2.39	16.30	-14.40	2.86	2.63	5.00
1960Q1	-2.39	17.70	-15.26	3.11	2.72	5.88
Q2	-2.39	16.95	-15.10	3.04	2.79	5.29
Q3	-2.39	16.97	-15.15	2.86	2.79	5.08
Q4	-2.39	16.56	-14.93	2.64	2.88	4.74

LONG RATE	Constant 1	0.129 Y 2	-0.174 M 3	0.008 S 4	0.057 L 5	Predicted r_L 6
1958Q1	1.47	10.96	-9.99	0.36	0.87	3.68
Q2	1.47	11.07	-10.00	0.36	0.80	3.70
Q3	1.47	10.97	-10.49	0.14	2.08	4.17
Q4	1.47	10.81	-10.31	0.17	2.05	4.19
1958Q1	1.47	11.58	-10.73	0.21	2.07	4.60
Q2	1.47	11.64	-10.33	0.23	2.11	5.12
Q3	1.47	11.50	-10.11	0.25	2.08	5.20
Q4	1.47	11.30	-9.75	0.25	2.05	5.33
1960Q1	1.47	12.28	-10.33	0.27	2.12	5.82
Q2	1.47	11.76	-10.22	0.27	2.18	5.45
Q3	1.47	11.77	-10.26	0.25	2.18	5.41
Q4	1.47	11.48	-10.11	0.23	2.25	5.33

TABLE 7: Decomposition of Estimated Reduced Form Equations 24 and 25

$$\text{Col. } 6 = \sum_{i=1}^{5} \text{col. } i$$

SHORT RATE	Constant 1	0.129 Y 2	-0.164 M 3	0.001 S 4	0.015 L 5	Predicted r_S 6
1958Q1	1.98	10.93	-9.40	0.05	0.23	3.79
Q2	1.98	11.04	-9.40	0.05	0.21	3.88
Q3	1.98	10.94	-9.87	0.02	0.54	3.62
Q4	1.98	10.78	-9.70	0.02	0.53	3.63
1959Q1	1.98	11.54	-10.09	0.03	0.54	4.01
Q2	1.98	11.60	-9.72	0.03	0.55	4.45
Q3	1.98	11.47	-9.51	0.03	0.54	4.52
Q4	1.98	11.27	-9.17	0.03	0.54	4.65
1960Q1	1.98	12.24	-9.71	0.04	0.55	5.10
Q2	1.98	11.72	-9.61	0.04	0.57	4.69
Q3	1.98	11.73	-9.65	0.03	0.57	4.67
Q4	1.98	11.45	-9.50	0.03	0.59	4.55

LONG RATE	Constant 1	0.102 Y 2	-0.124 M 3	-0.008 S 4	0.36 L 5	Predicted r_L 6
1958Q1	2.02	8.65	-7.11	-0.37	0.55	3.75
Q2	2.02	8.74	-7.12	-0.36	0.51	3.79
Q3	2.02	8.66	-7.47	-0.14	1.32	4.40
Q4	2.02	8.54	-7.34	-0.17	1.30	4.35
1959Q1	2.02	9.14	-7.64	-0.21	1.31	4.63
Q2	2.02	9.19	-7.35	-0.24	1.34	4.96
Q3	2.02	9.08	-7.20	-0.25	1.32	4.98
Q4	2.02	8.92	-6.94	-0.26	1.30	5.05
1960Q1	2.02	9.69	-7.35	-0.28	1.35	5.43
Q2	2.02	9.28	-7.28	-0.27	1.38	5.14
Q3	2.02	9.29	-7.30	-0.26	1.38	5.14
Q4	2.02	9.06	-7.19	-0.24	1.43	5.09

TABLE 8: Decomposition of Implied Reduced Form Equations 29 and 30

$$\text{Col. 9} = \sum_{i=1}^{8} \text{col. } i$$

SHORT RATE	Constant 1	0.158 Y 2	-0.322 M 3	0.161 S 4	0.175 L 5	$-0.133\ M_{-1}$ 6	$-0.163\ S_{-1}$ 7	$-0.171\ L_{-1}$ 8	Predicted r_S 9
1958Q1	1.53	13.43	-18.49	7.33	2.69	7.13	-7.75	-2.07	3.79
Q2	1.53	13.57	-18.51	7.22	2.45	7.64	-7.42	-2.62	3.85
Q3	1.53	13.44	-19.42	2.75	6.38	7.64	-7.31	-2.39	2.62
Q4	1.53	13.24	-19.08	3.44	6.29	8.02	-2.78	-6.24	4.42
1959Q1	1.53	14.18	-19.85	4.19	6.36	7.88	-3.49	-6.14	4.66
Q2	1.53	14.26	-19.12	4.69	6.47	8.20	-4.25	-6.22	5.57
Q3	1.53	14.09	-18.71	5.01	6.39	7.90	-4.75	-6.33	5.12
Q4	1.53	13.84	-18.04	5.07	6.31	7.73	-5.07	-6.24	5.12
1960Q1	1.53	15.04	-19.11	5.49	6.52	7.45	-5.13	-6.16	5.62
Q2	1.53	14.40	-18.92	5.38	6.69	7.89	-5.56	-6.37	5.04
Q3	1.53	14.41	-18.98	5.07	6.70	7.81	-5.45	-6.54	4.55
Q4	1.53	14.07	-18.70	4.66	6.90	7.84	-5.13	-6.55	4.62

Continued

TABLE 8 (Continued)

LONG RATE	Constant 1	0.114 Y 2	-0.233 M 3	0.089 S 4	0.196 L 5	0.106 M_{-1} 6	-0.091 S_{-1} 7	-0.157 L_{-1} 8	Predicted r_L 9
1958Q1	0.93	9.69	-13.38	4.05	3.01	5.68	-4.32	-1.90	3.76
Q2	0.93	9.79	-13.39	3.99	2.74	6.09	-4.14	-2.41	3.60
Q3	0.93	9.70	-14.05	1.52	7.15	6.09	-4.08	-2.20	5.06
Q4	0.93	9.56	-13.81	1.90	7.04	6.39	-1.55	-5.73	4.74
1959Q1	0.93	10.23	-14.37	2.32	7.12	6.28	-1.95	-5.64	4.94
Q2	0.93	10.29	-13.83	2.59	7.25	6.54	-2.37	-5.71	5.68
Q3	0.93	10.17	-13.54	2.77	7.15	6.29	-2.65	-5.81	5.31
Q4	0.93	9.99	-13.06	2.80	7.06	6.16	-2.83	-5.73	5.33
1960Q1	0.93	10.85	-13.83	3.04	7.30	5.94	-2.86	-5.66	5.70
Q2	0.93	10.39	-13.69	2.97	7.49	6.29	-3.11	-5.85	5.44
Q3	0.93	10.40	-13.74	2.80	7.50	6.23	-3.04	-6.00	5.08
Q4	0.93	10.15	-13.51	2.58	7.73	6.25	-2.86	-6.01	5.23

TABLE 9: Decomposition of Estimated Reduced Form Equations 31 and 32

$$\text{Col. 9} = \sum_{i=1}^{8} \text{col. i}$$

SHORT RATE	Constant 1	0.124 Y 2	-0.201 M 3	0.082 S 4	0.099 L 5	0.056 M_{-1} 6	-0.092 S_{-1} 7	-0.099 L_{-1} 8	Predicted r_S 9
1958Q1	2.14	10.53	-11.55	3.75	1.51	2.98	-4.35	-1.20	3.83
Q2	2.14	10.65	-11.56	3.70	1.38	3.19	-4.17	-1.52	3.82
Q3	2.14	10.55	-12.13	1.41	3.60	3.20	-4.11	-1.39	3.27
Q4	2.14	10.39	-11.92	1.76	3.54	3.35	-1.56	-3.61	4.11
1959Q1	2.14	11.13	-12.40	2.15	3.58	3.30	-1.96	-3.56	4.39
Q2	2.14	11.19	-11.94	2.40	3.65	3.43	-2.38	-3.60	4.88
Q3	2.14	11.06	-11.69	2.57	3.60	3.30	-2.67	-3.66	4.65
Q4	2.14	10.86	-11.27	2.60	3.55	3.23	-2.85	-3.62	4.66
1960Q1	2.14	11.80	-11.94	2.81	3.67	3.12	-2.88	-3.57	5.16
Q2	2.14	11.30	-11.82	2.76	3.77	3.30	-3.12	-3.69	4.64
Q3	2.14	11.31	-11.86	2.60	3.78	3.27	-3.06	-3.79	4.39
Q4	2.14	11.04	-11.68	2.39	3.89	3.28	-2.88	-3.79	4.38

Continued

TABLE 9 (Continued)

LONG RATE	Constant 1	0.102 Y 2	-0.139 M 3	0.006 S 4	0.050 L 5	0.018 M_{-1} 6	-0.018 S_{-1} 7	-0.018 L_{-1} 8	Predicted r_L 9
1958Q1	2.12	8.67	-7.80	0.28	0.77	0.96	-0.86	-0.22	3.72
Q2	2.12	8.77	-8.01	0.27	0.70	1.03	-0.82	-0.28	3.78
Q3	2.12	8.68	-8.40	0.10	1.83	1.03	-0.81	-0.26	4.30
Q4	2.12	8.56	-8.25	0.13	1.81	1.08	-0.31	-0.67	4.46
1959Q1	2.12	9.16	-8.59	0.16	1.83	1.06	-0.39	-0.66	4.70
Q2	2.12	9.21	-8.27	0.18	1.86	1.10	-0.47	-0.67	5.06
Q3	2.12	9.10	-8.09	0.19	1.83	1.06	-0.53	-0.68	5.01
Q4	2.12	8.95	-7.81	0.19	1.81	1.04	-0.56	-0.67	5.07
1960Q1	2.12	9.72	-8.27	0.21	1.87	1.00	-0.57	-0.66	5.42
Q2	2.12	9.30	-8.18	0.20	1.92	1.06	-0.62	-0.68	5.13
Q3	2.12	9.31	-8.21	0.19	1.92	1.05	-0.60	-0.70	5.08
Q4	2.12	9.09	-8.09	0.18	1.98	1.06	-0.57	-0.70	5.06

TABLE 10: Regression Results for the Model of Section 2C(iv)

Estimation Period	Dependent Variable	Constant	r_S	Max $\bar{R}^2$ at lag	D1	D2	LAR	USS	$\bar{R}^2$	See	d w	Eqn. #
1951Q1 to 1958Q2	Spread	1.93 (19.17)	-0.51 (-16.77)						0.91	0.11	0.44	33
1955Q1 to 1958Q2	Spread	1.58 (37.34)	-0.50 (-40.45)	Six Quarters					0.99	0.03	1.96	41
1955Q1 to 1965Q4	Spread	0.62 (2.81)	-0.35 (-10.39)	Six Quarters	-0.19 (-13.70)		0.06 (3.11)	0.19 (2.65)	0.93	0.11	1.20	42
1955Q1 to 1965Q4	Spread	(0.28) (1.28)	-0.33 (-9.71)	Six Quarters		- 0.21 (-13.30)	0.07 (3.51)	0.16 (2.09)	0.93	0.11	1.24	43

TABLE 11: Decomposition of Regression Equation 42

Col. 7 = $\sum_{i=1}^{6}$ col. i. Column 6 is calculated residually

	Constant	-0.19 D1	0.06 LAR	0.19 USS	-0.35 r_S	Expecta-tions	Predicted Spread
	1	2	3	4	5	6	7
1958Q1	0.62	-0.78	0.96	0.13	-1.29	0.76	0.40
Q2	0.62	-0.81	1.01	0.21	-1.15	0.81	0.69
Q3	0.62	-0.21	1.03	0.12	-1.08	0.78	1.26
Q4	0.62	-0.21	0.97	0.03	-1.39	0.68	0.70
1959Q1	0.62	-0.21	0.95	0.00	-1.64	0.51	0.22
Q2	0.62	-0.20	0.96	-0.04	-1.81	0.45	-0.02
Q3	0.62	-0.21	0.93	-0.10	-1.93	0.51	-0.19
Q4	0.62	-0.20	0.97	-0.14	-1.86	0.63	0.02
1960Q1	0.62	-0.20	0.99	-0.09	-1.88	0.78	0.21
Q2	0.62	-0.21	1.02	-0.02	-1.61	0.84	0.64
Q3	0.62	-0.21	1.03	0.07	-1.43	0.92	0.99
Q4	0.62	-0.20	0.97	0.07	-1.53	0.92	0.85

TABLE 12: Decomposition of Regression Equation 43

Col. 7 = $\sum_{i=1}^{6}$ col. i. Column 6 is calculated residually

	Constant 1	-0.21 D2 2	0.07 LAR 3	0.16 USS 4	-0.34 r_s 5	Expecta-tions 6	Predicted Spread 7
1958Q1	0.28	-0.63	1.12	0.11	-1.23	0.79	0.44
Q2	0.28	-0.68	1.18	0.17	-1.10	0.83	0.69
Q3	0.28	-0.10	1.20	0.10	-1.03	0.79	1.24
Q4	0.28	-0.13	1.14	0.02	-1.33	0.69	0.68
1959Q1	0.28	-0.15	1.11	0.00	-1.57	0.53	0.20
Q2	0.28	-0.17	1.13	-0.03	-1.72	0.48	-0.03
Q3	0.28	-0.18	1.09	-0.08	-1.85	0.54	-0.20
Q4	0.28	-0.18	1.14	-0.11	-1.77	0.66	-0.01
1960Q1	0.28	-0.19	1.16	-0.07	-1.80	0.81	0.18
Q2	0.28	-0.18	1.20	-0.02	-1.54	0.87	0.61
Q3	0.28	-0.17	1.20	-0.05	-1.36	0.94	0.95
Q4	0.28	-0.15	1.14	0.06	-1.46	0.94	0.81

TABLE 13

Standard Deviation for Each of the Four Maturity Classes in the Series Inside, Public, Sutch and FRB, and of the Ratios of Bonds Under 10 Years to Over 10 Years

13(a)

Data Series / Maturity	Inside	Public	Sutch	FRB
0 - 2 Years	651.70			
0 - 2 Years		379.21		
Short			1135.20	
0 - 1 Years				9716.51

13(b)

Data Series / Maturity	Inside	Public	Sutch	FRB
2 - 5 Years	530.79			
2 - 5 Years		282.85		
Medium (I)			629.28	
1 - 5 Years				8303.60

13(c)

Data Series / Maturity	Inside	Public	Sutch	FRB
5 - 10 Years	989.66			
5 - 10 Years		581.00		
Medium (II)			662.90	
5 - 10 Years				7465.77

13(d)

Data Series / Maturity	Inside	Public	Sutch	FRB
Over 10 Years	1059.57			
Over 10 Years		1019.74		
Long			314.56	
Over 10 Years				4622.97

13(e)

Data Series	Inside	Public	Sutch	FRB
$\frac{\text{Shorts}}{\text{Longs}}$	1.30	1.22	1.30	1.79

TABLE 14

Coefficients of Variation for Each of the Four Maturity Classes in the Series Inside, Public, Sutch and FRB, and of the Ratios of Bonds Under 10 Years to Over 10 Years.

14(a)

Data Series / Maturity	Inside	Public	Sutch	FRB
0 - 2 Years	31.20%			
0 - 2 Years		30.24%		
Short			18.50%	
0 - 1 Years				17.87%

14(b)

Data Series / Maturity	Inside	Public	Sutch	FRB
2 - 5 Years	27.18%			
2 - 5 Years		28.86%		
Medium (I)			16.19%	
1 - 5 Years				17.95%

14(c)

Data Series / Maturity	Inside	Public	Sutch	FRB
5 - 10 Years	50.28%			
5 - 10 Years		47.72%		
Medium (II)			28.72%	
5 - 10 Years				31.71%

14(d)

Data Series / Maturity	Inside	Public	Sutch	FRB
Over 10 Years	28.39%			
Over 10 Years		33.00%		
Long			12.98%	
Over 10 Years				19.90%

14(e)

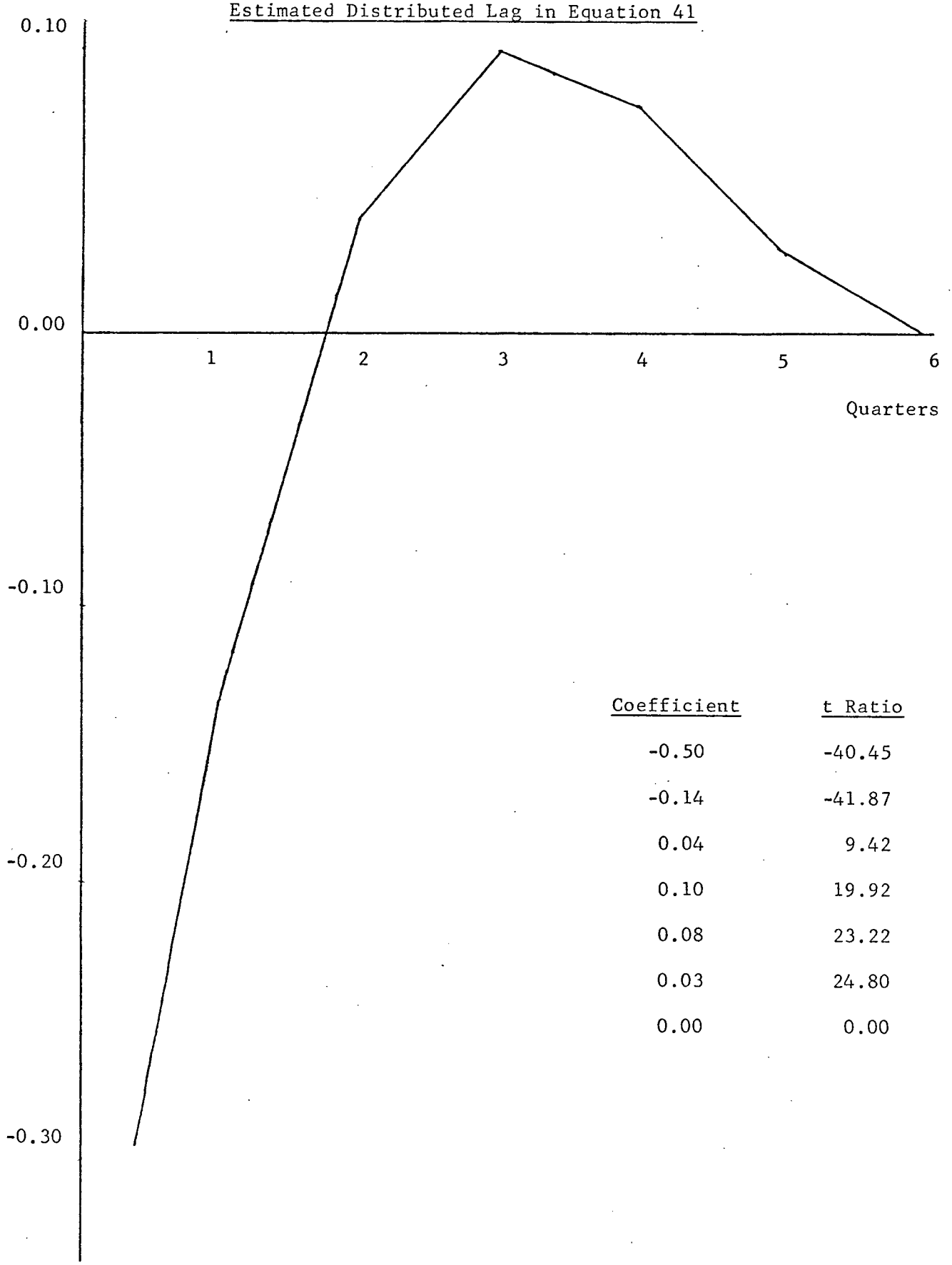
Data Series	Inside	Public	Sutch	FRB
$\frac{\text{Shorts}}{\text{Longs}}$	54.54%	74.04%	24.62%	31.48%

TABLE 15: Regression Results for Section 5

Estimation Period	Dependent Variable	Constant	r^e_{t-1}	r_{St-1}	R^e_{t-1}	R_{St-1}	$\bar{R}^2$	See	d w	Eqn. #
1955Q1 to 1965Q4	r_{St}	2.31 (4.07)	0.38 (3.45)				0.20	0.69	0.38	44
1955Q1 to 1965Q4	r_{St}	0.76 (2.47)		0.83 (11.59)			0.76	0.38	1.54	45
1955Q1 to 1965Q4	R_{St}	0.17 (0.31)			0.89 (6.25)		0.47	0.45	0.56	46
1955Q1 to 1965Q4	R_{St}	0.68 (2.46)				0.83 (10.78)	0.73	0.32	1.54	47

GRAPH 1

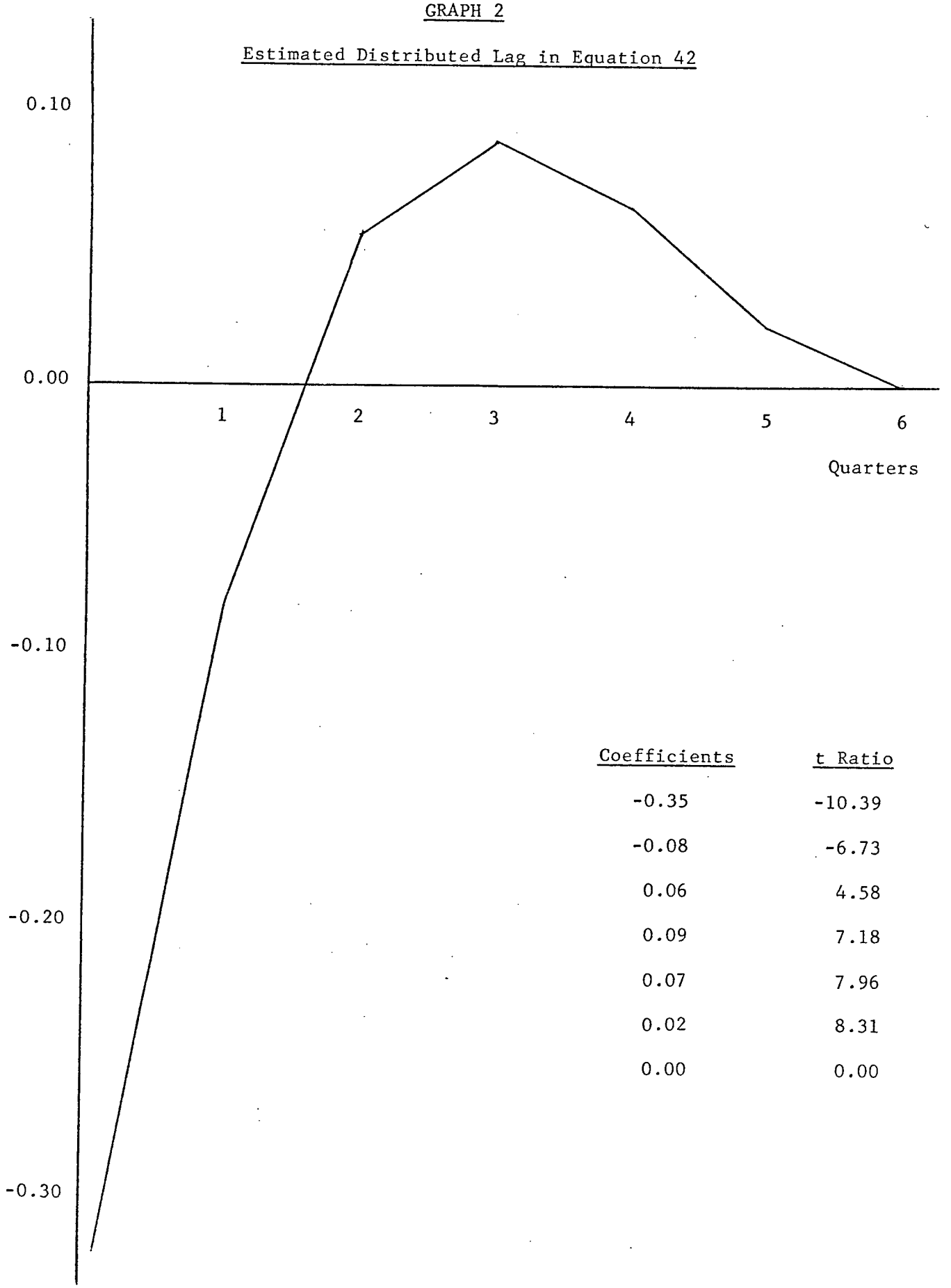
Estimated Distributed Lag in Equation 41



Coefficient	t Ratio
-0.50	-40.45
-0.14	-41.87
0.04	9.42
0.10	19.92
0.08	23.22
0.03	24.80
0.00	0.00

GRAPH 2

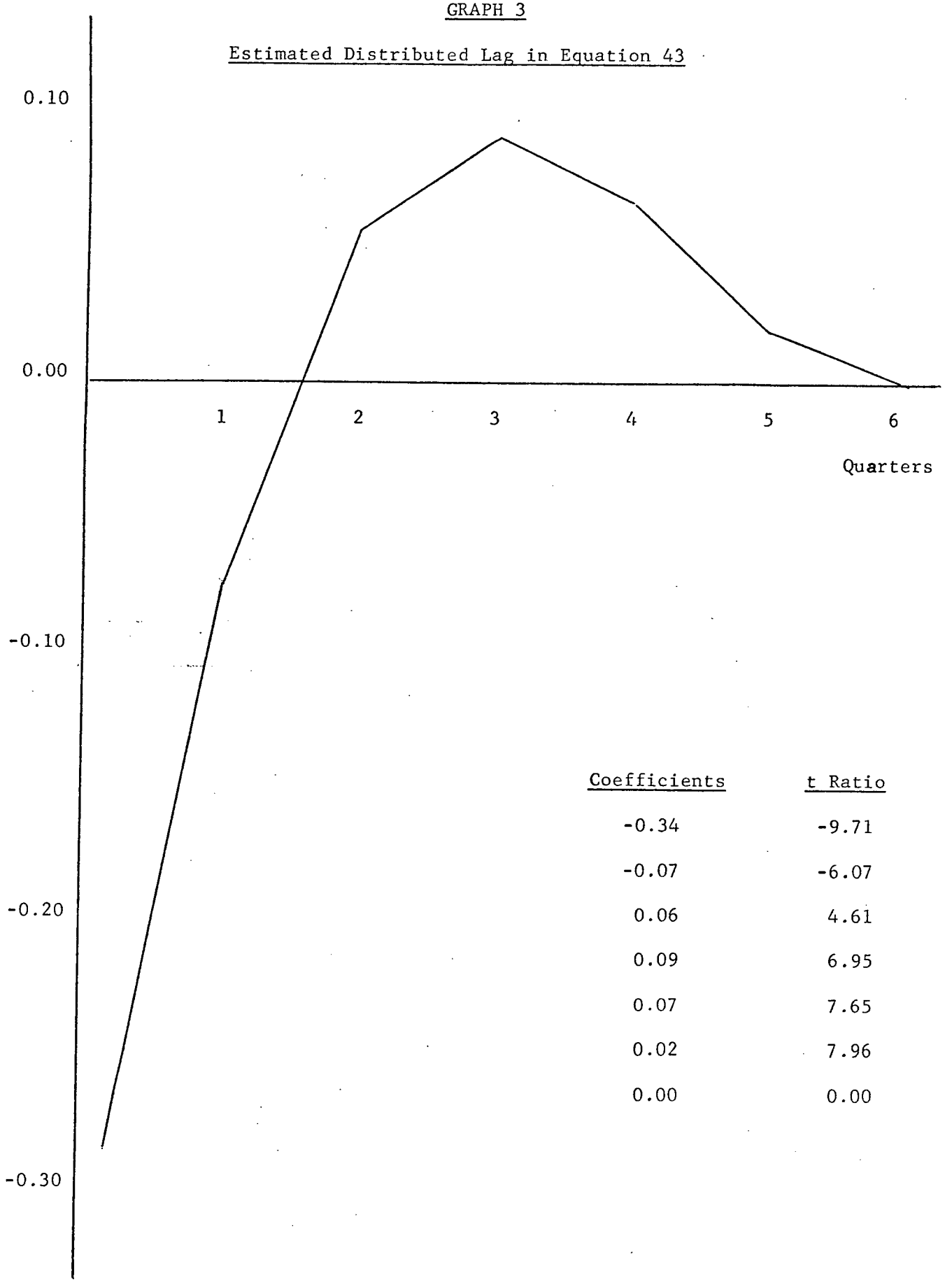
Estimated Distributed Lag in Equation 42



Coefficients	t Ratio
-0.35	-10.39
-0.08	-6.73
0.06	4.58
0.09	7.18
0.07	7.96
0.02	8.31
0.00	0.00

GRAPH 3

Estimated Distributed Lag in Equation 43



Coefficients	t Ratio
-0.34	-9.71
-0.07	-6.07
0.06	4.61
0.09	6.95
0.07	7.65
0.02	7.96
0.00	0.00

CHAPTER FOUR

FINANCIAL RESPONSES TO A NEW TERM STRUCTURE OF INTEREST RATES

In the previous chapter the determinants of the Canadian term structure of interest rates were examined. Of particular interest is the finding that the composition of the federal government debt does affect the term structure of government bond yields. Given that much, debt management operations such as the Conversion Loan, can twist the yield curve. The question then arises: What are the effects of such changes on the holding and issuing patterns of lenders[1] and borrowers? In this chapter these problems are examined.

Information on these matters is desirable per se. It has been suggested, for example, that as long-term rates increase relative to short-term ones, cost minimizing asset issuers would intensify their use of two alternatives. First, to the extent that they are constrained to the issue of bonds rather than, say, stock, they may issue more short- and fewer long-term bonds. Second, they may float more bonds in foreign currencies. In section one, the reasons why the response of lenders -- to the changes in the term structure that the Conversion Loan effected -- cannot be examined are stated. In section two, the response of borrowers is considered. The extent to which the two alternatives stated above are utilized is examined

in parts B and C of this section. In section three, the implications of section two for some of the effects of the Conversion Loan are discussed. Finally, section four examines the assumption made in what follows that government and other -- provincial, municipal and corporate -- bonds of the same term to maturity are perfect substitutes.

SECTION ONE: THE RESPONSE OF ASSET HOLDERS

Concerning the demand side of the problem, i.e. the holding patterns of lenders, little will be said. The reason is the extreme paucity of available information. What one aims for is time series of balance sheets for the various sectors. Moreover, these accounts must report government and other bonds in sufficient detail: Such bond holdings must be disaggregated by term to maturity. The Flow of Funds Accounts published by the Dominion Bureau of Statistics -- now Statistics Canada -- do contain such time series of sectoral balance sheets. There are, however, two major problems. The sectoral bond holdings are, naturally, disaggregated by issuer but not by term to maturity. Secondly, the Flow of Funds Accounts were not published during the 1950's. A pioneering study for the Royal Commission on Canada's Economic Prospects[2] gives some information for the period 1947-1955. But this too does not disaggregate bonds by term to maturity and in any case a gap for the years 1955-1962 still remains. Alternative sources of information were sought. Other published material is not helpful and personal inquiries at the Bank of Canada proved sterile. More information may become available in the future as the Flow of Funds Accounts series becomes more established. At that time a study of the

demand side of the problem may prove feasible.

More information is available on changes in ownership of Canadian securities held by foreign residents and foreign securities held by Canadians. However, since capital flows have been extensively studied by Helleiner (25), Penner (51), Powrie (52), Lee (38), Caves and Reuber (13) and RDX2 (27), attention is paid only to the new issues component of such flows.

SECTION TWO: THE RESPONSE OF ASSET ISSUERS

A. INTRODUCTORY

Time series of balance sheets provide information not only on the demand side, but also on the supply aspects of the problem. That is, they would help answer questions like:

i) If the spread between Canadian and U.S. interest rates widens, do borrowers become more inclined to incur liabilities in U.S. funds?

ii) If the spread between Canadian long- and short-term rates widens do borrowers issue shorter term securities?

iii) Do high interest rates discourage borrowing?

Given the paucity of the information contained in existing time series of balance sheets it might appear that such questions might remain unanswered. Fortunately an alternative source of information is available concerning issuing patterns of borrowers.

The Financial Post publishes an annual record of new financial issues. It gives, for every month, a list of bond and stock issues floated by the federal, provincial and municipal governments and by corporations. Each item in the list tells the face value of an instrument, whether in Canadian or U.S. funds, the coupon rate and yield, date of issue and maturity and various other less important details. This information is very accurate. This statement is based on a comparison of these data with unpublished material kindly made available by the Bank of Canada. Thus, while it is not possible to examine the term to maturity composition of the liabilities of the main bond issuers, it is possible to construct tables giving the maturity composition of new issues of bonds by the federal and provincial governments and by corporations. These tables were reported in chapter one.[3]

It should be noted that in studying such data no identification problems arise. The reason is that our information is not about quantities traded -- the usual kind of information -- but rather it reflects true borrower intentions -- points on supply curves.

Municipal governments are fairly important bond issuers but they are usually not at liberty to adjust their issuing patterns quite as much as other borrowers when market conditions change. Municipal borrowing is regulated by the province concerned. Frequently municipalities are obliged to issue serial bonds so that interest and principal are repaid annually.[4] For this reason the term to maturity of a serial bond is ambiguous and so is therefore the maturity composition of municipal debt. In principle some idea about it can be obtained: One needs detailed information on each

issue. Then for each particular bond an average term to maturity can be calculated. When this is done for all bonds some idea about the term to maturity of municipal debt can be obtained. Since a provincial by-law is usually required, authorizing each municipal issue, detailed information on each bond issue is, in fact, available. But the computational work involved is formidable. Because of this problem a table for Canadian municipalities similar to Tables 15, 16 and 17 was not constructed. It may be argued, however, that, since the average term to maturity of an X year serial bond is smaller than that of an X year sinking fund bond, a municipality wishing to issue shorter term liabilities may switch away from the latter to the former. This kind of possibility is investigated using another source of information -- Table 19 of chapter one.

The extent to which municipalities tap U.S. funds when it is profitable to do so will be briefly examined using annual data -- Table 14, chapter one. The new issue data on municipalities could also have been used but were not for two reasons. To begin with, comparing the Financial Post reports with those of the Bank of Canada indicated a substantial number of disparities -- this was not the case with provincial and corporate issues. A second, related, problem was the large number of rather small issues appearing in each month. This makes the clerical work involved quite substantial. The questions mentioned three paragraphs earlier are now investigated.

It was seen earlier that Boreham et al (7) had argued that the Conversion Loan increased the interest rate differential between Canada and the U.S., thereby inducing borrowers to issue bonds in U.S. dollars. The influx of

this capital is claimed to have appreciated the exchange rate and hurt the economy by handicapping our export industries. The extent to which borrowers issue U.S. dollar bonds under those circumstances is first examined. Implications for the effects of the Conversion Loan are stated later.

B. WHEN DO BORROWERS ISSUE LIABILITIES IN U.S. DOLLARS?

In discussions of the openness of the Canadian economy and its links with that of the U.S. the connections between the financial sectors of the two economies are emphasized. One such connection arises out of the alleged willingness of asset issuers in one country to float issues in the currency of the other country if the terms are right. The terms that a borrower must consider include interest rate differentials and the relation between the spot rate now and that prevailing at appropriate future dates. The latter prices are, of course, unobservable, the individual issuer must form expectations about them. A Canadian issuer, for example, will be more likely to float issues in U.S. dollars the higher the interest rate differential between Canada and the U.S. (CR-USR), and the higher the difference between the amount of Canadian dollars required to buy $1.00 U.S. and the spot rate expected to prevail in the future ($S-S^e$). These considerations underly the modern version of the interest rate parity theory.[5] Using S^e rather than the forward rate (S) established on the market may be necessary for two reasons.

i) Individual issuers may or may not wish to cover themselves with forward contracts, if appropriate forward markets exist.

ii) In fact such markets are not adequate. Many of the provincial

issues, for example, are as long as twenty years! The province concerned must think not only of repaying the principal but also of the interest payments due between the time of issue and repayment. Since it cannot cover itself by buying U.S. dollars forward it must speculate -- this involves constructing an S^e.

Using these considerations an attempt is now made to analyse some of the available information. Table 14 of chapter one gave annual data on the liability structure of federal, provincial and municipal governments, corporations, and other institutions. There, the distinction drawn is between Canadian dollar and other currency liabilities. Table 1 below gives the proportion of total liabilities issued in other currencies for the four main groups of borrowers. It shows that provinces, municipalities and corporations issue a substantial -- about 0.23 -- proportion of their liabilities in currencies other than Canadian dollars.[6] This is not true of the federal government which does so for only 0.02 of its bond issues. The same table also shows that the variance of each proportion is quite small. No attempt is made to apply regression analysis to the data because the relevant period contains so few observations. Instead, the relationship between each of columns 1 to 4 and column 5 -- the spread between the Canadian government bond yield CR and the corresponding U.S. one, USR i.e. CR-USR -- was examined on graphs not appearing here. One would expect this relationship to be a positive one: As the spread increases so does the proportion of debt denominated in other currencies. This appears to be partially true for municipalities and corporations and untrue for the federal and provincial governments.

There are, of course, two lots of assumptions implicit in the construction of those graphs. Firstly, the U.S. bond yield is used as a proxy for the bond yields in other countries generally. This is not unreasonable in view of the relative importance of U.S. dollar issues in the other currency category. Secondly, the assumption is made that government and other securities -- provincial, municipal and corporate -- are perfect substitutes. This problem will be examined in detail later on.

More evidence on this issue can be had from the new issue data discussed earlier on. It has already been mentioned that new issue data on municipal debt were, for various reasons, not constructed. Table 15, chapter one, shows that between 1955Q1 and 1965Q4 the federal government issued bonds in U.S. dollars on two occasions only. This makes it difficult to infer anything about its behaviour in this respect. Thus, we concentrate on provinces and corporations and utilize the data of Tables 16 and 17, chapter one, to examine whether these bodies will issue liabilities in U.S. dollars[7] when it is advantageous for them to do so.

In accord with earlier discussion the proportion of new provincial issues and new corporate issues in the respective totals is regressed against a constant, the spread CR-USR, a variable reflecting the availability of credit in Canada -- namely the nominal, narrow, money supply M -- and the difference between the spot rate S and the expected future spot rate S^e. Two alternative specifications of S^e were made. In specification one, S^e was set equal to the only forward rate (F) available, the 90-day one. The rationale is that if a province or corporation wished to hedge its loan and it borrowed on a 90-day basis,

the 90-day forward rate would be the rate that it would use. In specification two, S^e was made a function of past spot rates. The reason for doing so is that the underlying expectational framework is the same as the one generating expectations about future short interest rates. This mechanism was extensively discussed in the last chapter. The main point is that if the spot rate has been rising, extrapolative expectations would have it continue rising in the future, while regressive expectations see it falling to a normal level. Since different provinces and corporations may have a different view of the future, a combination of both regressive and extrapolative elements may be necessary in order to explain observed behaviour. In this specification the number of relevant past spot rates as well as the weights attached to each one of them is determined empirically. A third degree polynomial was specified in the context of a modified Almon procedure and the first Almon variable was dropped.[8] This imposes further restrictions on the shape of the polynomial describing the weight pattern so that only one turning point in it can occur, in accord with theoretical considerations discussed in chapter three.

The results obtained are consistent with the conjectures made on the basis of the annual data considered earlier on. Table 2 and Graphs 1 and 2 give the necessary details. They show that:

i) The overall explanatory power of either specification is very low so that the maintained hypothesis, that the vector of coefficients is equal to the zero vector, must be accepted. This means that the following statements are made quite informally.

ii) There is some evidence that the hypothesis more accurately

describes the behaviour of corporations than it does that of provinces.

iii) Specification two provides a better representation of how expectations concerning future spot rates are formed. The coefficients for (S-F) do not have the anticipated signs.

iv) The credit availability variable, M, in the equation for corporate placements in the U.S. does not have the expected sign. The remaining variables do.

How can these results be rationalized? Firstly, it may be argued that a quarter is too fine a period of time for looking at new issue data. This is because new issues by both provinces and corporations are fairly sparse. Whatever variance there may be in the dependent variables[9] may, therefore, be of no economic significance. This statement may be consistent with the one made earlier to the effect that the alternative, annual, data examined above varied over a small range. Statement (ii) may be consistent with informal, but widely held, views that business firms are better cost minimizers than government agencies. Statement (iii) should come as no surprise. Although provinces and corporations may wish to hedge in their dealings with U.S. markets the opportunities for doing so are quite limited. There is no possibility of covering a twenty-year contract, as many of the bonds issued are. Then expectations about future spot rates must be formed, at least partially, out of current and past experience with the behaviour of the spot rate. This hypothesis is fairly consistent with corporate behaviour, as Graph 2 shows. Finally, statement (iv) is consistent with at least two thoughts. First, that corporations possess more means of finance than provinces do, so that credit availability is less likely to

affect their operations. Second, if monetary policy is effective, when M decreases firms are likely to reduce their risky means of financing projects -- i.e. borrowing in the U.S. -- before they reduce the less risky ones -- i.e. borrowing in Canada. If so, the sign of M should in fact be positive.

It is noteworthy that the behaviour of bond issues in foreign funds has proved a difficult "nut to crack". Helleiner, for example, using both delivery data and alternative contract-data, reports results no more encouraging than those presented here. Also, the explanatory power of the analogous equations in the RDX2 model of the Canadian economy is about the lowest in the entire model.[10]

So much for this issue. The extent to which provinces and corporations switch to short-term financing as the spread between the long and short government bond yields increases and as interest rates in general[11] increase will now be examined. This constitutes the second possibility of adapting issuing patterns to changed costs of borrowing. It was shown in chapter three that the Conversion Loan increased the spread between long and short rates. Did bond issuers subsequently adjust their financing patterns? This issue is examined first. Implications for the Conversion Loan are again confined to a separate section.

C. WHAT DETERMINES THE SHORT-LONG MIX OF BOND ISSUES?

In this part of section 2, as in the last one, the assumption of perfect substitutability between government and other bonds is maintained.

The response of municipalities, provinces and corporations is examined. In line with previous comments it is hypothesized that as the spread between the government long and short bond yield (≅ Spread) increases, municipalities issue more serial and less sinking fund bonds. In Table 3, the ratio of serial to sinking fund municipal issues by province, is given for the years 1955 - 1965. A trend can be detected in each column but it is not always in the same direction: Serial bonds have become more popular with municipalities in some provinces and less so with others. The last column gives the ratio for municipalities in all provinces. There is a downward trend here. This last column was plotted against the Spread. The graph revealed, if anything, a negative relationship between the two, contrary to what one might expect.

Turning to the new issue -- quarterly -- data for provinces and corporations, the ratio of new short issues to new long ones is regressed against a constant, the Spread, and the rate CR -- a simple average of the Canadian government bond yields over and under 10 years. The variable Spread should carry a positive sign and so should variable CR. Graphs 5 and 6 depict the two dependent variables and Table 4 gives the estimated regression equations. The following comments may be made.

i) Here, as in the previous section, the maintained hypothesis cannot be rejected. As a result the following points are made informally.

ii) The sign of the Spread variable is different in equations 5 and 6.

iii) There is some evidence that high interest rates coincide with decreases in the ratio of new corporate shorts to their new long ones.

At first these results may appear implausible, but this may not be so on reflection. The argument that, as the Spread increases cost minimizing implies issuing more shorts, is too simplistic. Similarly, the argument that as CR increases only short-term commitments will be undertaken omits important forces. Both arguments ignore the importance of expectations. The first argument ignores expectations about future short rates. If the expectations hypothesis on the term structure of interest rates holds, then at any moment in time there is an expected future short rate implied[12] by the market r^*. An individual bond issuer will have his own expectations about that rate,[13] let us say that he expects it to be r^e. Then he will issue:

longs if $r^e > r^*$

shorts if $r^e < r^*$ and

be indifferent if $r^e = r^*$

This will hold regardless of the shape of, or changes in, the yield curve. The argument leading to an a priori sign on CR ignores expectations about the future level of interest rates in general. An increase in CR will not deter investors from committing themselves to high interest payments if even higher CR values are expected to prevail in the future. For these reasons the results in Table 4 are not too implausible.

SECTION THREE: IMPLICATIONS OF SECTION TWO B FOR A STUDY OF THE CONVERSION LOAN

It was seen in section two B that Boreham et al (7) have claimed that

the Conversion Loan induced borrowers to issue bonds in U.S. dollars. In his 1962 paper, Barber (3) had made the more general statement that the Loan attracted capital from abroad. He did not specify what particular forms of capital were involved and hence the suggestion by Boreham et al may be at least part of what Barber had in mind. The results presented above indicate that this argument is not supported by the evidence. Also, the relevant equations in RDX2 show that such flows have not been found to be sensitive to Canadian-U.S. interest rate differentials, as already indicated. This contradicts the point by Boreham et al and requires that, for Barber's argument to hold, some other capital flows must be sensitive to such differentials.

There is, in fact, ample evidence that this is so. The studies by Helleiner (25), Penner (51), Powrie (52), Lee (38), Caves and Reuber (13) and the RDX2 researchers (27) all point to that direction.[14]

Use has been made thus far of the assumption of perfect substitutability between government securities and those issued by others -- when the term to maturity is held constant. It is now necessary to question this assumption.

SECTION FOUR: ON SUBSTITUTABILITY IN FINANCIAL MARKETS

It is very difficult to supply a viable definition of perfect substitutability between government bonds and other bonds of the same term to maturity. Price theory definitions cannot be applied here: Since the maturity composition of other debt is not known -- only the maturity composition of new issues between 1955 - 1965 is known -- demand functions

cannot be estimated and cross elasticities must remain unknown.

An alternative definition may be that the rate of return on a government bond with X years to maturity is identical to that for other bonds of the same term. Accordingly, the government bond yield under ten years was regressed on the provincial and corporate new issue yields on bonds with less than ten years to maturity. Similarly for government bond yields over ten years and the provincial and corporate new issue yields on bonds with more than ten years to maturity.[15] If the assumption of perfect substitutability holds, 45° lines should be estimated. Thus, zero intercept and a slope equal to unity becomes the null hypothesis.

Table 5 presents the results obtained.

i) All constants except that in equation 10 are not significantly different from zero at the 1% level of significance.

ii) All slope coefficients are not significantly different from unity at the 1% level.

iii) The explanatory power of the provincial equations 7 and 9 is higher than that of the corporate ones 8 and 10.

iv) The d w statistic indicates positive serial correlation in equations 8, 9 and 10. There is no positive serial correlation in equation 7.

The significance of the constant term in equation 10 requires comment. In footnote 15, mention was made of the findings of the two NBER studies on the spread between new and seasoned long corporate bond yields. If this spread exists in Canada too, then running the equations in the form

used here would result in a negative intercept. Thus, equation 10 provides some evidence corroborating the NBER results.

On the whole the hypothesis of perfect substitutability is quite consistent with evidence. Thus, a fair amount of confidence can be invested in the results of sections two B and two C.

NOTES TO CHAPTER FOUR

1. In Canada the main bond suppliers are the federal, provincial and municipal governments and corporations. The main bond demanders are financial institutions, some governmental bodies, such as the Unemployment Insurance Fund and private individuals.

2. See the appendix in Hood (31).

3. Tables 15, 16 and 17.

4. This is believed to minimize the possibility of mismanagement by the allegedly relatively inexperienced municipal treasurers.

5. For good expositions see Kesselman (35) and Stoll (62).

6. Mainly U.S. dollars. Note that the range of the variables in the first three columns of Table 1 is rather small.

7. The new issue data indicate that these were the only issues in currencies other than Canadian dollars.

8. See Massager (40), Operation 53.

9. See Graphs 3 and 4 for an indication of such information.

10. See Helleiner (25), pp. 386 - 387 and RDX2 (27), equations 19.5 and 19.6, in Part 2, pp. 119 - 120.

11. See Wonnacott (69). p. 143.

12. See section one, chapter three.

13. If firm and uniform expectations are held then $r^e = r^*$.

14. It may be worthwhile to outline some of the main differences between the study in this thesis and the one by Caves and Reuber (13) -- the most extensive and recent of those mentioned above. They are:

    A. DEPENDENT VARIABLE DIFFERENCES

    i) Caves and Reuber -- CR -- use balance of payments data which refer to deliveries whereas the Financial Post data used here are offer-data. It is well-known, and as CR imply -- CR, pp. 35 - 36 -- offer-data are preferable since they more accurately reflect borrowers' intentions.

    ii) The data used in this chapter include only corporate and provincial issues -- see page 146 for reasons -- whereas the CR data

presumably include federal and municipal issues. The inclusion of issues by the federal government should make little difference, since, in the relevant period, it issued hardly any U.S. - dollar bonds. However, the inclusion of municipal issues could make a substantial difference: There is some evidence that the proportion of municipal debt outstanding issued in currencies other than Canadian dollars is positively related to the Canada-U.S. interest rate differential -- see p. 145. Then the CR results are likely to arise. In what follows, the sensitivity of portfolio capital flows to interest rate differentials observed by CR will be referred to as the "CR results".

iii) The data used here is "gross-new" whereas theirs is "net". To the extent that Canadians retire fewer securities -- thereby increasing the net inflow of capital -- as the Canadian-U.S. differential increases the CR results are again more likely to arise.

iv) CR include U.S. and other foreigners' issues in Canadian dollars and, of course, their retirements. These issuers may be more responsive to interest rate differentials than Canadians are.

v) Unlike the data used here, the CR data include stocks. They had included a yield-on-capital-differential variable -- i.e. DRK in CR, pp. 58 - 59 -- which they regard as an acceptable proxy of the appropriate rates of return, even though it is not statistically significant at the customary 5% level. However, it is possible that their CL and USL rates are better proxies for the appropriate rates of return. If so, and if net flows of "stock-capital" are sensitive to the Canadian-U.S. differential, then the CR results might occur.

vi) Finally, there are the differences between the Financial Post data and reality as presented in government statistics. A rough indication of these differences is available in Tables 16b and 17b of chapter one.

B. INDEPENDENT VARIABLE DIFFERENCES

i) Caves and Reuber use CR and USR, rather than the differential CR-USR used in this study. Their specification captures, they argue, expectations of future changes in these rates. But their argument is couched in terms of regressive expectations alone. Moreover, they still feel it necessary to include a separate expectational variable.

ii) Their expectational variable CTS assumes that expectations are regressive and that they are realised -- both assumptions are questionable. The apparent significance of CTS can be otherwise accounted for.

iii) As CR point out, of their availability variables, only NNCS, i.e. net new issues sold to Canadians, is vaguely acceptable. Of course a good proxy of credit availability must reflect excess demand, but such proxies are hard to come by.

Thus, the main difference between the two studies is that they use a much higher level of aggregation. For the purposes of analysing the conjecture made by Boreham et al -- see p. 155 -- this study is adequate.

15. This procedure requires the assumption that a new bond with X years to maturity is a perfect substitute for an (X+Y) year bond issued Y years ago. Conard (16) and Conard and Frankena (17), present evidence that the yield on the former is usually above that on the latter. They did not examine whether this "premium" differed according to the size of X: The bond yields examined are those on very long-term bonds -- around 26 years. See Conard (16) p. 106.

TABLE 1

Proportion of Outstanding Debt that has Been Issued in Currencies Other than Canadian.

Spread Between Canadian and U.S. Federal Government Bond Yield

Year	Federal Government	Provincial Government	Municipal Government	Corporations	CR-USR
	1	2	3	4	5
1955	0.000	0.224	0.187	0.188	0.114
1956	0.000	0.240	0.205	0.200	0.509
1957	0.024	0.224	0.221	0.233	0.800
1958	0.023	0.225	0.237	0.238	0.686
1959	0.012	0.244	0.250	0.237	0.764
1960	0.012	0.232	0.253	0.216	0.923
1961	0.008	0.197	0.229	0.234	0.833
1962	0.014	0.204	0.235	0.256	1.134
1963	0.019	0.218	0.216	0.265	0.840
1964	0.018	0.231	0.220	0.265	0.779
1965	0.018	0.238	0.213	0.266	0.666

Sources: Columns 1 - 4; Table 14, chapter one.
Column 5; CR is the Canadian Rate -- a simple average of the rates SA2 and r_t --see Data and Sources, chapter three . USR is the U.S. rate -- a simple average of U.S. federal government bond yields constructed by R. Sutch (63).

TABLE 2

Regression Equations for Specification One (Equations 1 and 2) and Two (Equations 3 and 4)

Equ. #	Estimation Period	Dependent Variable	Constant	CR-USR	S-F	M	$\sum_i w_i S_{t-i}$	$\bar{R}^2$	See	d w
1	1955Q1-65Q4	Ratio of New Provincial Issues in the U.S. to their Total New Issues	0.20 (0.91)	0.11 (0.85)	-0.62 (-0.03)	-0.00002 (-0.53)		0.00	0.23	1.76
2	1955Q1-65Q4	Ratio of New Corporate Issues in the U.S. to their Total New Issues	-0.28 (-2.01)	0.08 (1.04)	-18.30 (-1.22)	0.00006 (2.61)		0.16	0.15	2.40
3	1955Q1-65Q4	Ratio of New Provincial Issues in the U.S. to their Total New Issues	-0.44 (-0.37)	0.12 (1.00)		-0.00004 (-0.76)	See Graph 5	0.00	0.24	1.78
4	1955Q1-65Q4	Ratio of New Corporate Issues in the U.S. to their Total New Issues	-1.11 (-1.50)	0.14 (1.90)		0.00001 (0.23)	See Graph 6	0.19	0.15	2.46

TABLE 3

Ratio of Serial to Sinking Fund issues by Province.

The last Column gives the Ratio of all Serial to all Sinking Fund Issues by all Provinces.

Year	N	PEI	NS	NB	O	M	S	A	BC	Q	Y	NWT	All
1955	1.34	0.51	3.68	2.28	18.64	1.37	1.89	14.54	2.17	**	*	*	5.47+
1956	1.50	0.62	4.06	2.18	6.31	1.10	1.81	17.07	2.11	**	*	*	4.01+
1957	1.46	0.56	4.62	3.61	4.00	1.19	1.58	20.39	2.15	19.93	*	*	3.91
1958	1.80	0.56	5.35	3.33	3.10	1.14	1.31	22.42	2.11	25.35	*	*	3.48
1959	1.90	0.56	6.34	4.00	2.56	1.18	1.25	25.92	2.10	31.80	*	*	3.21
1960	2.08	0.49	7.41	4.55	2.27	1.13	1.29	27.75	2.15	9.60	*	*	2.93
1961	2.51	0.47	12.30	4.79	2.16	1.34	1.29	34.60	2.18	4.73	*	*	2.78
1962	2.88	0.50	14.06	5.03	2.00	1.68	1.35	37.00	2.36	4.15	*	*	2.70
1963	3.12	0.44	16.55	5.31	1.82	1.94	1.37	37.51	2.57	4.66	*	*	2.65
1964	3.60	0.38	16.94	5.38	1.71	1.90	1.32	38.58	2.70	0.48	*	*	2.14
1965	3.95	0.38	19.70	5.78	1.67	1.84	1.47	41.36	2.86	0.47	*	*	3.00

Source: Table 19, chapter one.

+ These two figures exclude issues by the Province of Quebec. See ** above.

* Yukon and North West Territories do not issue sinking fund debentures.

** The data for these two dates are not reliable.

TABLE 4

Regression Equations for Provinces and Corporations

Pertaining to Section Two C

Equation #	Estimation Period	Dependent Variable	Constant	Spread	CR	$\bar{R}^2$	See	d w
5	1955Q1-65Q4	Ratio of New Provincial Short Issues to their New Long Ones.	0.77 (1.04)	0.41 (1.60)	-0.09 (-0.53)	0.02	0.77	1.81
6	1955Q1-65Q4	Ratio of New Corporate Short Issues to their New Long Ones.	0.64 (5.21)	-0.07 (-1.76)	-0.11 (-4.00)	0.27	0.13	1.46

TABLE 5

Regression Results Pertaining to Section Four

Equation No.	Estimation Period	Dependent Variable	Constant	Z_1	Z_2	Z_3	Z_4	$\bar{R}^2$	SEE	d.w.
7	1955Q1-65Q4*	Canadian Federal Government Bond Yield Under 10 Years	0.34 (0.63)	0.82 [0.11]				0.60	0.48	1.44
8	1955Q1-65Q4+	Same as above	0.69 (0.66)		0.59 [0.17]			0.25	0.68	0.90
9	1955Q1-65Q4	Canadian Federal Government Bond Yield Over 10 Years	-0.24 (-0.97)			0.94 [0.05]		0.90	0.23	0.74
10	1955Q1-65Q4	Same as above	-2.37 (-4.89)				1.19 [0.08]	0.83	0.31	0.90

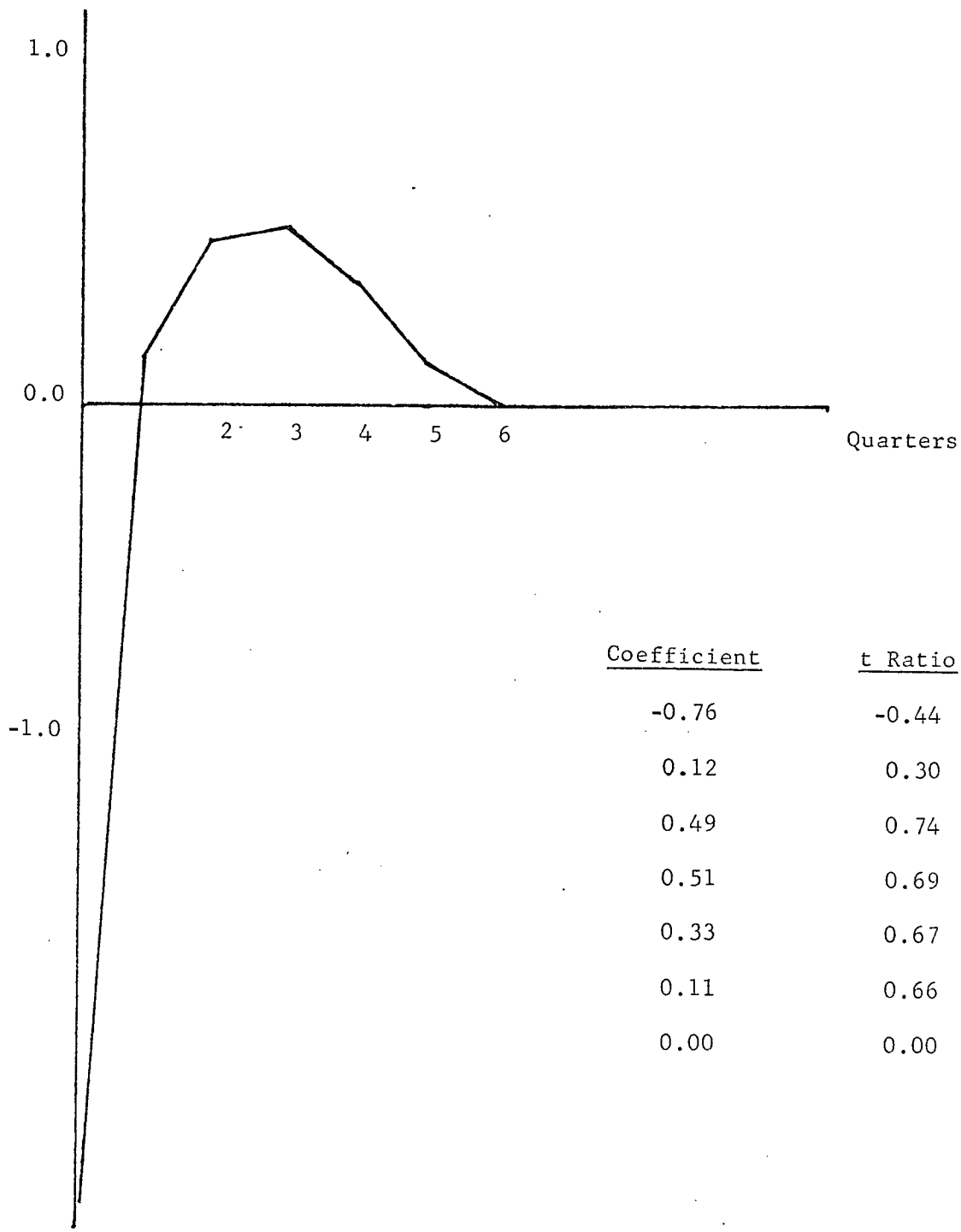
Numbers in rounded brackets are t ratios. Those in square brackets are standard errors.

Z_1 ≡ Bond yield on new provincial issues under 10 years to maturity.
Z_2 ≡ Bond yield on new corporate issues under 10 years to maturity.
Z_3 ≡ Bond yield on new provincial issues over 10 years to maturity.
Z_4 ≡ Bond yield on new corporate issues over 10 years to maturity.

* Excluding the following quarters during which no new provincial issues were made: 55Q2, 55Q4, 56Q2, 64Q4, 65Q1.
+ Excluding the following quarters during which no new corporate issues were made: 55Q2, 57Q3, 58Q1, 59Q1, 62Q4, 64Q2, 64Q3.

GRAPH I

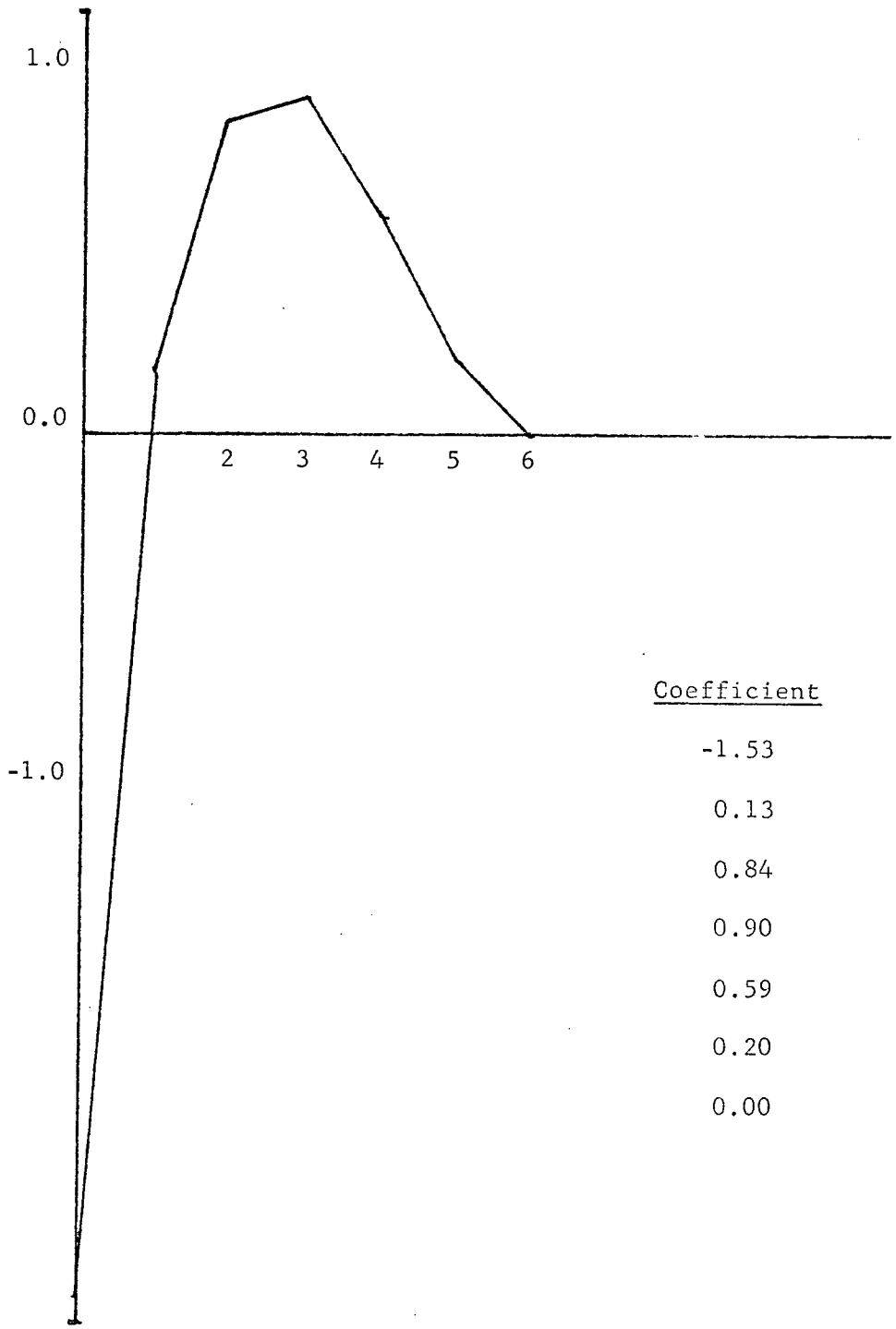
Estimated Weights for Equation 3



Coefficient	t Ratio
-0.76	-0.44
0.12	0.30
0.49	0.74
0.51	0.69
0.33	0.67
0.11	0.66
0.00	0.00

GRAPH 2

Estimated Weights for Equation 4

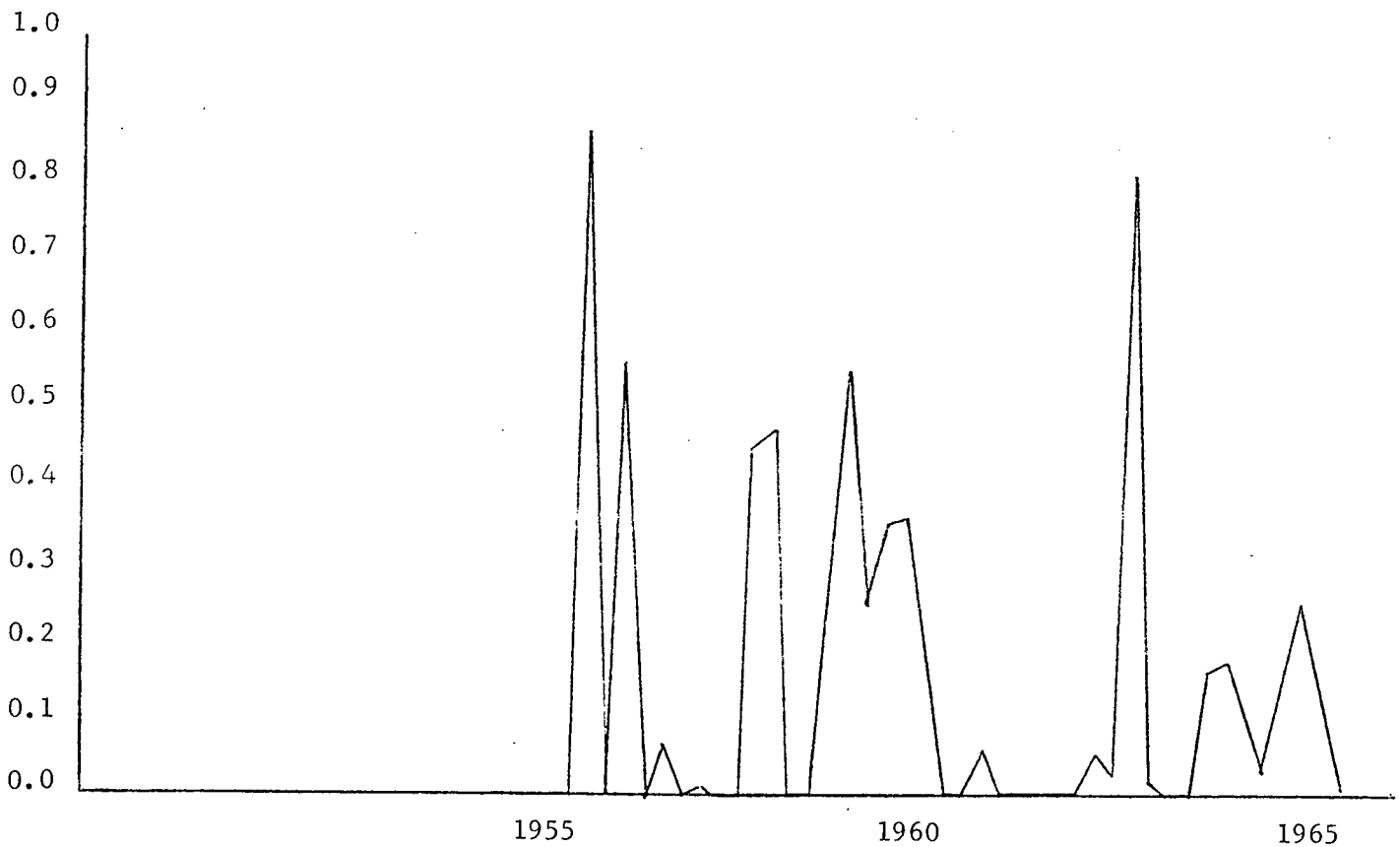


Coefficient	t Ratio
-1.53	-1.40
0.13	0.49
0.84	2.00
0.90	1.93
0.59	1.89
0.20	1.87
0.00	0.00

GRAPH 3

Ratio of New Provincial Issues in the U.S.

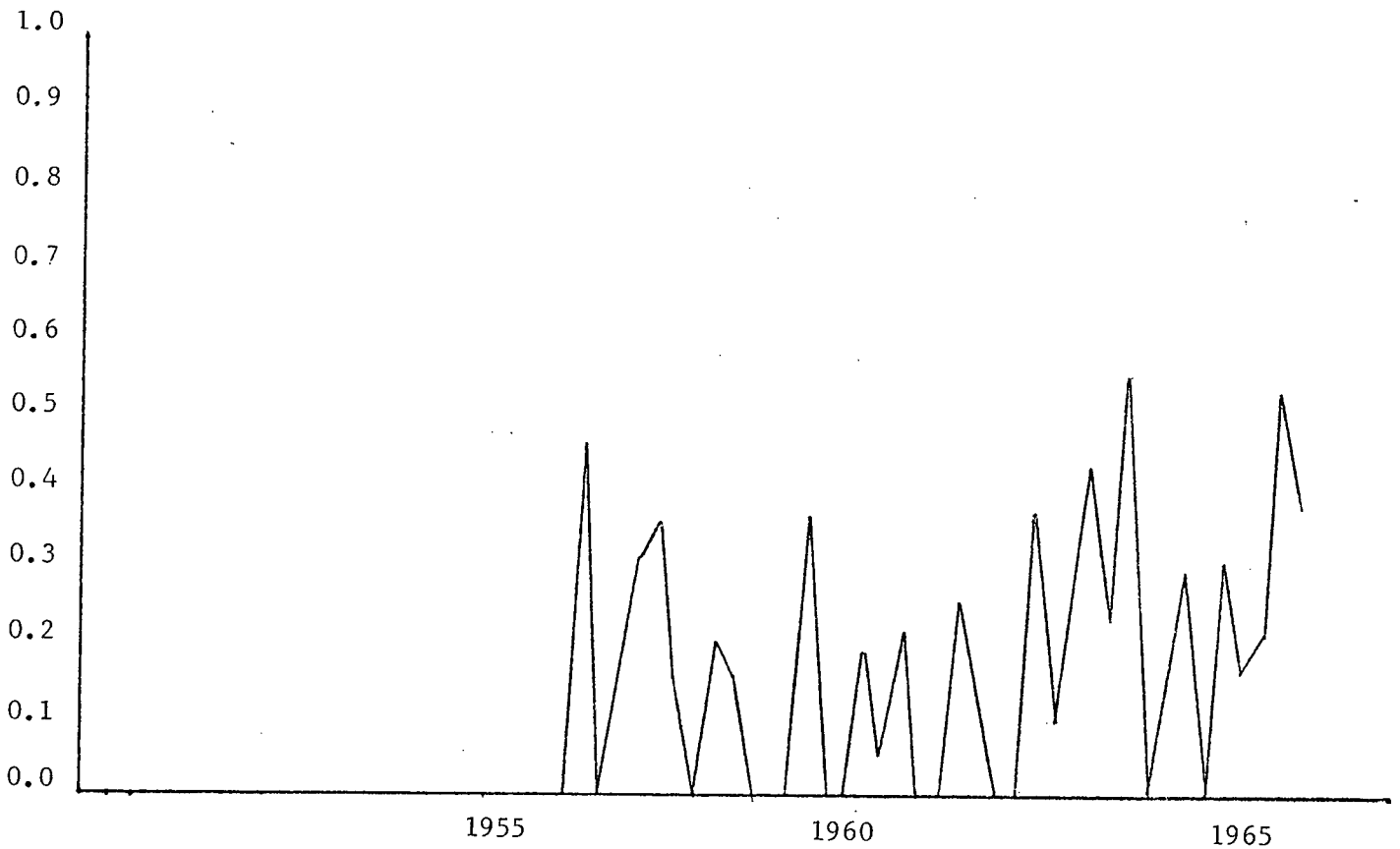
to Their Total New Issues



GRAPH 4

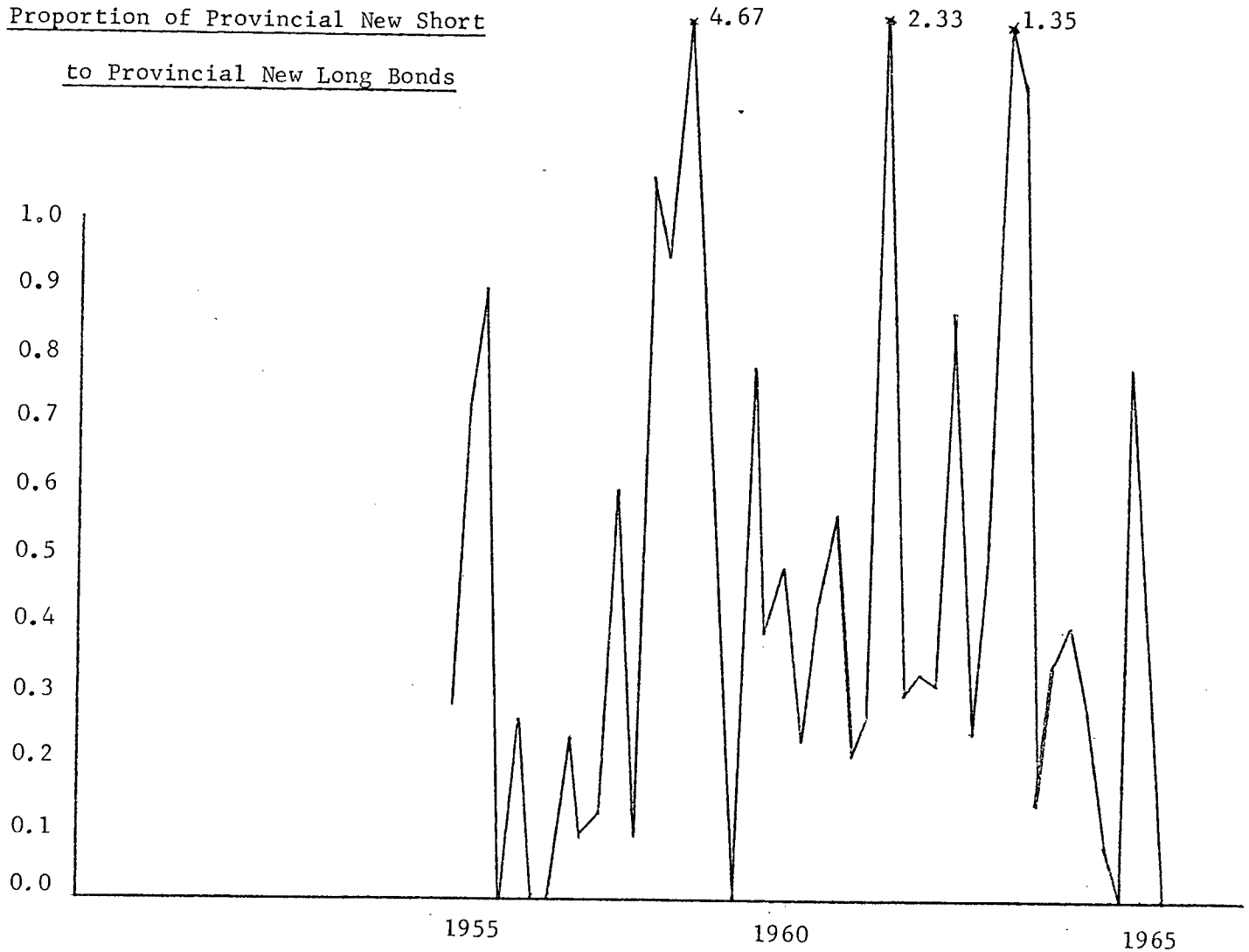
Ratio of New Corporate Issues in the U.S.

to Their Total New Issues



GRAPH 5

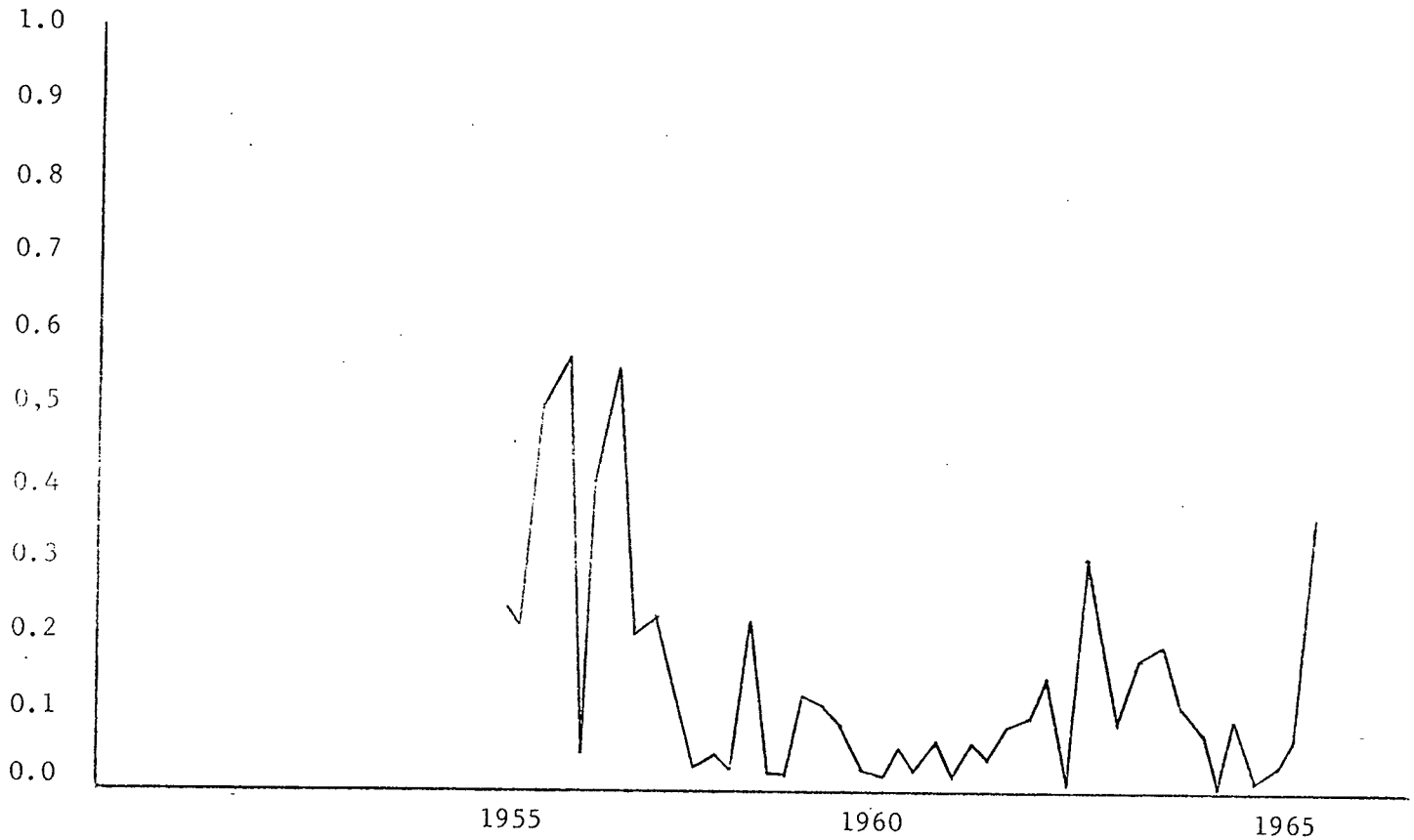
Proportion of Provincial New Short to Provincial New Long Bonds



GRAPH 6

Proportion of Corporate New Short to

Corporate New Long Bonds



CHAPTER FIVE

REAL RESPONSES TO THE CONVERSION LOAN

INTRODUCTORY

In chapter three the effects of the Conversion Loan on the level and term structure of interest rates were examined. In chapter four certain financial responses to the new term structure were investigated. It is now time to look at the effects on aggregate economic activity. It will be recalled from chapter two that important claims have been made about its effects. Specifically, it has been argued that by reducing liquidity the Loan increased the rate of interest, led to a capital account surplus, an exchange rate appreciation and a consequent decrease in economic activity. Barber in fact ventured a guess that GNP would have been higher by an amount in the order of billions of dollars.

In proceeding, no guidance can be had from the studies of Operation Twist. As mentioned on page 213, no one has as yet investigated the claim of its proponents that, for example, it would break the trade-off between unemployment and a sound balance of payments position.

This chapter utilizes published econometric information on the Canadian economy to investigate the effects of the Loan on economic activity. In section one, some "back-of-the-envelope" calculations are presented using information from the Stewart (61) model of the Canadian economy. In section two, the results of simulations using the Bank of Canada RDX2 model (27) are discussed. The final section contains concluding remarks.

SECTION ONE: SOME PRELIMINARY CALCULATIONS

It will be instructive to quantify the arguments suggested in the opening paragraph of this chapter. To that end, the Stewart (61) model[1] is first utilized. In that model, the average term to maturity of the federal debt held by the Public (A) enters the demand for money function much as Barber had argued it should. Estimates of changes in endogenous variables following the increase in A can be had from the table of impact multipliers and his data.[2]

The Conversion Loan increased A by 81 months[3] and hence raised the 3-month Treasury Bill rate (rsc) by 187 basis points. This increase led to a rise in the average yield on Government of Canada securities over 12 years (rlc) of 11 basis points. The exchange rate[4] (ERs) appreciated by $0.008. These are, of course, impact effects.

The impact effects on real variables were as follows. The endogenous components of the national income identity -- in real terms -- are the familiar C, I, X and M.[5] The Loan apparently had no effect on exports and it decreased imports by $7.792 million -- more will be said on this later. Consumption expenditures were decreased by $9.388 million. The Loan, through its effects on rlc, reduced investment very substantially -- by $86.751 million. The sum-total of these changes is $88.347 million, although the effect on real GNP minus accrued net income of farm operators from farm production (Ygnp-nf), as given by the impact multiplier is only $57.429 million.

The above discussion leaves something to be desired. Although impact multipliers take into account the complete interdependence of most variables

in the system they fail to capture effects that manifest themselves with a time-lag. This problem is particularly acute when lagged endogenous -- and to an extent exogenous -- variables play an important role in the model. It may be instructive to illustrate this argument. The equation for rlc is[6]

$$rlc_t = 0.330 + 0.895\ rlc_{t-1} + 0.056\ rsc_t$$

Looking at this equation in isolation from the rest of the model it can be seen that an increase in rsc by 100 basis points will lead to an immediate increase in rlc of only 6 basis points. Such an increase would only discourage investment (I) by $20 million in 1958Q3 -- the rlc_t coefficients in the equations for residential (Irc) and non-residential (Ibc) construction are -33 and -303 respectively, while other components of I are not sensitive to rlc_t. Turning to the long-run form of this equation, obtained by successive substitution of the expression for rlc_{t-i}, i.e.

$$rlc_t = 0.314 + 0.533\ rsc_t$$

it is clear that the ultimate effect on rlc of such a change is 53 basis points. The contractionary effect on I, for example, would now be considerably higher, namely $178 million. Thus, the long-run effect on rlc_t and hence aggregate demand given by the impact multipliers is understated.

The moral is twofold: On the one hand, this model allows no possibility for the authorities to affect the long rate directly -- rlc_t is tied to rsc_t, which is in turn determined in the money market. Since rlc features more prominently than rsc in the real sector of the model, the Stewart model may be underestimating the impact effect of the Conversion Loan. On the other hand,

the impact on real income of the increase in A considered above does not tell the whole story. Further increases in the long rate and decreases in investment can be expected. However, no attempt was made to carry out simulations using the Stewart model. Instead, use was made of another more recent and far more disaggregated model.

SECTION TWO: SIMULATION RESULTS

Two sets of experiments were conducted using the Bank of Canada RDX2 model of the Canadian economy.[7] In the first set, the model was asked to hold the composition of the --exogenous -- federal government debt at levels that might have prevailed in the absence of the Conversion Loan -- three no-Loan hypotheses were examined. The effects of this "shock" on the endogenous variables were calculated over the following thirty quarters and compared to the "control" values of these variables; that is the values predicted by the model given that the Conversion Loan in fact occurred. Thus, a measure of the effect of the Loan on endogenous variables was derived. This simulation showed that the Loan had very weak effects on all variables, primarily because the RDX2 model leaves very little scope for any possible effects from debt management operations on the level and term structure of interest rates. For this reason it was thought fit to introduce some of the results from chapter three of this thesis into the financial sector RDX2. In that chapter, the effects of the Loan on r_S and r_L were derived within the context of a portfolio model. When the predicted -- "control" -- values of r_S and r_L are subtracted from the values for these rates obtained by holding the composition of the debt at the hypothesized levels -- the "shock" values -- the resulting figures

give an indication of the effects of the Loan on interest rates. The shock-control values for interest rates are then incorporated in the equations for such rates in RDX2 and their effects on the rest of the system are traced out through simulation. These simulations indicate that the Conversion Loan had quite substantial effects on real variables. It is noteworthy that in the two sets of simulations the exchange rate was assumed to remain flexible throughout the simulation period. The purpose of this procedure was to avoid imposing upon the model shocks additional to the hypothesized no-Loan ones, such as a structural change of the foreign exchange market. In fact, the control solution for the flexible exchange rate tracks the history of the pegged rate extremely well until 1966Q4 -- this is one reason why we only report simulation results till 1965Q4.

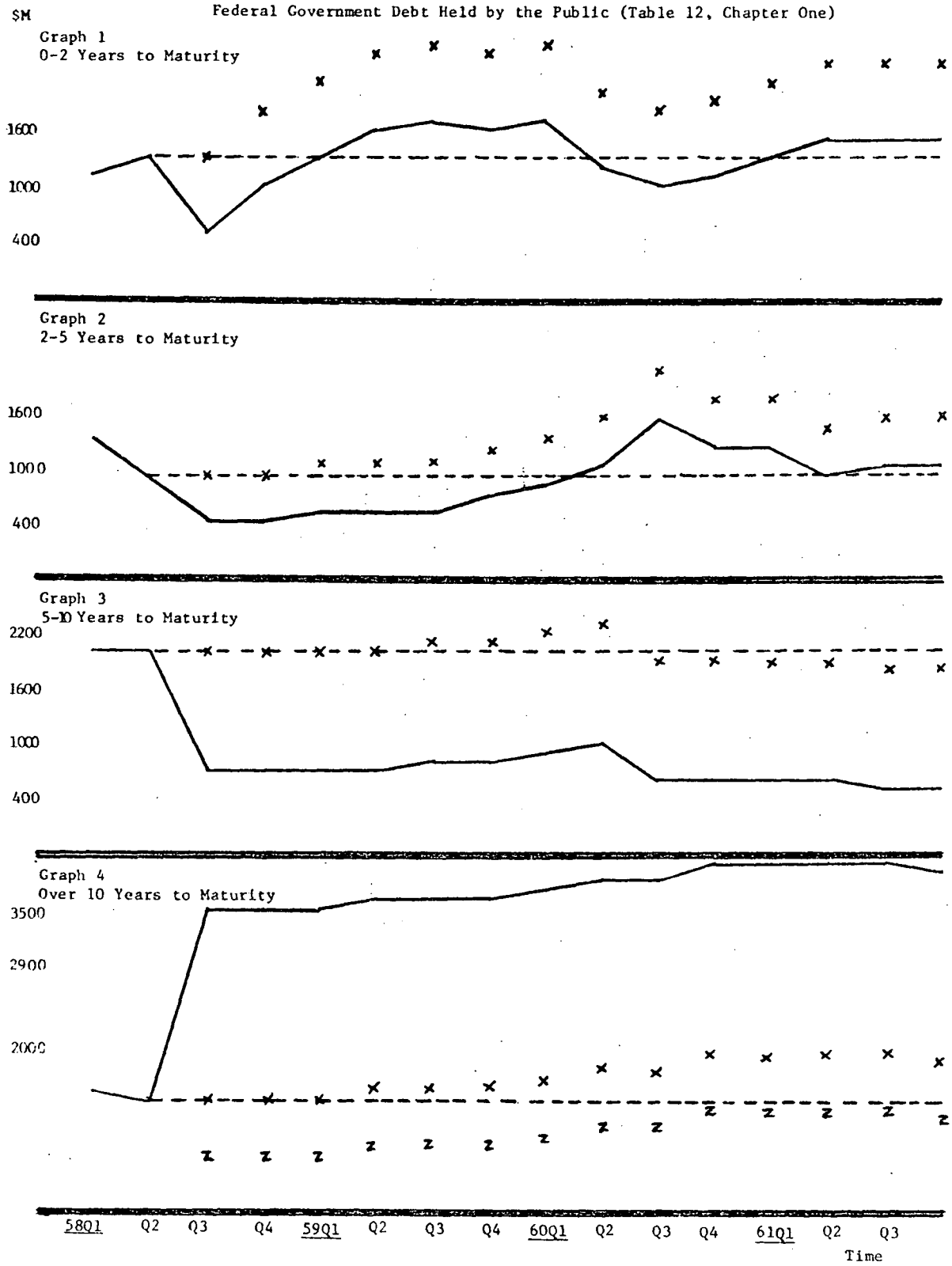
Before giving a detailed account of the results it is necessary to briefly remind the reader of the changes in the composition of the debt that the Conversion Loan brought about and to speculate on what would have happened to it in the absence of the Loan -- this is an essential element of counterfactual methodology. It will be recalled that the composition of direct and guaranteed debt held by non-governmental agencies is not available and so the quantities held by the Public are used instead -- see chapter one, pp. 6-7.

Graphs one to four show the composition of the federal government debt held by the Public between 1958Q1-1961Q4. Looking at Graph 4, it is clear that the Loan simply increased the number of bonds in the over 10 year category -- for the moment ignore all but the solid lines. Graph 3 tells a similar story. Following 1958Q3, there is no appreciable change in the

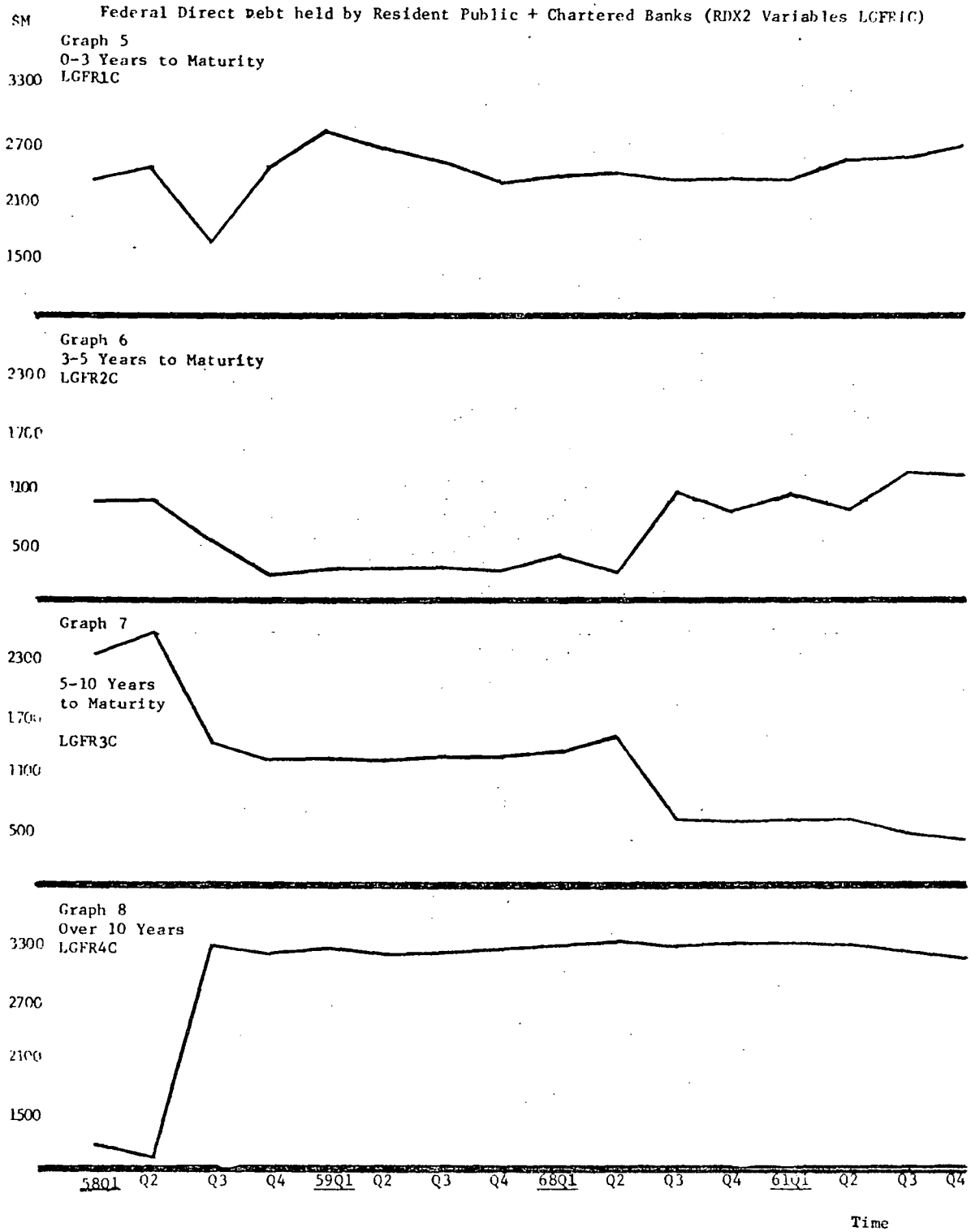
value of bonds in this category until 1960Q3, at which time bonds worth approximately $500 million were reclassified into the 2-5 year category. This change is, of course, reflected in Graph 2 which also shows a small increase in bonds with 2-5 years to maturity during 1959Q4-1960Q3. The picture with bonds under 2 years to maturity is far more complicated. Following the Conversion Loan there was a decrease of bonds in this category. Chapter one showed that this decrease was not nearly as great as would have occurred had the Bank of Canada not sold short bonds -- in order to purchase those long bonds which the Public did not wish to hold at 1958Q3 interest rates. Beyond 1958Q3, bonds in this category increased. In 1958Q4 and 1959Q1 they increased for two reasons. To begin with, the Bank was still reducing its holdings of bonds in this category.[8] Secondly, the total value of 0-2 year bonds was also increased. In 1959Q2, the Bank began increasing its holdings of these bonds, but the larger increase in the totals outstanding raised the value of bonds held by the Public. For the remainder of 1959, changes in Bank holdings and in the totals outstanding just about cancel each other. Beyond 1960Q1, bonds in this category decreased.[9]

It is now necessary to speculate on the alternative course of history, assuming that the Conversion Loan did not occur. In particular, how would the public debt have behaved in the absence of the Loan? Three possibilities are considered:

First No-Loan Hypothesis (NLH1). It is assumed here that in the absence of the Loan the four debt categories would have behaved as they did historically plus a constant adjustment for the shock imposed by the Loan. Since the Loan affected the four categories differently, the adjustments


$M
Federal Government Debt Held by the Public (Table 12, Chapter One)
Graph 1
0-2 Years to Maturity
1600
1000
400
Graph 2
2-5 Years to Maturity
1600
1000
400
Graph 3
5-10 Years to Maturity
2200
1600
1000
400
Graph 4
Over 10 Years to Maturity
3500
2900
2000
58Q1
Q2
Q3
Q4
59Q1
Q2
Q3
Q4
60Q1
Q2
Q3
Q4
61Q1
Q2
Q3
Time

Federal Direct Debt held by Resident Public + Chartered Banks (RDX2 Variables LGFR1C)



also vary. They are +$854 million, +$493 million, +$1340 million and -$2180 million, corresponding to the debt categories under 2 years, 2-5 years, 5-10 years and over 10 years to maturity.[10] The resulting hypothetical time series are indicated by the x's in Graphs 1-4, and they tell what the four debt categories might have been if the Conversion Loan and "other" changes had not occurred. "Other" changes include the price support programme of the Bank of Canada, the response of other governmental agencies[11] and the induced changes in chartered bank portfolios. The results of these "other" responses in terms of pressures felt by the Public were to change the Conversion Loan from a pure debt management operation of $3518 million to a decrease in shorts of $2687 million and an increase in longs of $2180 million[12] -- a "scale effect" and a "shortening effect".

Second No-Loan Hypothesis (NLH2). Had "other" changes been more symmetric in their effects on shorts and longs held by the Public a more pure debt management operation would have been felt "Inside" the system. It is assumed here that longs held by the Public would have increased by $2687 million. The resulting hypothetical time series are exactly the same as in NLH1, except for longs -- indicated by the z's in Graph 4. They tell what the debt composition would have been like had a debt management operation of $2687 million been implemented. This hypothesis eliminates the "shortening effect" that "other" changes brought about. Since the authorities wished to preserve orderly markets, I did not attempt to examine the hypothesis that in the absence of the Loan shorts and longs would have been higher and lower respectively by the full $3518 million.

Third No-Loan Hypothesis (NLH3). It is assumed here that without the Conversion Loan the debt levels would have continued at their 1958Q2 values. The implied time series are indicated by the broken lines in Graphs 1-4.

This is a more naive hypothesis.

Three more points must be raised before discussing the results of the simulations. First, the constraints imposed upon government behaviour by the no-Loan hypotheses: It is implicitly assumed that bonds are issued in order to make the various debt categories implied by the NLH1-3 viable. Also, in the context of the RDX2 model, the no-Loan hypotheses imply that Treasury Bills, which are excluded from the shortest category, become the source of any residual finance dictated by the values of the variables in the model. Second, the short rate r_S in chapter three is the simple average of the RDX2 variables RS, RMS, RML; they correspond to the rates on the three maturity classes 0-3, 3-5, 5-10 years. In the second set of simulations below, the shock-control values for r_S calculated from chapter three equations are used for all three RDX2 variables. Clearly this procedure preserves the relationship between r_S and the three RDX2 variables. Third, there is another problem relating to the difference between variables used in chapter three and the RDX2 model: The relevant data on the composition of the debt used in chapter three were taken from Table 12, chapter one, which excludes chartered bank holdings. The RDX2 series does include chartered bank holdings, but it excludes guaranteed federal issues. The two sets of simulations are now discussed in greater detail.

The first set of simulations made use of the RDX2 model only. The model was asked to set the exogenous levels of the four debt categories equal to those suggested by the three hypotheses NLH1-3 and calculate the resulting shock values of endogenous variables. These were then compared to the control solution values thereby giving a measure of the effects of

the Conversion Loan on endogenous variables. These effects turned out to be minute. Table 1 reports the shock-control values for nominal GNE (YGNE). The Conversion Loan as specified here had no impact on the GNE deflator (PGNE) and hence the values reported are effectively in real terms.[13] Using NLH1, for example, the cumulative effect on YGNE by 1961Q4 is $66.730 million -- the ensuing contractionary cycle reduces this effect to $18.878 million by 1965Q4. The maximum impact in any one quarter never exceeds one tenth of 1% of real GNE.

The results displayed in Table 1 indicate a cyclical response to the shock. There are major cycles -- lasting between fourteen and sixteen quarters -- each containing smaller cyclical patterns. There is also other evidence indicating that the amplitudes of major cycles beyond 1965Q4 may be increasing.

The reason why the results are so negative becomes obvious when we look at the financial sector of the model. The maturity composition of the federal government debt, as distinct from its size and changes in its size, does not feature very prominently in the model. The only place where supply variables are at all important is in equation 17.2 for the long rate, RL. There, the change in the ratio of bonds over ten years to those under three affects the long rate positively.[14] The change brought about by the Loan in this ratio[15] was 1.5394 and the coefficient being 0.0580, the equation predicts that the Loan increased RL by a mere 9 basis points. It is noteworthy that beyond 1958Q3 there is no scope for equation 17.2 to increase the predicted RL through the ratio in question, since this ratio in fact declined. Conducting the same exercise using equations 23 and 25 of chapter

three, provides insight into the distinctly different nature of the results in the second set of simulations reported below. Equations 23 and 25 predict that the Loan increased the long rate in 1958Q3 by 106 and 103 basis points respectively.

The substantive issue is not whether equation 17.2 in RDX2 is in an overall sense better or worse than equations 23 and 25 of chapter three. Rather, the point is that equation 17.2 offers no scope for debt management to affect the level and term structure of interest rates. It was, therefore, thought desirable to incorporate some of the features of equations 22 to 25, chapter three, into the equations for RS, RMS, RML, and RL in RDX2. Equations 22 to 25 were first used to establish what the short and long rates, r_S and r_L, would have been under the no-Loan hypotheses discussed above. Then the federal debt categories were again held at levels consistent with NLH1-3 in order to derive "shock" solutions for the endogenous variables in RDX2. Finally, the intercepts in the equations for RS, RMS, RML, RL were altered so that the shock-control values for these variables were equal to those calculated using equations 22 to 25. In this step, the shock values of interest rates were exogenized. Since r_S is the simple average for RS, RMS, and RML, the shock-control values of these variables are all equal. This simulation then answers the question: How would the economy have behaved under a no-Loan hypothesis, if equations 22 and 23, or 24 and 25, correctly estimate the effects of debt management on the level and term structure of interest rates? Equations 22 to 25, chapter three, are reproduced below for the readers convenience:

[22] $r_S = -2.394 + 0.186Y - 0.257M + 0.091S + 0.073L$

[23] $r_L = 1.471 + 0.129Y - 0.174M + 0.008S + 0.057L$

[24] $r_S = 1.983 + 0.129Y - 0.164M + 0.001S + 0.015L$

[25] $r_L = 2.024 + 0.102Y - 0.124M - 0.008S + 0.036L$

Since there are two equations for each of r_S and r_L and three no-Loan hypotheses, six simulations were carried out. The superscript A denotes use of equations 22 and 23 to construct shock-control values for r_S and r_L, while superscript B denotes use of equations 24 and 25. The effects of the no-Loan hypotheses (NLH) on the term structure of interest rates are reported in Tables 2 and 3. Table 4 shows the effects of the Conversion Loan on YGNE under the six NLH, while Table 5 the effects on UGNE*, where

$$UGNE^* = \frac{\text{Shock-Control UGNE}}{\text{Control UGNE}} \times 100 \text{ , and } UGNE = \frac{YGNE}{PGNE} .$$

Tables 6-9 and 10-13 report in greater detail the results of two out of the six simulations conducted, namely $NLH1^A$ and $NLH1^B$.

The impact effect of the Loan on GNE given by row 1 of Table 4 is remarkably similar in all simulations, ranging between \$41.945-\$57.969 million, or 0.391-0.537% of $UGNE^*$-- Table 5. However, over a longer period, different results are reported. In terms of their implications for the effects of the Conversion Loan on UGNE*, the A simulations rank as follows: NLH3 > NLH2 > NLH1. The reasons are provided in Tables 2 and 3 which give the impact of the NLH on RS, RMS, RML and RL. NLH2 implies a bigger change in longs than NLH1. Given the coefficients for S and L in equations 22 and 23, NLH2 implies a greater decrease in RL and a smaller increase in the

three short rates than NLH1. Hence its effects on real income are larger. Turning to NLH3, although its impact on RL is always smaller than that of NLH2, it has a very different effect on r_S: As Graphs 1 and 2 show, NLH3 implies that for long periods of time the Conversion Loan increased the quantities of bonds with less than 5 years to maturity! When the 5 - 10 year category is included, NLH3 still posits an increase in shorts, but a much smaller one. This results in a lower r_S and is, of course, expansionary. Turning to the B simulations, the pattern is NLH2 > NLH1 > NLH3. Whereas in equation 22 the S coefficient is greater than the L coefficient, the opposite is true in 24. This means that without the Conversion Loan r_S would have been lower. Since NLH2 decreases L by more than NLH1 does, this source of expansion is stronger in NLH2. This is also the reason why NLH2 has a greater impact on r_L than NLH1, despite the fact that the difference between the S and L coefficients in [23] exceeds absolutely that in [25] -- they are -0.049 and -0.042 respectively. NLH1 has a greater impact on GNE than NLH3 because it lowers r_L more: The negative coefficient on S in [25] reinforces the tendency of r_L to fall under NLH1; but since NLH3 posits a considerably smaller increase in shorts, it yields a milder overall reduction in r_L.

Turning to another cross-classification, note that $NLH1^B > NLH1^A$ and $NLH2^B > NLH2^A$. The reason is again the configuration of S and L coefficients in [22] and [24]. The latter equation implies lower r_S without the Conversion Loan which is expansionary. However, $NLH3^A > NLH3^B$. This arises because of the assumed small increase in S: It does not reinforce the tendency under a NLH of r_L to fall given the -0.008 coefficient on S in [25];

nor does it counteract the strong negative effect on r_S, imparted by the large 0.073 coefficient on L in [22],with the even larger 0.091 coefficient on S in the same equation. The simulation results for $NLH1^A$ and $NLH1^B$ will now be discussed in greater detail. These are probably the two most interesting simulations.

Tables 6 - 9 report on $NLH1^A$. Table 6 shows that under this hypothesis short rates are higher and RL is lower. The large number of interest rates in RDX2 are interconnected and a decrease in RL decreases the conventional mortgage rate (RMC). The effects on the supply price of capital (RHO) are more complex. Under a NLH lower long rates initially reduce RHO. An intuitive explanation is as follows. Given that the relative supplies of real capital and government debt are unchanged, a shock that reduces RL increases the desirability of real capital in portfolios. The market ensures that the existing stocks of government debt are held by reducing RHO. The reduction in RHO is checked and, after 1961, reversed by the increase in corporate profits, inflationary expectations and the rise in the market value of capital assets brought about by increased economic activity under $NLH3^A$. The supply price of capital in real terms (RHOR) declines throughout the simulation period because of the substantial increases in inflationary expectations (PCPICE) during 1961 - 1964 -- Table 7, column 5.

Table 7 displays some of the consequences of exogenizing RS, RMS, RML and RL in the shock simulations. Given the reaction function,[16] the shock increase in RS is effected with a reduction in chartered bank personal (ABLP) and business and miscellaneous general loans (ABLB), which is in turn caused

by a reduction in Bank of Canada deposits held by chartered banks (ABBCD) -- Table 7, columns 1 and 3, 1958 and parts of 1959. As time elapses, the need for tight monetary policy is obviated by the growth in government debt, the increases in the consumer price index (PCPI) and the growth of RS itself. In fact, after 1959Q2 ABBCD and hence ABLB increase. The credit availability variable, RABEL -- column 2, Table 7 -- behaves somewhat more erratically.

The real sector feels the expansionary forces very early -- Table 8. The initial decrease in RHOR stimulates most components of consumption. With the subsequent improvement in incomes, further induced increases in consumption demand occur until the end of 1963. The most powerful increase in aggregate demand comes from the rise in business investment in machinery, equipment and inventories, and the increases in residential and non-residential construction -- their sum is shown in column 2, Table 8. The rise in these demand components is due to the rise in consumption, the decrease in RL, RHO and RMC, the increased credit availability after 1959Q1 and the increased loans to business after 1959Q3.

Export demand stimulates the economy only moderately but trade as a whole (X-M) is contractionary until the end of 1961. Despite the increase in short rates implicit in $NLH1^{A}$, capital inflows (UBAL-XBAL$) decrease throughout all but a few quarters in the simulation period. The balance of payments surplus (UBAL) decreases until 1961Q3, but despite this the exchange rate (PFX) appreciates slightly during 1958 and 1959. During 1960 and 1961 the increased economic activity maintains imports at a high level, thereby keeping the current account (XBAL$) in the red despite an exchange rate

depreciation of as much as 7 cents in 1962Q4. Beyond 1962 the current account surplus stimulates aggregate demand, but it is not long before these injections are swamped by the contractionary cycle that sets in.

It is noteworthy that this account of the significance of the openness of the Canadian economy is essentially different from that in the conventional wisdom on the effects of the Loan -- recall that the Loan is felt to have led to a capital account surplus which appreciated the exchange rate, led to a current account deficit, which in turn brought about a depression.

Under $NLH1^A$ this argument is valid only during 1962Q1 - 1964Q4. Columns 3 and 4 of Table 8 indicate the effect of the no-Loan hypothesis on exports and imports in real terms. Column 5 in that table gives the effect on gross private real business product. Table 9 documents these effects on trade and capital flows in nominal terms, as well as those on PFX and the 90-day forward rate PFXF.

The effects of the expansion in the labour market are summarized by the unemployment rate(RNU) -- column 5, Table 6. It shows that the maximum effect of $NLH1^A$ occurs in 1960Q4, when the unemployment rate is lowered by 2.083%. Figures not shown indicate that gains in employment were secured despite increases in the labour force -- induced by higher wage rates. Average weekly hours worked also increase.

After 1961 RHO increases and by 1963Q2 decreases in investment and consumption set in -- columns 1 and 2, Table 8 -- reversing the expansionary

cycle. The ensuing cycle is not complete by the end of the simulation period. Here, as in the first set of simulations minor cyclical fluctuations exist within the major cycles.

Tables 10 - 13 document the results from $NLH1^B$. Although the results are in many respects similar, some interesting differences exist. For reasons already indicated, $NLH1^B$ implies a decrease in short rates -- column 1, Table 10. As can be seen from column 1, Table 11, this assumption about short rates does not call for tight monetary policy and so it increases the expansionary impact of $NLH1^B$. Of course this greater effectiveness calls for an earlier increase in RHO -- shock-control RHO becomes positive in 1959Q4 under $NLH1^B$. With lower short rates under $NLH1^B$, capital inflows are lower, at least during the early part of the simulation period, and despite a smaller current account deficit the exchange rate depreciates throughout 1958Q3 - 1965Q2.

This last observation is even less favourable to conventional wisdom than the analogous one under $NLH1^A$. Although the Conversion Loan did attract hot capital and appreciate PFX, its contractionary nature checked the tendency of the current account to be in deficit!

Remarks made earlier on concerning the cyclical nature of the results apply here too. It is rather unfortunate that the length of the major cycles did not make it possible to get a more precise idea about the stability of the model. It appears unlikely that the length of these cycles is a simple function of the size of the shock imposed: Simulation $NLH1^B$ was conducted

reducing the shock-control values of RS, RMS, RML and RL to one tenth of what they originally were. The expansionary cycle in YGNE finished in exactly the same quarter -- 1964Q1 -- and the size of the shock-control YGNE values were greater than one tenth of those appearing in column 2, Table 4.

SECTION THREE: CONCLUSIONS

A: CONCLUSIONS FOR CHAPTER FIVE

Several somewhat different estimates of the effects of the Conversion Loan on economic activity have been presented. It is now time to draw some informal tentative conclusions on this score. I will concern myself only with effects on GNP (or GNE), as one proxy for economic welfare.

It will be recalled that the following estimates of the effects of the Loan on GNE have been given. For 1958Q3 only, the impact effects predicted by the Stewart model are in the region of $61 - 94 million.[17] Turning to the RDX2 model, the first set of simulations, using RDX2 only, yield estimates around $4 million -- Table 1 -- while the second set of simulations, using RDX2 plus chapter three, yield the range $42 - 58 million -- Table 4. In view of the substantial lags in RDX2 the Stewart range does not appear unreasonable and so the figure of $60 million -- or roughly 0.6% of GNE --

is chosen.

Beyond 1958Q3 the effects become by all accounts stronger. In Table 1, the effect very nearly doubles while in Table 4 it ranges around three times the impact effect -- the range there is \$117 - 163 million. $NLH1^A$ and $NLH1^B$ report an average loss in GNE of \$126 million. Recalling the back-of-the-envelope long-run effect on I in the Stewart model of \$178 million, infuses more credibility to this result. Thus, in the last two quarters of 1958 approximately 1% of GNE was lost because of the Conversion Loan.

Any statements made for the effects of the Conversion Loan beyond 1958 are made with considerable apprehension. In Table 1 the effect of NLH1 stays roughly at its 1958Q4 level until 1961. In Table 4, $NLH1^A$ and $NLH1^B$ indicate that it increases to about five times its 1958Q4 level until at least the end of 1961, declining thereafter. Thus, the loss in YGNE during this period increases to around 5% in 1961Q1, declining beyond that date -- $NLH1^A$, Table 4, is used.

The figures given by $NLH1^A$ are probably more reasonable than those by $NLH1^B$ because the latter compounds the effects of the Conversion Loan with those of a monetary expansion -- indicated in column 1, Table 11. Whereas $NLH1^A$ permits some monetary expansion this is not as serious as in $NLH1^B$, though it still results in some overestimation of the Conversion Loan and "other" changes <u>per se</u>. It should also be remembered that we have only been able to report on part of one of the major cycles that NLH bring about: The cumulative effect of the Loan is not equal to the sum of the positive entries

under column 1, Table 4. However, Barber's guess that

> "An addition to out GNP amounting to several billion dollars has been lost forever."[18]

is not outside the realm of possibility.

Finally, it should be remembered that the Conversion Loan without the "shortening effect" of the price support programme of the Bank of Canada would have had considerably greater effects -- perhaps as high as the 7% indicated by $NLH2^A$, or $NLH2^B$, in 1961Q1?

B. CONCLUDING COMMENTS

In chapter one of this thesis the problem at hand was extensively discussed. Chapter two surveyed existing literature on the problem and found that the following questions had, in some cases, not been posed and certainly not answered. These questions were:

i) Did the Loan significantly increase interest rates?

ii) Did the Loan alter the term structure of interest rates? If so, what are the determinants of the term structure?

iii) Following changes in interest rates, did borrowers such as provinces municipalities and corporations change their issuing patterns in an attempt to minimize costs?

iv) Was the Loan contractionary?

v) How much GNP was "lost forever"?

vi) If the Conversion Loan was contractionary, what were the channels

through which this was brought about?

The answers to them were given in chapters 3, 4 and 5 and are as follows:

i) When time trends have been accounted for, there is evidence that long rates rose and some evidence that short ones declined.

ii) Hence, the Loan did affect the term structure. There is unquestionable evidence that the composition of the federal government debt affects the term structure of interest rates. Other determinants are expectations, monetary policy and the behaviour of chartered banks, transactions requirements, private sector wealth and the U.S. term structure.

iii) Although the proportion of new short issues to new long ones and also the proportion of total new issues made in U.S. funds do vary, little success must be reported on attempts to determine just how these ratios vary. These ratios have also defied several other investigators.

iv) The Loan was certainly contractionary.

v) The effects of the Loan on GNE during 1958 are estimated at 1% of GNE, increasing to possibly 5% during 1959 to 1961, decreasing thereafter. The cumulative contractionary impact on YGNE by 1964Q4 exceeds $10 billion, but the expansionary part of the first cycle decreases this figure.

vi) Contrary to conventional wisdom, the Loan was contractionary not so much because it affected our trading position, but because high interest rates discouraged investment.

vii) More generally, the Canadian authorities -- unlike the U.S. authorities -- <u>can</u> "twist" the yield curve. They can also use monetary policy to determine the level of interest rates. Such policies can have real effects. However, it is not so obvious that the authorities can also break the trade-off between employment and the balance of payments: The import component of Canadian production is rather substantial.

NOTES TO CHAPTER FIVE

1. Stewart's model was chosen for various reasons. First, it is not very disaggregated so that a quick intuitive grasp of how it works can be developed. Second, the specification of the various equations is very much in line with Canadian economic thinking during the 1950's. A good example of this is the specification of the money market, noted below. Third, Stewart publishes his data.

2. See Stewart (61), pp. 163 - 172 and 121 - 131 respectively.

3. See Stewart (61), p. 121, column 1.

4. Throughout this chapter the exchange rate is defined as the amount of Canadian dollars required to buy one U.S. dollar.

5. That is, consumption ($\equiv$ Cd + Cnd + Cs), investment ($\equiv$ Ibc + Ime + Irc + Iinv-nf), exports ($\equiv$ Xgs) and imports ($\equiv$ Mgs).

6. See Stewart (61), equation 33, p. 115.

7. I wish to gratefully acknowledge John Helliwell's very substantial help in constructing the simulations and John Lester's work at the U.B.C. Computing Centre.

8. See Tables 8 and 13, chapter one.

9. Graphs 5 - 8 show that the RDX2 variables for the composition of the federal government debt behave almost exactly like those of chapters one and three -- compare Graphs 1 - 4 with Graphs 5 - 8.

10. These numbers are suggested by Table 12, chapter one -- compare 1958Q2 with 1958Q3. The corresponding numbers for the RDX2 data are very similar indeed, namely +$784 million, +$402 million, +$1172 million and -$2221 million.

11. See chapter one, p. 5.

12. The real counterpart of these numbers is $27.776 million and $22.484 million respectively.

13. The list of variables at the end of this chapter defines all RDX2 variables mentioned. A more detailed discussion of some interrelationships in RDX2 appears in connection with the second set of simulations below.

14. The coefficient on this variable is not significant at the 5% level.

15. The RDX2 data series for the various debt categories were used here.

16. Equation 17.1 in RDX2.

17. In the Stewart model price indeces are used with 1957 as the base year. However, price indeces in the RDX2 model use 1961 as the base year. In order to make the GNP figures comparable, the impact effects given in section one -- i.e. $57.429 million and $88.347 million -- were multiplied by $\frac{106.6}{100.0}$. The value 106.6 corresponds to the average value during 1961 of the GNP deflator (pgnp) in the Stewart model -- see Stewart (61), p. 127.

18. See Barber (4), p. 3.

RDX2 VARIABLES REFERRED TO IN THIS CHAPTER

ABBCD = Bank of Canada deposits held by chartered banks -- millions of current dollars.

ABLB = Chartered bank business and miscellaneous general loans -- millions of current dollars.

ABLP = Chartered bank personal loans -- millions of current dollars.

C = CNDSD + CS + CMV + CDO, where

- CNDSD = Consumer expenditure on non-durables and semi-durables -- millions of 1961 dollars.
- CS = Consumer expenditure on services -- millions of 1961 dollars.
- CMV = Consumer expenditure on motor vehicles and parts -- millions of 1961 dollars.
- CDO = Consumer expenditure on durables, excluding CMV -- millions of 1961 dollars.

I = IME + INRC + IRC

- IME = Business investment in machinery and equipment -- millions of 1961 dollars.
- INRC = Business investment in non-residential construction -- millions of 1961 dollars.
- IRC = Business investment in residential construction -- millions of 1961 dollars.

IIB = Change in non-farm business inventories -- millions of 1961 dollars.

M = Imports of goods and services -- millions of 1961 dollars.

PCPI = The consumer price index -- 1961 = 1.00.

PCPICE = Expected annual rate of change in PCPI.

PFX = Spot exchange rate -- Canadian dollars per $1 U.S.

RDX2 VARIABLES (CONTINUED)

PFXF = 90-day forward exchange rate -- Canadian dollars per $1 U.S.

PGNE = Price deflator for gross national expenditure -- 1961 = 1.00.

RABEL = Earning liquid asset ratio of chartered banks.

RHO = An approximation to the nominal supply price of capital -- % per annum.

RHOR = RHO - PCPICE.

RL = Average yield on Government of Canada bonds, over 10 years -- % per annum.

RMC = Conventional mortgage rate -- % per annum.

RML = Average yield on Government of Canada bonds, 5 - 10 years -- % per annum.

RMS = Average yield on Government of Canada bonds, 3 - 5 years -- % per annum.

RNU = The unemployment rate -- %.

RS = Average yield on Government of Canada bonds, 0 - 3 years -- % per annum.

UBAL = Net balance of payments on current and long-term capital account -- millions of current Canadian dollars.

UGNE = Gross national expenditure -- millions of 1961 dollars.

UGPP = Gross private business product, excluding agriculture and non-commercial services -- millions of 1961 dollars.

X = Exports of goods and services -- millions of 1961 dollars.

XBAL$ = Net balance on current account -- millions of current Canadian dollars.

YGNE = Gross national expenditure -- millions of current dollars.

TABLE 1

Effects of the Conversion Loan on YGNE

Shock-Control Values (i.e. No Loan minus Conversion Loan Values)

	NLH1	NLH2	NLH3
1958Q3	3.715	4.191	3.719
Q4	6.176	7.039	5.898
1959Q1	6.254	7.238	5.504
Q2	7.023	8.203	5.852
Q3	5.734	6.828	4.270
Q4	5.934	7.145	4.441
1960Q1	5.703	6.953	4.379
Q2	5.211	6.383	4.129
Q3	6.070	7.297	5.227
Q4	5.148	6.258	3.996
1961Q1	3.574	4.426	2.477
Q2	2.758	3.488	1.410
Q3	2.141	2.793	0.484
Q4	1.289	1.855	-0.461
1962Q1	-0.109	0.188	-1.984
Q2	-0.539	-0.297	-2.383
Q3	-0.953	-0.730	-3.098
Q4	-2.082	-2.012	-4.457
1963Q1	-2.395	-2.566	-3.637
Q2	-3.348	-3.703	-4.344
Q3	-3.664	-4.199	-3.867
Q4	-4.582	-5.324	-4.562
1964Q1	-4.434	-5.227	-3.965
Q2	-4.785	-5.754	-3.875
Q3	-5.379	-6.512	-4.555
Q4	-5.098	-6.293	-3.859
1965Q1	-3.863	-4.914	-2.336
Q2	-3.195	-4.234	-1.191
Q3	-2.367	-3.352	-0.121
Q4	-1.059	-1.910	1.426

TABLE 2

Shock-Control Values for RS, RMS, RML

Generated by Equations 22-25

	NLH1[A]	NLH1[B]	NLH2[A]	NLH2[B]	NLH3[A]	NLH3[B]
1958Q3	0.886	-0.309	0.500	-0.389	0.886	-0.309
Q4	0.886	-0.309	0.500	-0.389	0.533	-0.305
1959Q1	0.886	-0.309	0.500	-0.389	0.078	-0.317
Q2	0.886	-0.309	0.500	-0.389	-0.251	-0.329
Q3	0.886	-0.309	0.500	-0.389	-0.394	-0.324
Q4	0.886	-0.309	0.500	-0.389	-0.394	-0.317
1960Q1	0.886	-0.309	0.500	-0.389	-0.723	-0.338
Q2	0.886	-0.309	0.500	-0.389	-0.731	-0.352
Q3	0.886	-0.309	0.500	-0.389	-0.557	-0.351
Q4	0.886	-0.309	0.500	-0.389	-0.413	-0.366
1961Q1	0.886	-0.309	0.500	-0.389	-0.497	-0.365
Q2	0.886	-0.309	0.500	-0.389	-0.515	-0.365
Q3	0.886	-0.309	0.500	-0.389	-0.518	-0.355
Q4	0.886	-0.309	0.500	-0.389	-0.352	-0.347
1962Q1	0.886	-0.309	0.500	-0.389	-0.399	-0.344
Q2	0.886	-0.309	0.500	-0.389	-0.551	-0.352
Q3	0.886	-0.309	0.500	-0.389	-1.245	-0.286
Q4	0.886	-0.309	0.500	-0.389	-0.707	-0.336
1963Q1	0.886	-0.309	0.500	-0.389	-0.745	-0.349
Q2	0.886	-0.309	0.500	-0.389	-0.681	-0.361
Q3	0.886	-0.309	0.500	-0.389	-0.458	-0.340
Q4	0.886	-0.309	0.500	-0.389	-0.455	-0.337
1964Q1	0.886	-0.309	0.500	-0.389	-0.477	-0.326
Q2	0.886	-0.309	0.500	-0.389	-0.551	-0.333
Q3	0.886	-0.309	0.500	-0.389	-0.592	-0.330
Q4	0.886	-0.309	0.500	-0.389	-0.411	-0.316
1965Q1	0.886	-0.309	0.500	-0.389	-0.366	-0.308
Q2	0.886	-0.309	0.500	-0.389	-0.126	-0.293
Q3	0.886	-0.309	0.500	-0.389	-0.160	-0.293
Q4	0.886	-0.309	0.500	-0.389	-0.075	-0.248

A: Equations 22 and 23 were used for shock-control r_S and r_L.

B: Equations 24 and 25 were used for shock-control r_S and r_L.

TABLE 3

Shock-Control Values for RL

Generated by Equations 22-25

	NLH1[A]	NLH1[B]	NLH2[A]	NLH2[B]	NLH3[A]	NLH3[B]
1958Q3	-1.059	-1.032	-1.361	-1.222	-1.059	-1.032
Q4	-1.059	-1.032	-1.361	-1.222	-1.062	-0.977
1959Q1	-1.059	-1.032	-1.361	-1.222	-1.124	-0.955
Q2	-1.059	-1.032	-1.361	-1.222	-1.186	-0.954
Q3	-1.059	-1.032	-1.361	-1.222	-1.173	-0.920
Q4	-1.059	-1.032	-1.361	-1.222	-1.150	-0.901
1960Q1	-1.059	-1.032	-1.361	-1.222	-1.240	-0.923
Q2	-1.059	-1.032	-1.361	-1.222	-1.291	-0.964
Q3	-1.059	-1.032	-1.361	-1.222	-1.278	-0.982
Q4	-1.059	-1.032	-1.361	-1.222	-1.323	-1.043
1961Q1	-1.059	-1.032	-1.361	-1.222	-1.325	-1.031
Q2	-1.059	-1.032	-1.361	-1.222	-1.326	-1.028
Q3	-1.059	-1.032	-1.361	-1.222	-1.290	-0.998
Q4	-1.059	-1.032	-1.361	-1.222	-1.254	-0.995
1962Q1	-1.059	-1.032	-1.361	-1.222	-1.247	-0.981
Q2	-1.059	-1.032	-1.361	-1.222	-1.281	-0.985
Q3	-1.059	-1.032	-1.361	-1.222	-1.081	-0.705
Q4	-1.059	-1.032	-1.361	-1.222	-1.231	-0.918
1963Q1	-1.059	-1.032	-1.361	-1.222	-1.280	-0.953
Q2	-1.059	-1.032	-1.361	-1.222	-1.319	-0.996
Q3	-1.059	-1.032	-1.361	-1.222	-1.235	-0.961
Q4	-1.059	-1.032	-1.361	-1.222	-1.222	-0.951
1964Q1	-1.059	-1.032	-1.361	-1.222	-1.185	-0.916
Q2	-1.059	-1.032	-1.361	-1.222	-1.214	-0.929
Q3	-1.059	-1.032	-1.361	-1.222	-1.204	-0.914
Q4	-1.059	-1.032	-1.361	-1.222	-1.146	-0.894
1965Q1	-1.059	-1.032	-1.361	-1.222	-1.115	-0.876
Q2	-1.059	-1.032	-1.361	-1.222	-1.048	-0.859
Q3	-1.059	-1.032	-1.361	-1.222	-1.053	-0.857
Q4	-1.059	-1.032	-1.361	-1.222	-0.887	-0.732

A: Equations 22 and 23 were used for shock-control r_S and r_L.

B: Equations 24 and 25 were used for shock-control r_S and r_L.

TABLE 4

Effects of the Conversion Loan on YGNE

Shock-Control Values (i.e. No Loan minus Conversion Loan Values)

	NLH1[A]	NLH1[B]	NLH2[A]	NLH2[B]	NLH3[A]	NLH3[B]
1958Q3	41.945	46.457	57.969	55.566	41.949	46.461
Q4	116.527	135.449	163.480	161.547	118.629	133.121
1959Q1	187.324	223.598	266.297	266.734	198.789	216.137
Q2	274.719	338.379	397.453	404.016	309.805	323.797
Q3	350.148	450.813	521.285	541.195	426.641	425.062
Q4	421.980	544.004	630.027	654.078	538.035	506.254
1960Q1	453.273	596.258	683.055	716.375	615.848	551.168
Q2	483.324	651.219	739.504	784.426	708.164	599.898
Q3	519.926	722.008	813.551	876.398	828.324	667.484
Q4	570.906	777.297	886.828	948.004	929.105	723.598
1961Q1	555.828	751.555	858.590	918.785	936.578	704.871
Q2	576.125	775.918	888.008	953.129	997.645	733.832
Q3	588.270	792.047	905.445	976.406	1049.145	755.336
Q4	595.980	775.617	904.855	961.379	1052.676	741.465
1962Q1	524.668	655.105	780.078	814.699	928.098	630.418
Q2	545.281	659.891	800.926	822.336	956.730	635.695
Q3	554.094	651.215	804.297	812.730	967.473	613.793
Q4	534.645	591.691	756.004	742.539	921.855	544.559
1963Q1	441.801	437.223	588.559	547.703	744.305	395.055
Q2	434.523	395.762	551.160	493.582	727.949	352.988
Q3	409.125	329.543	485.258	409.684	681.313	295.441
Q4	350.012	227.098	370.426	278.680	540.785	199.332
1964Q1	254.047	83.953	204.285	93.945	314.641	62.480
Q2	210.797	-8.273	108.883	-23.957	186.703	-25.984
Q3	143.680	-124.051	- 16.117	-169.973	24.730	-145.418
Q4	68.883	-225.074	-129.824	-291.695	-142.246	-251.027
1965Q1	-9.062	-307.652	-235.246	-395.066	-310.629	-333.121
Q2	- 69.563	-403.066	-340.957	-514.215	-476.863	-431.805
Q3	-137.121	-500.895	-453.652	-635.758	-663.605	-535.387
Q4	-194.809	-549.086	-520.891	-690.066	-812.469	-597.105

A: Equations 22 and 23 were used for shock-control r_S and r_L.

B: Equations 24 and 25 were used for shock-control r_S and r_L.

TABLE 5

Effects of the Conversion Loan on UGNE*

Shock-Control Values (i.e. No Loan minus Conversion Loan Values)

	NLH1[A]	NLH1[B]	NLH2[A]	NLH2[B]	NLH3[A]	NLH3[B]
1958Q3	0.391	0.427	0.537	0.510	0.391	0.426
Q4	1.210	1.343	1.663	1.601	1.228	1.320
1959Q1	2.091	2.379	2.908	2.836	2.202	2.297
Q2	2.776	3.251	3.923	3.878	3.084	3.107
Q3	3.028	3.679	4.367	4.399	3.588	3.464
Q4	3.903	4.698	5.601	5.613	4.776	4.363
1960Q1	4.494	5.535	6.506	6.601	5.852	5.102
Q2	4.479	5.642	6.552	6.728	6.267	5.184
Q3	4.007	5.183	5.929	6.189	6.074	4.789
Q4	4.710	5.890	6.846	7.042	7.242	5.489
1961Q1	4.898	6.102	7.070	7.299	7.853	5.750
Q2	4.563	5.629	6.514	6.741	7.534	5.371
Q3	4.031	4.933	5.688	5.909	6.853	4.773
Q4	4.080	4.652	5.559	5.587	6.719	4.536
1962Q1	3.702	3.935	4.861	4.730	6.044	3.886
Q2	3.402	3.390	4.341	4.072	5.426	3.368
Q3	2.788	2.594	3.447	3.104	4.320	2.486
Q4	2.641	1.986	2.968	2.362	3.791	1.796
1963Q1	2.163	1.074	2.032	1.216	2.818	0.891
Q2	1.775	0.451	1.316	0.413	2.124	0.290
Q3	1.256	-0.128	0.557	-0.315	1.319	-0.197
Q4	0.787	-1.087	-0.501	-1.592	0.039	-1.098
1964Q1	0.322	-1.840	-1.379	-2.590	-1.224	-1.822
Q2	0.012	-2.280	-1.926	-3.175	-2.056	-2.223
Q3	-0.305	-2.559	-2.336	-3.539	-2.706	-2.521
Q4	-0.808	-3.334	-3.247	-4.558	-4.079	-3.307
1965Q1	-1.069	-3.595	-3.598	-4.896	-4.828	-3.594
Q2	-1.287	-3.793	-3.887	-5.154	-5.434	-3.804
Q3	-1.390	-3.683	-3.863	-4.994	-5.614	-3.725
Q4	-1.795	-4.110	-4.458	-4.188	-6.827	-4.220

A: Equations 22 and 23 were used for shock-control r_S and r_L.

B: Equations 24 and 25 were used for shock-control r_S and r_L.

TABLE 6

Conversion Loan Effects Under NLH1[A]

Shock-Control Values (i.e. No Loan minus Conversion Loan Values)

	RS, RMS, RML	RL	RMC	RHO	RNU
1958Q3	0.886	-1.059	-0.127	-0.872	-0.084
Q4	0.886	-1.059	-0.233	-0.802	-0.296
1959Q1	0.886	-1.059	-0.313	-0.706	-0.578
Q2	0.886	-1.059	-0.374	-0.582	-0.936
Q3	0.886	-1.059	-0.424	-0.443	-1.253
Q4	0.886	-1.059	-0.461	-0.300	-1.573
1960Q1	0.886	-1.059	-0.490	-0.190	-1.808
Q2	0.886	-1.059	-0.507	-0.107	-1.990
Q3	0.886	-1.059	-0.509	-0.047	-2.049
Q4	0.886	-1.059	-0.503	-0.015	-2.083
1961Q1	0.886	-1.059	-0.495	-0.010	-2.016
Q2	0.886	-1.059	-0.482	-0.020	-1.887
Q3	0.886	-1.059	-0.468	-0.029	-1.676
Q4	0.886	-1.059	-0.458	-0.011	-1.394
1962Q1	0.886	-1.059	-0.452	0.008	-1.041
Q2	0.886	-1.059	-0.447	0.062	-0.675
Q3	0.886	-1.059	-0.448	0.138	-0.340
Q4	0.886	-1.059	-0.452	0.204	0.061
1963Q1	0.886	-1.059	-0.459	0.230	0.438
Q2	0.886	-1.059	-0.468	0.211	0.826
Q3	0.886	-1.059	-0.480	0.143	1.156
Q4	0.886	-1.059	-0.494	0.069	1.524
1964Q1	0.886	-1.059	-0.512	0.018	1.728
Q2	0.886	-1.059	-0.527	-0.035	1.910
Q3	0.886	-1.059	-0.545	-0.105	1.993
Q4	0.886	-1.059	-0.564	-0.203	2.107
1965Q1	0.886	-1.059	-0.584	-0.298	2.030
Q2	0.886	-1.059	-0.602	-0.424	1.940
Q3	0.886	-1.059	-0.621	-0.574	1.823
Q4	0.886	-1.059	-0.640	-0.717	1.729

NLH1[A]: NLH1 when equations 22 and 23 are used.

TABLE 7

Conversion Loan Effects Under NLH1[A]

Shock-Control Values (i.e. No Loan minus Conversion Loan Values)

	ABBCD	RABEL	ABLB	PCPI	PCPICE
1958Q3	-3.323	-0.544	-3.128	0.000	-0.002
Q4	-6.645	-0.483	-10.712	0.000	-0.006
1959Q1	-6.347	-0.209	-17.368	-0.001	-0.012
Q2	-3.958	0.153	-19.197	-0.001	-0.015
Q3	0.686	0.271	-11.673	0.000	-0.007
Q4	3.960	0.337	5.725	0.001	0.014
1960Q1	8.261	0.216	36.036	0.002	0.046
Q2	7.283	-0.478	84.691	0.004	0.084
Q3	4.587	-0.683	114.824	0.006	0.123
Q4	8.738	-0.442	122.426	0.009	0.155
1961Q1	10.172	-0.560	122.911	0.011	0.184
Q2	7.602	-0.629	123.734	0.014	0.212
Q3	8.609	-0.478	117.953	0.016	0.243
Q4	10.092	-0.289	106.738	0.018	0.289
1962Q1	9.083	-0.158	100.559	0.020	0.354
Q2	15.406	0.256	97.723	0.022	0.433
Q3	21.205	0.405	98.508	0.024	0.515
Q4	22.755	0.305	100.930	0.025	0.590
1963Q1	19.357	0.128	111.371	0.026	0.648
Q2	21.947	-0.062	115.555	0.027	0.682
Q3	17.651	-0.109	108.543	0.027	0.685
Q4	15.166	-0.201	90.844	0.026	0.655
1964Q1	7.819	-0.354	71.984	0.026	0.596
Q2	2.919	-0.423	40.555	0.025	0.515
Q3	-7.301	-0.649	-0.141	0.023	0.416
Q4	-18.532	-0.814	-52.168	0.021	0.307
1965Q1	-25.412	-0.768	-106.613	0.018	0.194
Q2	-29.650	-0.536	-183.055	0.015	0.082
Q3	-42.613	-0.742	-258.137	0.013	-0.024
Q4	-52.557	-0.627	-329.937	0.010	-0.125

NLH1[A]: NLH1 when equations 22 and 23 are used.

TABLE 8

Conversion Loan Effects under NLH1[A]

Shock-Control Values (i.e. No Loan minus Conversion Loan Values)

	C	I + IIB	X	M	UGPP
1958Q3	-25.692	27.737	-0.656	4.823	38.059
Q4	37.241	68.791	-4.390	31.741	109.844
1959Q1	80.811	131.212	-8.339	55.151	174.672
Q2	138.092	185.953	-14.307	90.802	249.992
Q3	161.816	241.560	-20.487	108.021	310.656
Q4	202.844	281.722	-17.199	123.248	366.195
1960Q1	186.920	322.678	-13.117	114.725	387.711
Q2	201.757	324.312	-10.049	115.036	405.191
Q3	195.920	308.366	-0.203	94.969	418.379
Q4	224.665	305.614	7.164	102.444	442.410
1961Q1	197.493	290.257	16.416	79.575	425.867
Q2	208.799	254.730	29.100	70.222	423.949
Q3	189.400	213.886	51.270	48.957	410.973
Q4	200.573	186.567	45.404	48.625	390.059
1962Q1	150.709	148.440	46.149	16.295	332.684
Q2	140.755	112.013	61.691	1.301	324.965
Q3	112.584	83.976	85.809	-9.183	309.570
Q4	102.685	61.217	66.540	-16.781	264.559
1963Q1	51.502	39.922	58.922	-40.722	200.195
Q2	32.465	-5.142	75.098	-58.908	174.137
Q3	16.179	-38.744	96.406	-55.837	141.633
Q4	-0.043	-72.163	72.113	-73.629	74.188
1964Q1	-36.408	-88.930	61.610	-86.715	19.148
Q2	-59.381	-140.088	74.542	-108.007	-15.172
Q3	-77.580	-170.780	89.166	-99.962	-56.410
Q4	-112.683	-188.882	65.728	-118.345	-114.191
1965Q1	-134.067	-183.242	52.370	-125.983	-138.805
Q2	-156.844	-217.296	61.491	-138.244	-173.473
Q3	-149.031	-241.398	69.830	-119.538	-207.008
Q4	-166.789	-254.517	52.148	-138.962	-242.957

NLH1[A]: NLH1 when equations 22 and 23 are used.

TABLE 9

Conversion Loan Effects Under NLH1[A]

Shock-Control Values (i.e. No Loan minus Conversion Loan Values)

	UBAL	XBAL$	UBAL-XBAL$	PFX	PFXF
1958Q3	-109.367	-3.212	-106.155	-0.007	-0.005
Q4	-133.935	-32.469	-101.466	-0.011	-0.010
1959Q1	-157.626	-58.851	-98.775	-0.013	-0.012
Q2	-188.241	-97.629	-90.612	-0.012	-0.011
Q3	-202.397	-120.338	-82.059	-0.007	-0.007
Q4	-206.330	-133.288	-73.042	-0.001	-0.001
1960Q1	-187.784	-125.337	-62.447	0.007	0.007
Q2	-162.265	-125.501	-36.764	0.016	0.017
Q3	-123.229	-94.340	-28.889	0.026	0.026
Q4	-117.096	-93.826	-23.270	0.035	0.036
1961Q1	-75.849	-65.788	-10.061	0.044	0.045
Q2	-36.413	-45.876	9.463	0.051	0.053
Q3	18.473	1.470	17.003	0.057	0.059
Q4	8.784	-1.265	10.049	0.063	0.064
1962Q1	32.765	29.740	3.025	0.066	0.068
Q2	58.477	61.855	-3.378	0.068	0.070
Q3	65.166	100.635	-35.469	0.069	0.072
Q4	64.663	89.485	-24.822	0.069	0.071
1963Q1	54.503	101.627	-47.124	0.068	0.071
Q2	89.862	138.361	-48.499	0.066	0.069
Q3	92.676	162.098	-69.422	0.064	0.066
Q4	76.231	156.506	-80.275	0.060	0.063
1964Q1	72.516	158.836	-86.320	0.057	0.059
Q2	98.864	195.659	-96.795	0.052	0.055
Q3	112.112	205.723	-93.611	0.047	0.050
Q4	52.365	198.050	-145.685	0.043	0.045
1965Q1	60.432	191.695	-131.263	0.038	0.041
Q2	55.036	213.691	-158.655	0.034	0.036
Q3	54.513	205.542	-151.029	0.030	0.032
Q4	36.301	204.166	-167.869	0.026	0.028

NLH1[A]: NLH1 when equations 22 and 23 are used.

TABLE 10

Conversion Loan Effects Under NLH1[B]

Shock-Control Values (i.e. No Loan minus Conversion Loan Values)

	RS, RMS, RML	RL	RMC	RHO	RNU
1958Q3	-0.309	-1.032	-0.133	-0.813	-0.101
Q4	-0.309	-1.032	-0.246	-0.689	-0.354
1959Q1	-0.309	-1.032	-0.333	-0.527	-0.695
Q2	-0.309	-1.032	-0.396	-0.319	-1.139
Q3	-0.309	-1.032	-0.435	-0.104	-1.557
Q4	-0.309	-1.032	-0.457	0.102	-1.952
1960Q1	-0.309	-1.032	-0.472	0.259	-2.255
Q2	-0.309	-1.032	-0.477	0.375	-2.500
Q3	-0.309	-1.032	-0.470	0.458	-2.605
Q4	-0.309	-1.032	-0.459	0.506	-2.616
1961Q1	-0.309	-1.032	-0.447	0.519	-2.497
Q2	-0.309	-1.032	-0.430	0.507	-2.304
Q3	-0.309	-1.032	-0.414	0.485	-2.019
Q4	-0.309	-1.032	-0.401	0.483	-1.602
1962Q1	-0.309	-1.032	-0.392	0.470	-1.090
Q2	-0.309	-1.032	-0.383	0.488	-0.556
Q3	-0.309	-1.032	-0.383	0.520	-0.075
Q4	-0.309	-1.032	-0.389	0.539	0.522
1963Q1	-0.309	-1.032	-0.398	0.506	1.082
Q2	-0.309	-1.032	-0.409	0.410	1.660
Q3	-0.309	-1.032	-0.427	0.244	2.144
Q4	-0.309	-1.032	-0.450	0.084	2.675
1964Q1	-0.309	-1.032	-0.477	-0.048	2.973
Q2	-0.309	-1.032	-0.502	-0.192	3.247
Q3	-0.309	-1.032	-0.532	-0.364	3.382
Q4	-0.309	-1.032	-0.565	-0.558	3.523
1965Q1	-0.309	-1.032	-0.596	-0.738	3.365
Q2	-0.309	-1.032	-0.624	-0.937	3.192
Q3	-0.309	-1.032	-0.655	-1.142	2.976
Q4	-0.309	-1.032	-0.686	-1.324	2.730

NLH1[B]: NLH1 when equations 24 and 25 are used.

TABLE 11

Conversion Loan Effects under NLH1[B]

Shock-Control Values (i.e. No Loan minus Conversion Loan Values)

	ABBCD	RABEL	ABLB	PCPI	PCPICE
1958Q3	6.677	0.677	0.992	0.000	0.001
Q4	18.619	1.262	7.625	0.000	0.004
1959Q1	28.385	1.656	29.787	0.000	0.009
Q2	42.604	2.053	74.131	0.001	0.021
Q3	54.882	2.213	140.820	0.002	0.046
Q4	66.885	2.068	227.043	0.004	0.082
1960Q1	75.043	1.851	331.336	0.006	0.126
Q2	80.325	0.461	471.085	0.009	0.176
Q3	82.569	-0.230	576.777	0.013	0.233
Q4	88.523	-0.523	632.664	0.017	0.290
1961Q1	87.992	-0.809	658.924	0.020	0.352
Q2	86.467	-1.193	689.019	0.024	0.416
Q3	85.872	-1.365	682.059	0.028	0.483
Q4	83.438	-1.048	645.527	0.031	0.560
1962Q1	75.547	-1.113	608.480	0.034	0.649
Q2	79.094	-0.830	588.941	0.036	0.743
Q3	77.729	-0.456	557.824	0.038	0.830
Q4	70.222	-0.661	514.527	0.039	0.904
1963Q1	64.856	-0.699	481.824	0.040	0.954
Q2	62.539	-0.607	450.832	0.040	0.974
Q3	56.524	-0.578	406.355	0.040	0.953
Q4	50.166	-0.572	350.914	0.039	0.888
1964Q1	39.115	-0.290	300.801	0.037	0.784
Q2	36.503	-0.195	243.086	0.035	0.647
Q3	25.246	-0.604	187.977	0.031	0.488
Q4	9.465	-0.775	118.402	0.027	0.315
1965Q1	-0.036	-0.682	46.992	0.023	0.136
Q2	-1.824	-0.321	-45.680	0.019	-0.041
Q3	-18.382	-0.566	-130.137	0.014	-0.209
Q4	-26.153	-0.484	-211.277	0.010	-0.368

NLH1[B]: NLH1 when equations 24 and 25 are used.

TABLE 12

Conversion Loan Effects under NLH1[B]

Shock-Control Values (i.e. No Loan minus Conversion Loan Values)

	C	I + IIB	X	M	UGPP
1958Q3	-25.958	25.718	0.591	-0.779	41.223
Q4	35.940	66.260	3.166	22.590	121.105
1959Q1	74.770	135.808	5.873	44.379	197.629
Q2	128.011	196.705	11.392	74.086	290.719
Q3	150.890	264.133	21.795	95.511	374.934
Q4	190.994	325.327	22.782	121.264	437.082
1960Q1	180.065	380.791	27.234	115.745	473.242
Q2	197.621	384.401	40.463	115.307	506.516
Q3	197.350	370.945	65.354	100.830	537.219
Q4	229.035	382.090	55.420	119.878	549.371
1961Q1	209.209	359.704	56.249	92.089	527.184
Q2	220.586	304.983	76.130	76.435	520.898
Q3	196.822	247.330	108.037	51.156	501.941
Q4	200.703	212.524	80.944	52.046	443.328
1962Q1	144.480	146.118	71.778	6.421	353.148
Q2	121.942	85.576	90.478	-18.171	323.473
Q3	81.680	42.312	118.234	-31.928	287.836
Q4	54.419	1.797	82.792	-45.689	197.332
1963Q1	-7.400	-43.030	67.484	-76.729	95.227
Q2	-44.558	-107.556	82.788	-101.854	37.203
Q3	-66.656	-157.183	100.772	-97.080	-26.383
Q4	-103.904	-209.273	69.057	-125.622	-133.230
1964Q1	-142.729	-238.682	54.411	-136.941	-207.840
Q2	-182.502	-304.705	62.403	-163.967	-274.078
Q3	-198.092	-346.741	67.897	-150.216	-344.000
Q4	-251.703	-374.724	46.244	-178.097	-415.063
1965Q1	-261.703	-361.408	31.184	-179.089	-421.598
Q2	-290.414	-394.226	34.399	-188.703	-473.527
Q3	-267.498	-420.444	32.153	-160.823	-518.824
Q4	-291.191	-427.901	23.666	-185.725	-535.699

NLH1[B]: NLH1 when equations 24 and 25 are used.

TABLE 13

Conversion Loan Effects under NLH1[B]

Shock-Control Values (i.e. No Loan minus Conversion Loan Values)

	UBAL	XBAL$	UBAL - XBAL$	PFX	PFXF
1958Q3	-105.126	0.252	-105.378	0.005	0.004
Q4	-127.177	-20.937	-106.240	0.011	0.010
1959Q1	-148.378	-41.586	-106.792	0.017	0.016
Q2	-167.710	-68.442	-99.268	0.025	0.024
Q3	-173.818	-78.544	-95.274	0.034	0.033
Q4	-186.879	-102.307	-84.572	0.044	0.042
1960Q1	-163.234	-97.363	-65.871	0.054	0.053
Q2	-117.007	-87.235	-29.772	0.064	0.063
Q3	-53.263	-43.640	-9.623	0.073	0.072
Q4	-58.119	-67.758	9.639	0.082	0.080
1961Q1	-5.013	-43.796	38.783	0.088	0.087
Q2	61.294	-8.324	69.618	0.092	0.092
Q3	140.092	57.388	82.704	0.094	0.094
Q4	110.878	35.651	75.227	0.095	0.095
1962Q1	135.327	70.194	65.133	0.093	0.094
Q2	170.697	117.434	53.263	0.090	0.090
Q3	174.512	163.814	10.698	0.085	0.086
Q4	167.745	143.734	24.011	0.079	0.080
1963Q1	137.786	155.045	-17.259	0.072	0.073
Q2	172.884	199.812	-26.928	0.064	0.065
Q3	156.077	218.019	-61.942	0.056	0.056
Q4	131.967	216.226	-84.259	0.047	0.048
1964Q1	111.118	213.111	-101.993	0.038	0.039
Q2	122.572	251.329	-128.757	0.030	0.030
Q3	112.578	242.853	-130.275	0.021	0.021
Q4	23.873	245.885	-222.012	0.014	0.014
1965Q1	36.421	233.171	-196.750	0.007	0.007
Q2	0.143	243.800	-243.657	0.002	0.002
Q3	-22.599	210.963	-233.562	-0.002	-0.003
Q4	-37.237	223.632	-260.869	-0.005	-0.006

NLH1[B]: NLH1 when equations 24 and 25 are used.

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APPENDIX TO CHAPTER TWO

STUDIES OF "OPERATION TWIST"

The early 1960's found the U.S. with a balance of payments deficit and high unemployment. It was then suggested by President Kennedy's economic advisers that the familiar trade-off could be dodged. This was to be achieved with the aid of "Operation Twist".[1] The Federal Reserve was to sell short securities and buy long ones, thereby increasing short and decreasing long rates. The increase in short rates would forestall capital outflows and perhaps reverse them, while leaving inventory investment practically unaffected. The decrease in long rates would bring about an increase in long-term and hence overall investment, and, therefore, income and employment. It was also hoped that the increase in long-term investment would, through increased productivity, improve the competitive position of U.S. merchandise abroad. At the risk of repetition it must be emphasized that OT was not an attempt to shift yield curves per se. Its ultimate aim was to avoid the familiar trade-off. In the words of one Government official,

> "My own thesis is that all these commitments[2] can be met, that they need not, as some would have it, be mutually contradictory; but that with determined effort they can become instead... mutually reinforcing."[3]

Was OT successful? A decade has elapsed since then. Yet, remarkably, no study has attempted to examine the rather bold claims of those supporting it. We still cannot give the old trade-off a decent burial for fear

it might still be alive. But let us be more specific. What existing studies do is to try to establish whether the term structure has been twisted. It should be clear that while this issue may logically precede others it is not the end of the road: We still have to know whether twisting the yield curve will, in fact, improve the balance of payments at no cost to domestic employment. Nevertheless, looking at the effects on the term structure is a good starting point.

An early paper by Roosa (53) does little more than make the assertions presented in the second paragraph above. Okun's CMC study (49) does not deal with OT explicitly, though it does present quantitative evidence indicating that debt management[4] is practically ineffective. His conclusion has been challenged by Scott (55) who would attribute more importance to it when a more sensitive measure of average maturity is used. Ross (54) argues that by overlooking the interest elasticity of short term, inventory, investment the effects of OT have been exaggerated. Modigliani and Sutch (44) examine the extent to which the term structure has been twisted. They give the following figures: In 1961Q1, the spread between the government long rate and the bill rate was +1.48% and that between A_{aa} corporate bonds and the commercial short paper +1.26%. In 1965Q3, by contrast, the former was down to +0.35% and the latter to +0.12%. This would appear to be impressive evidence suggesting that OT did twist the yield curve. But, though they do not discuss this, their data show that, aside from the spread, the actual level of both the long-term government bond rate and the A_{aa} one were higher in 1965Q3 than in 1961Q1. The reason that Modigliani and Sutch advance for withholding judgment on this score is that, in

recovery, such as presumably 1965Q3, the spread usually becomes more narrow. The question then is what part of the decreased spread was due to recovery and what, if any, to OT? This is not an easy question to answer. They advance an hypothesis explaining the spread between the two rates and estimate the functional form that their hypothesis[5] suggests, using data prior to the OT period. Then they predict the spread for the OT period and find that, although the actual spread, after OT was initiated, was always below the computed one[6] the difference was not very large. In another equation the authors add a dummy variable that takes on the value of 1 after 1962 to allow for the introduction of negotiable Time Certificates of Deposit.[7] This shifts the predicted spread line down so that actual spread is usually above the computed one. In their conclusion it is stated that

> "The spread between long and short rates in the government market since the inception of OT was on average some twelve base points below what one might infer from the pre-OT relation. This discrepancy seems to be largely attributable to the successive increase in the ceiling rate under Regulation Q which enabled the newly invented CD's to exercise their maximum influence."[8]

The remaining papers are not as important and can be dealt with briefly. Holland (30) simply runs regressions to "explain" the U.S. government long-term bond yield index and that on three-month TB's, using 1953 - 1961 data. Little justification can be found for the inclusion of particular variables in his equations. Also, although R^2 is generally high, many of the variables are insignificant and some have the wrong signs. Nevertheless these equations are used to predict the two rates for

1962 - 1964. The predictions for the long rate are very good, indicating that OT did not succeed in making them lower than they would be, but the predicted short rate lies below the actual one, thus indicating some degree of success for OT. Modigliani and Sutch presented further evidence on the effectiveness of DM in a more recent paper (45). Again using the Preferred Habitat Theory of the term structure they introduce additional independent variables, such as average maturity and the proportion of a particular term in total government debt, in an attempt to evaluate the importance of DM. They argue that they do not expect such measures to be very effective because almost all the variance in the long rate is explained by the current and lagged values of the bill rate. Indeed, they find little evidence substantiating the importance of DM. Malkiel examines, in a thorough manner,[9] the implementation of the project, i.e. the size of Treasury operations and the concurrent activities of the Federal Reserve. It has been argued that the combined activities of those institutions resulted in changes in the maturity composition of the federal debt that were not consistent with declared policy objectives, namely OT.[10] Malkiel points out that, while the average term to maturity did indeed increase during OT, there was also a substantial increase in short-term issues -- less than 6 months to maturity -- outstanding. Thus, the overall effect on the term structure would depend on the relative magnitude of the increase in long and short rates needed to accommodate the increases in both long and very short maturities. This appears to exhaust the studies that deal in a fairly direct manner with OT.

NOTES FOR APPENDIX TO CHAPTER TWO

1. Hereafter referred to as OT.

2. These commitments are listed immediately above the quotation and include, among others, balance of payments equilibrium along with a high growth and employment rate.

3. Roosa (53), p. 2.

4. Hereafter referred to as DM.

5. They argue that the term structure is determined according to the Preferred Habitat Hypothesis. The empirical formulation of the model typically takes the form

$$R_t = a + br_t + \sum_{i=1}^{n} c_i r_{t-i} + U_t$$

where $R_t \equiv$ Long Rate at t; $r_t \equiv$ Bill Rate at t and n is determined by the data. More on this appears in chapter three.

6. OT is effective.

7. Abbreviated to CD's.

8. Modigliani and Sutch (44), p. 196.

9. See Malkiel (39), pp. 232 - 233.

10. Johnson, for example, writes

> "As a result, primarily of Treasury funding operations, the maturity of the debt in public hands has in fact been lengthened appreciably, instead of shortened as the policy would require."

See Johnson (33), p. 286.