DEMAND FOR GOVERNMENT OF CANADA DEBT

AN ANALYSIS OF THE DEMAND FOR GOVERNMENT OF CANADA MARKETABLE DEBT

BY

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ABSTRACT

The primary objective of this thesis is to provide a systematic analysis of the portfolio behaviour of the principal holders of Government of Canada securities, particularly insofar as these latter securities are concerned. The main non-government participants in the market for these securities are categorized as chartered banks, non-bank financial institutions, which are further subdivided into deposit-type and insurance-type institutions, and non-financial corporations. Since institutional and legal considerations differ considerably with respect to their impact on the investment behaviour of the groups studied, these aspects are examined in varying degrees of detail for each group. Empirical evidence is examined to determine the changes in the portfolio structure of these institutions over time and regression analysis is used to isolate the principal determinants of the demand for Government of Canada securities on the part of each of the above-mentioned groups. To provide a theoretical basis for an assessment of the appropriate explanatory variables and the direction of influence of these variables, a model of portfolio behaviour is developed for the deposit-type institutions. The results of this analysis are used in the specification and interpretation of demand equations for federal government securities on the part of these institutions. The thesis commences by providing a background with respect to the characteristics of the public debt and the growth in the debt over time and concludes with a summary of the results reached in the main body of empirical analysis.

PREFACE

The topic of his study was decided upon after discussions with officials of the Fiscal Policy Division of the Department of Finance in Ottawa. In assessing the overall impact of a given fiscal policy stance, policymakers must take into consideration the financial implications of the resulting level of federal government cash requirements. This implies an understanding of the operations of the market for federal government securities and it is in this area that the present study attempts to shed some light by examining the behavior of the major participants in this market. It should be pointed out that the views expressed here are those of the author and should not be attributed to the Department of Finance.

I should like to express my appreciation to John Allan, currently Director of the Fiscal Analysis and Forecasting Division of the Department of Finance, who suggested the topic to me initially and who also made available to me the Department's computer, typing and other facilities. I should also like to give special thanks to Mrs. Susan Clark, formerly of the Department of Finance, for her excellent computational assistance throughout the preparation of this thesis.

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CHARACTERISTICS OF GOVERNMENT OF CANADA DEBT

Introduction

To begin with, it is useful to undertake an examination of the general haracteristics of the outstanding debt of the Government of Canada. In rticular the topics to be considered in this chapter include the manner in ich the public debt is generated and its growth over the last fifteen years, ie types of debt instruments outstanding and their maturity characteristics, ne distribution of the debt among principal ownership groups, the role played y Canada Savings Bonds (CSB's) in the federal government's debt management olicy and the pattern of interest rates on the debt in recent years. Treatment f these topics in a general manner at this point will provide a background for he analysis to follow in later chapters.

. The Public Debt and Its Fiscal and Monetary Effects

A deficit position on budgetary and non-budgetary accounts on the art of the federal government implies the necessity of two economic decisions. The first is fiscal in nature and is associated with the extent of the difference between total government expenditures and revenues, while the second is a financial decision related to the method of financing the deficit. The total impact of the government's position will be a composite of these two effects

and cannot be predicted until both aspects of the policy have been specified.[1] The government must decide which among the various debt instruments at its disposal will be increased. The alternatives include:

(a) Transferable demand debt,

(b) Direct or guaranteed marketable short-term debt,

(c) Direct or guaranteed marketable long-term debt,

(d) Non-marketable debt.

The total of these outstanding at any time represents the algebraic sum of previous deficits and surpluses on budgetary and non-budgetary accounts. A categorization of government economic decisions (insofar as the debt is concerned) may then be made with respect to their relation to the government debt as defined above. Those intended to alter the overall volume of the debt may be referred to as fiscal decisions. Those concerned with the proportion of the debt in the forms (b) to (d) may be referred to as debt management decisions. Those concerned with the proportion of (a) in the total debt may be referred to as monetary decisions. Table I-1 presents a summary of the relationship between the Government cash requirements and the debt outstanding in the period 1960-1971.

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[1] In Carl Christ's review of the financial sector of nine econometric models he points out that none of these models includes a government constraint. See C. Christ, "Econometric Models of the Financial Sector", Journal of Money, Credit and Banking, May 1971, Volume III, No. 2, Part 2, pages 419-449. For examples of macroeconomic models which provide explicit inclusion of the relationship between the government's fiscal position and the financing technique employed, see D. Ott and A. Ott, "Budget Balance In Equilibrium Income", Journal of Finance, March 1965, Volume XX, No. 1, pages 71-77; C. Christ, "A Simple Macroeconomic Model With a Government Budget Restraint", Journal of Political Economy. January/February 1968, pages 53-67.

TABLE I-1

Government of Canada Financial Requirements and Sources of Financing

(millions of dollars)

	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70	1970-71
Financial Requirements											
Budgetary											
Revenue	5,618	5,730	5,878	6,253	7,180	7,696	8,376	9,076	10,191	12,324	12,803
Expenditure	-5,958	-6,521	-6,570	-6,872	-7,218	-7,735	-8,798	-9,871	-10,767	-11,931	-13,181
Surplus (+) or Deficit (-)	-340	-791	-692	-619	-38	-39	-422	-795	-576	393	-378
Non-budgetary (excluding foreign exchange transactions)	-7	-93	-266	305	62	88	-286	-625	-318	-208	-804
Financial Requirements (Excluding foreign exchange transactions)	-347	-884	-958	-314	24	49	-708	-1,420	-894	185	-1,182
Foreign Exchange Transactions	-127	223	-276	-15	-403	-113	287	662	-681	-347	-1,255
Total Financial Requirements	-474	-661	-1,234	-329	-379	-64	-421	-758	-1,575	-162	-2,437
Debt (Excluding change in Gov't. bonds held by the UIC and foreign issues)											
Marketable Bonds	129	611	-21	250	-175	-155	274	555	722	-15	741
Canada Savings Bonds	419	500	527	510	460	181	283	80	72	410	1,226
Treasury Bills	-190	-50	280	65	-90	10	160	170	360	55	840
Securities Investment Account	-23	19	51	-66	43	-19	-116	155	-	-53	41
Miscellaneous	68	-2	-3	22	-6	-	-1	-1	7	-3	12
	403	1,078	834	781	232	17	600	959	1,161	394	2,860
Net Increase or Decrease (-) in Receiver General Bank Balances	-71	417	-400	452	-147	-47	179	201	-414	232	423

Source: Department of Finance

In Canada the immediate responsibility for monetary policy rests with the Bank of Canada although the Minister of Finance is ultimately accountable. The Department of Finance is directly responsible for both fiscal and debt management policies. It is immediately apparent that it is not possible to draw a well-defined line between debt management and monetary policies since decisions made by each authority have considerable overlap.

The monetary effects of the financing decision will depend upon (a) the nature of the instruments issued and (b) their distribution among the different sectors of the economy. The expenditure decisions of economic units resulting from the inclusion of additional claims against the government into their asset portfolios will differ depending upon the type of claim assimilated and the nature of the economic unit.

Tobin points out that the direction of the effect of an increase in debt on aggregate expenditure is unambiguously positive but that the magnitude of the effect differs according to the type of debt. It is strongest for demand debt, weaker for short-term debt and weaker again for longer-term debt.[2] In addition, since portfolio responses in various sectors are likely to differ considerably, the proportion of a given increase in debt assumed by each sector will be significant in determining the overall effect.

Throughout this study the conventional definition of the government debt which includes only (b) to (d) of the financing options mentioned above will be assumed and the principal task will be to determine the demand for government debt instruments on a sectoral basis.

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[2] J. Tobin, "An Essay on Principles of Debt Management", Fiscal and Debt Management Policies (Englewood Cliffs, N.J.: Prentice-Hall Inc., 1963), pp. 143-218.

3. Federal, Provincial, Municipal and Corporate Debt Since 1956

Chart I-1 indicates that federal government bonds are the largest component of the bond market in Canada. Noticeable also in the graph is the fact that provincial debt has been growing in the period 1956-1971 at a more rapid rate than federal or municipal debt. This high rate of growth in the volume of provincial bonds outstanding stems from the increased demand for government expenditures in the areas under the jurisdiction of provincial governments such as highway construction, education, health and welfare, municipal services etc., combined with a slower growth in provincial revenues due to the provinces' reliance on taxes that respond slowly to changes in GNP. A continuation of the growth in the provinces' deficits and hence of the volume of provincial bonds outstanding is likely to continue in the immediate future.

Corporations tend to rely, for the most part, on internal sources of funds for financing. The growth in corporate bonds since 1961 reflects the tendency of corporations to go more and more to the market for their required external financing rather than to the banks. This trend has been encouraged by the fact that rates on funds obtained through direct financing are lower than those charged for bank credit and by the experience of diminished lines of credit with banks during periods of restrictive monetary policy.

From 1956 to 1971 the Government[3] debt rose from $15,234 million to $28,277 million, an increase of approximately 85.6 per cent. The national debt may be put into perspective by considering it in relation to the size of the gross national product. In Table I-2 we see that although the debt has been increasing rapidly since 1956 it has actually fallen as a percentage of GNP from 48.6 per cent

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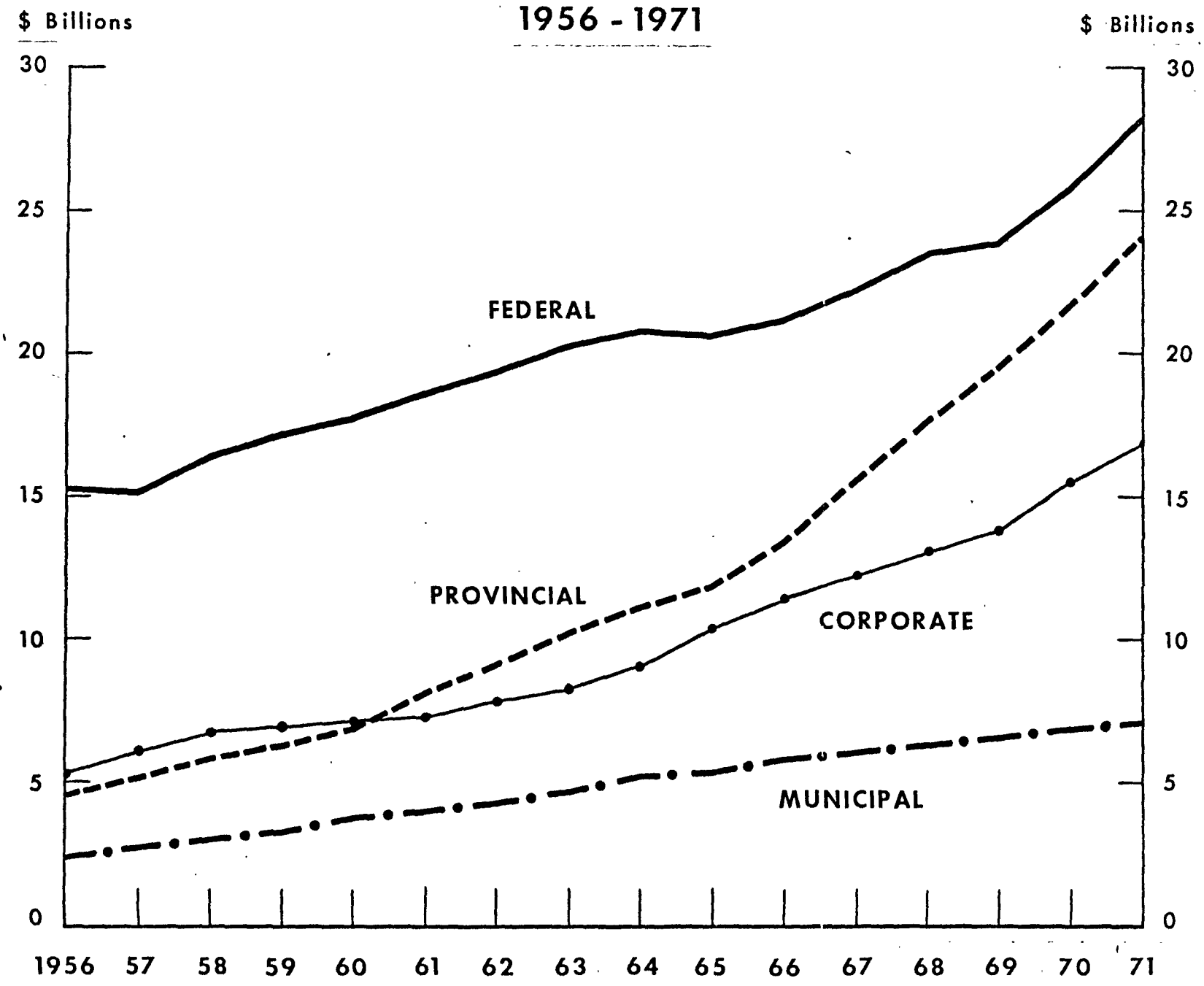
[3] Throughout the remainder of this study the word Government, when capitalized, refers to the federal government.



Source: Bank of Canada, Statistical Supplement.

GROSS NATIONAL PRODUCT, THE PUBLIC DEBT AND PUBLIC DEBT CHARGES

(millions of dollars)

Year	Total Debt Outstanding	GNP	Debt as % of GNP	Interest on the Public Debt	Charges as % of GNP
1956	15,234	31,374	48.6	516	1.6
1957	15,165	32,907	46.1	531	1.6
1958	16,416	34,094	48.1	568	1.7
1959	17,135	36,266	47.2	733	2.0
1960	17,747	37,775	47.0	753	2.0
1961	18,636	39,080	47.7	786	2.0
1962	19,448	42,353	45.9	865	2.0
1963	20,276	45,465	44.6	935	2.1
1964	20,733	49,783	41.6	995	2.0
1965	20,681	54,897	37.7	1,052	1.9
1966	21,111	61,421	34.4	1,151	1.9
1967	22,011	65,722	33.5	1,245	1.9
1968	23,556	71,388	33.0	1,409	2.0
1969	23,902	78,560	30.4	1,589	2.0
1970	25,746	84,468	30.5	1,861	2.2
1971	28,277	92,126	30.7	1,992	2.2

Source: Bank of Canada, Statistical Supplement, and Statistics Canada, National Income and Expenditure Accounts.

in 1956 to 30.7 per cent in 1971. Another common method of gaining a perspective on the debt is to consider it in terms of the service charges it generates. Table I-2 also shows public debt charges as a percentage of GNP. Although this measure increased from 1.6 per cent in 1956 to 2.0 per cent in 1959, it has shown little tendency to increase since then.

Perhaps a more meaningful figure than the gross debt outstanding is the amount of public debt held outside the accounts of the government and its agencies or the net amount of the debt. The net public debt is shown in the last column of Table I-3. On a net basis the public debt was 36.0 per cent of GNP in 1956, compared to 48.6 per cent on a gross basis, and fell to 24.8 per cent in 1971, compared to 30.7 per cent. Similarly, the cost of the debt described above overstates the true amount to the extent that it includes interest payments on debt held in government accounts and with the Bank of Canada.

4. Composition of the Debt of the Government of Canada

The Government debt consists of the following types of debt instruments:

(1) Marketable Debt

This category includes:

(a) Treasury bills. They accounted for 13.5 per cent of the total debt at the end of 1971.

(b) Unmatured and matured and outstanding direct market issues (other than Treasury bills). These constituted 51.1 per cent of the debt at the end of 1971.

(c) Guaranteed market issues. In the period 1956-71 these have included only CNR issues, which at the end of 1971 totalled $816 million or 2.9 per cent of total debt outstanding. Because of the exceptionally high cost of these bonds, no new issues have been made in recent years.

(d) Perpetuals. Only $55 million in perpetuals is currently outstanding.

GOVERNMENT OF CANADA DIRECT AND GUARANTEED [illegible]

(millions of dollars)

Year	Direct Marketable	Direct Non-marketable	Total	Guaranteed	Total Outstanding	Held In Gov't Accounts	Held By B. of C.	Held By Ch. Banks And General Publi
1956	11,900	2,541	14,441	793	15,234	1,518	2,426	11,290
1957	11,788	2,649	14,437	728	15,165	1,367	2,463	11,335
1958	12,498	2,895	15,393	1,023	16,416	1,258	2,670	12,489
1959	12,589	3.212	15,801	1,334	17,135	923	2,677	13,535
1960	12,476	3,595	16,071	1,676	17,747	866	2,744	14,137
1961	12,728	4,237	16,965	1,671	18,636	644	2,876	15,116
1962	13,097	4,720	17,817	1,631	19,448	670	2,936	15,842
1963	13,698	5,199	18,897	1,379	20,276	516	3,091	16,669
1964	13,664	5,701	19,365	1,368	20,733	769	3,115	16,849
1965	13,280	6,034	19,314	1,367	20,681	557	3,472	16,652
1966	13,398	6,387	19,785	1,326	21,111	848	3,473	16,790
1967	14,122	6,692	20,814	1,197	22,011	814	3,807	17,390
1968	15,630	6,795	22,425	1,131	23,556	985	3,942	18,629
1969	15,617	7,235	22,852	1,050	23,902	1,033	4,112	18,757
1970	16,815	7,888	24,703	1,043	25,746	1,005	4,295	20,446
1971	17,519	9,942	27,461	816	28,277	569	4,866	22,843

urce: Bank of Canada, Review.

(2) Nonmarketable Debt

This category includes:

(a) Canada Savings Bonds. In the last three years these bonds have become an important instrument of debt management policy and accounted for 35.1 per cent of the total debt in 1971, compared to only 16.7 per cent at the end of 1956.

(b) Special Nonmarketable Institutional Issues. These include special issues held by the Unemployment Insurance Commission Fund until March 1966 and thereafter also those held by the Canada Pension Plan. In 1971 the bonds held by the UIC were redeemed in accordance with the Unemployment Insurance Act of that year. The proceeds were included in the total balance on deposit with the Government. Deficits are now made good by way of Government loans rather than bond sales with the loans being repaid by means of adjustments in employer-employee contributions. Funds in excess of payment requirements for benefits and administration costs of the Canada Pension Plan are used to purchase special nonmarketable securities of provincial governments and the Government of Canada.

Tax exempt bonds were included in the nonmarketable category at one time but in recent years these have disappeared from use.

By far the major part of the Government debt is payable in Canadian dollars, although the Government does issue foreign pay bonds in limited quantities, particularly in times of foreign exchange crises. At the end of 1971 the Canadian dollar equivalent of foreign pay bonds outstanding was $325 million out of a total outstanding debt of $28,277 million.

The maturity characteristics of the debt are described in Table I-4. The most outstanding feature of this illustration is the alteration in maturity structure induced by the Conversion Loan of 1958. Essentially, the idea of the Conversion Loan was to replace the 3% Victory Bonds whose maturity dates fell in the interval 1959 to 1966 with new bonds whose maturity dates were between 1961 and 1983.[4] Approximately 90% of the outstanding $6,416 million of Victory

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[4] For an extensive treatment of the Conversion Loan see D. Fullerton, The Bond Market in Canada (Toronto: The Carswell Co., 1962) pp. 235-264.

MATURITY STRUCTURE OF GOVERNMENT DIRECT AND GUARANTEED SECURITIES

(millions of dollars)

Year	3 Years & Under T.B.'s	3 Years & Under Other	% of Total	3-5 Years	% of Total	5-10 Years	% of Total	More Than 10 Years	% of Total	Total	Average Term to Maturity Years	Average Term to Maturity Months
1956	1,575	3,152	37.5	1,168	9.3	4,800	38.1	1,916	15.1	12,611	6	7
1957	1,625	4,104	46.0	1,352	10.9	3,496	28.1	1,866	15.0	12,443	6	-
1958	1,495	3,747	39.0	583	4.3	1,947	14.5	5,684	42.2	13,456	10	4
1959	2,077	3,205	38.1	793	5.7	2,075	15.0	5,702	41.2	13,852	9	6
1960	1,985	3,566	39.4	1,466	10.4	1,160	8.3	5,895	41.9	14,072	9	5
1961	1,885	4,214	42.6	1,721	12.0	978	6.8	5,527	38.6	14,325	8	4
1962	2,165	4,192	43.4	778	5.3	2,472	16.9	5,048	34.4	14,655	8	5
1963	2,240	4,303	43.6	1,428	9.5	1,838	12.3	5,188	34.6	14,997	7	11
1964	2,140	3,572	38.2	1,840	12.3	2,313	15.4	5,096	34.1	14,961	7	10
1965	2,150	3,573	39.3	1,225	8.4	2,796	19.2	4,830	33.1	14,574	7	9
1966	2,170	3,758	40.5	1,296	8.9	2,898	19.8	4,521	30.8	14,643	7	7
1967	2,455	3,895	41.6	2,155	14.1	2,283	15.0	4,461	29.3	15,249	6	11
1968	2,825	4,651	44.8	2,547	15.3	2.239	13.4	4,429	26.5	16,691	6	4
1969	2,895	5,191	48.7	2,308	13.9	2,107	12.7	4,095	24.7	16,595	5	10
1970	3,625	5,200	49.6	2,951	16.6	2,275	12.8	3,738	21.0	17,788	5	4
1971	3,830	5,300	50.0	3,153	17.3	2,415	13.2	3,567	19.5	18,265	5	1

Source: Bank of Canada, Review.

bonds were converted during the operation. The effect on the maturity structure of the debt is evident in the jump in the average term to maturity of the debt from 6 years in 1957 to 10 years and 4 months in 1958. Significant also is the change in the percentage of the total amount of the debt with ten or more years to maturity. This rose from 15.0 per cent in 1957 to 42.2 per cent in 1958, from which peak it has been falling in every subsequent year.

Since 1958 the trend has been a gradual reduction in the volume of long-term debt and an increase in the "three years and under" component of the debt and a consequent fall in the average term to maturity of the overall debt. The three-to-five year and five-to-ten year categories have exhibited considerable variation in this period with no apparent long-term trend.

5. Ownership Patterns

In the following a few preliminary comments will be made on trends in the general patterns of ownership of the Government debt in the period 1956-71. A more detailed analysis of the determinants of sectoral holdings will be undertaken in later chapters.

The Bank of Canada's holdings of securities are limited to direct or guaranteed issues of the federal or provincial governments, short-term issues of the British government, securities of the U.S. government, and certain types of commercial paper. By far the most important among the Bank's security holdings is its stock of Government securities, which grew from $2,426 million at the end of 1956 to $4,866 million in 1971. At present the major part of these holdings has a term to maturity of three years or less but the maturity structure of the Bank's holdings of federal government debt shows a considerable degree of variability. Changes in the size and characteristics of the central

bank's stock of Government debt reflects the Bank's response to changing economic conditions in an effort to achieve the economic objectives of the Government's overall stabilization programme.

In the private sector, there has been a general trend towards disinvestment of Government bonds in terms of the proportion of the various portfolios held in this form. As illustrated in Table I-5 the largest stock of federal debt held by any one group of investors is held by the chartered banks, who, in December of 1971 for example, held 56.7 per cent of total marketable debt outside the accounts of the Government and the Bank of Canada. Although the volume of Government debt held by the banks has increased over time, the proportion of their total assets held in the form of federal securities has decreased steadily in the last fifteen years.

Next to the chartered banks in terms of holdings of Government debt are the non-bank financial institutions, whose holdings have fallen from 70.4 per cent of the total held by the banks in 1956 to 38.5 per cent at the end of 1970. Even the dollar value of the federal debt holdings of these institutions has shown little growth since the early 1960's. Among the non-bank financial institutions the largest holders of Government debt are the insurance companies and pension funds, who at the end of 1970 held 57.0 per cent of the total holdings of the group. These institutions have also shown a tendency to shift out of Government bonds in the recent past. Federal government bonds as a percentage of the total assets of life insurance companies and pension funds fell from 11.7 per cent in 1960 to 3.7 per cent in 1970.

TABLE I-5

DISTRIBUTION OF HOLDINGS OF PUBLIC DEBT

(millions of dollars)

Year	B. of C.	Government Accounts	Chartered Banks	NBFI	Non-Fin Corp's	Provincial and Municipal Governments	CSB'S
1956	2,426	1,518	2,524	1,776	750	568	2,541
1957	2,463	1,367	2,641	1,913	582	505	2,649
1958	2,670	1,258	3,521	1,892	695	511	2,895
1959	2,677	923	2,811	2,088	880	580	3,212
1960	2,744	866	3,057	2,428	777	623	3,594
1961	2,876	644	3,792	2,455	726	664	4,080
1962	2,936	670	3,371	2,563	796	625	4,620
1963	3,091	516	3,933	2,496	799	611	5,133
1964	3,115	769	3,705	2,401	638	626	5,613
1965	3,472	557	3,723	2,135	451	575	5,866
1966	3,473	848	3,890	2,249	468	563	6,089
1967	3,807	814	4,630	2,285	344	523	6,319
1968	3,942	985	5,573	2,323	221	538	6,359
1969	4,112	1,033	5,093	2,542	221	563	6,683
1970	4,295	1,005	6,603	2,542	99	555	7,397
1971	4,866	569	7,324	NA*	NA	NA	9,916

Source: Bank of Canada, Review.

* Indicates data are not yet available.

Trust and mortgage loan companies also hold a substantial volume of federal debt. Whereas the portfolio structure of mortgage loan companies has remained stable for many years, the trust companies, who hold considerably more Government bonds, have followed the general trend towards alternative investment instruments and in particular mortgages.

Perhaps the most noticeable disinvestment of Governments has been that carried out by non-financial corporations. This group has held federal debt primarily as an offset to federal corporate tax accruals and with the delay in tax payments reduced considerably, the need for a sizeable stock of liquid financial assets has largely disappeared.

6. Canada Savings Bonds

Since CSB's have become such a significant part of the Government's total debt outstanding, it is worthwhile at this point to examine more carefully various features of this type of debt. As indicated above, CSB's are non-marketable demand debt. Although they are designed to be held principally by individuals, the types of holders permissible have varied considerably over time. The 1971 issue, for example, was available to individuals, estates of deceased persons, trusts established for or on behalf of individuals, religious institutions, charitable organizations and other non-profit making associations provided they are bona fide Canadian residents. In the past, however, they have been made available to corporations, partnerships, etc. These latter groups have been attracted to a large extent by the liquidity of CSB's and have tended to use them as a short-term abode for excess cash balances. Consequently, their inclusion among allowable holders has had the effect of increasing the rate of redemption prior to maturity. The amount any one holder is permitted has varied from $1,000 to $50,000.

Canada Savings Bonds were issued initially in 1946 and were at that time designed to provide a savings vehicle for those in the average income category. They have evolved, however, as an important source of funds to the Government in financing its cash requirements. In the period 1946-1971, total marketable Government debt has grown by 47.2 per cent while CSB's have increased by 290.2 per cent. As a result CSB's have increased from 16.7 per cent of the total debt outstanding in 1946 to 35.1 per cent in 1971. CSB's represented 63.9 per cent of the general public's holdings of Government of Canada direct and guaranteed securities outstanding in 1971 compared to 29.0 per cent in 1956.

Because of their demand nature, there is a ratchet effect with respect to the public's holdings of particular issues of CSB's at various interest rates. When rates on subsequent issues of CSB's are high, holders of previous issues redeem their bonds and invest in the new bonds. An examination of Table I-6 reveals that the percentage of the initial value of an issue still outstanding in subsequent years is highly sensitive in an inverse direction to higher rates paid on issues in following years. For example, the 1955 issue shows only 28.7 per cent of total initial sales still outstanding after two years which may be attributed to the more attractive rates on issues in the following two years. Even more noticeable are the redemption rates on the 1967 and 1968 issues, which were affected significantly by the exceptionally attractive 1969 bonds. Of the total initial sales in 1967 and 1968, only 10.0 and 14.8 per cent respectively were still outstanding after two years.

Conversely, when interest rates are moving in a downward direction, holders of high-rate bonds tend to retain them. This is evident in the retention rates of the 1959, 1962 and 1969 issues.

TABLE I-6

ISSUES AND REDEMPTIONS OF CANADA SAVINGS BONDS

Total Initial Sales ($ Millions)	Series/Yr. of Issue		After 1 Yr.(1) ($Mil)	%	After 2 Yrs. ($Mil)	%	After 3 Yrs. ($Mil)	%	After 5 Yrs. ($Mil)	%	At Maturity ($Mil)	%	Yield To Maturity
535	1	1946	417	77.9	338	63.2	292	54.6	206	38.5	58	10.8	2¾
288	2	47	202	70.1	161	55.9	136	47.2	93	32.3	23	8.0	2¾
261	3	48	176	67.4	133	51.0	105	40.2	49	18.8	15	5.7	2¾
320	4	49	214	66.9	154	48.1	127	39.7	53	16.6	17	5.3	2¾
286	5	50	167	58.4	119	41.6	68	23.8	39	13.6	11	3.8	2¾
395	6	51	266	67.3	173	43.8	153	38.7	121	30.6	25	6.3	3.21
381	7	52	220	57.7	173	45.4	155	40.7	97	25.5	20	5.2	3.44
900	8	53	723	80.3	648	72.0	580	64.4	294	32.7	46	5.1	3.75
799	9	54	628	78.6	369	46.2	203	25.4	87	10.9	25	3.1	3.25
729	10	55	404	55.4	209	28.7	149	20.4	67	9.1	18	2.5	3.25
854	11	56	396	46.4	274	32.1	146	17.1	93	10.9	20	2.3	3.76
1,217	12	57	1,018	83.6	793	65.2	720	59.2	513	42.2	41	3.4	4.46
924	13	58	454	49.1	349	37.8	268	29.0	132	14.3	-	-	4.19
1,536	14	59	1,271	82.7	1,144	74.5	1,042	67.8	924	60.2	722	47.0	4.98
961	15	60	730	76.0	528	54.9	462	48.1	388	40.4	28	2.9	4.71
1,100	16	61	544	49.5	416	37.8	352	32.0	196	17.8	34	3.1	4.60
1,797	17	62	1,479	82.3	1,312	73.0	1,199	66.7	742	41.3	-	-	5.11
1,245	18	63	979	78.6	838	67.3	515	41.4	174	14.0	-	-	5.03
1,150	19	64	867	75.4	490	42.6	331	28.8	62	5.4	-	-	5.00
969	20	65	434	44.8	282	29.1	147	15.2	52	5.4	-	-	5.03
2,422	21	66	1,909	78.8	734	30.3	346	14.3	214	8.8	-	-	5.48
1,526	22	67	468	30.7	153	10.0	129	8.5	-	-	-	-	5.48
3,367	23	68	717	21.3	498	14.8	470	14.0	-	-	-	-	6.75
4,978	24	69	4,488	90.2	4,265	85.7	-	-	-	-	-	-	8.00
2,082	25	70	1,783	85.6	-	-	-	-	-	-	-	-	7.75
2,611	26	71	-	-	-	-	-	-	-	-	-	-	7.19
852	SR(2)	68	301	35.3	217	25.2	211	24.8	-	-	-	-	6.88

(1) Refers to second January following issue date, which is normally in November.
(2) Special Replacement Series; issued in exchange for an equal par value of the 1959 series.

Source: Department of Finance

The above feature of CSB's plus high administrative costs tend to make CSB financing more costly relative to marketable issues. High administrative costs are particularly noticeable during a period of rising interest rates when the fixed costs of advertising, sales, redemption, etc., are spread over a short period as holders exchange low-rate bonds for the high-rate issues. The administrative cost is highest when CSB's are used as an abode for short-term money.

Still on the topic of cost, to the extent that holders of CSB's are in low income tax brackets, the Government will be able to recoup a smaller part of the interest payments it makes on the debt. This is in contrast to the case of conventional bonds where perhaps half of interest costs are regained through taxes. The lower tax yield on interest paid on CSB's is accentuated by the fact that for those purchasing CSB's through payroll deductions, a good part of interest received on the bonds in the first year is offset for tax purposes by the interest paid on the bank loan used to finance the purchase.

Of considerable importance is the role of CSB's in anti-cyclical debt management policy. The basic idea behind the use of debt management policy for stabilization purposes is that the liquidity of the economy ought to be reduced by issuing long-term debt during expansionary periods and increased by issuing short-term debt during recessions. Looking at the case of restrictive debt management policy, it is apparent that the replacement of short by longer term debt will have a restrictive effect to the extent that expenditures are positively related to liquidity and inversely related to the long-term interest rate. Since liquidity is being reduced and interest rates increased, the direction of the overall effect is unambiguous.

The effect of CSB's in this context is not so clear cut in that, although their nominal maturity is usually in the range of 10 to 12 years, and an increase in their supply will likely push up interest rates in the mid- to long-term range, CSB's are in fact demand debt so that with an increase in the proportion of the total debt in the form of CSB's, the liquidity of the economy will have increased. The net effect on expenditures will depend upon the relative strengths of the positive liquidity effect and the negative interest rate effect.

Still in the realm of stabilization policy, having such a large part of direct debt outstanding in the form of CSB's creates the possibility of an offset to the effectiveness of restrictive monetary policy. If the Government were to embark on a policy of tight money resulting in a widening of the yield differential between CSB's and their prime substitutes, holders of savings bonds might be induced to redeem their bonds and place these funds elsewhere. Given the volume of CSB's outstanding it may not be possible to meet this additional demand for government funds by going to the conventional bond market without causing serious distortions in the allocation of funds and the rates paid on them. The government might then be required to finance the redemption of CSB's through the money supply thereby offsetting, at least in part, the effectiveness of its policy of monetary restraint.

Heavy reliance on CSB's as a method of financing the Government's cash requirements is a relatively recent phenomenon. A good deal of research would seem to be warranted before any conclusions can be reached regarding the advisability of the Government's use of this type of debt in its overall debt management policy stance.

7. The Pattern of Interest Rates, Their Level and Structure

Chart I-2 shows the pattern of interest rates in the period 1956 to 1970. Three stages are recognizable insofar as the long-term rates are concerned. The first stage is the period from 1956I to 1960I when there was a gradual increase in long-term rates until in 1960I, the long-term government rate was at its highest point since the 1930's. The rapid increase in the long-term government rate beginning in 1958II coincides with the commencement of the conversion loan in July 1958 and the announcement of the budget in June 1958 which saw the largest deficit since the war years. However, it is reasonably certain that anticipation of higher rates existed prior to the announcement of the conversion loan so that it is difficult to isolate the impact of the conversion policy itself on interest rates.[5]

The second stage begins in 1960I and continues until 1965I. There was a slight drop in rates in the second and third quarters of 1960 after which rates remained virtually constant until 1965I.

The third stage extends from 1965I until 1970II in which period there was an almost uninterrupted rise in interest rates. This interval also coincides with sustained economic expansion and continued inflationary pressures. Rates fell throughout 1970 but since then have exhibited a considerable degree of variability. The 91-day treasury bill rate appears to have followed essentially the same pattern as the longer-term rates but with highly exaggerated fluctuations.

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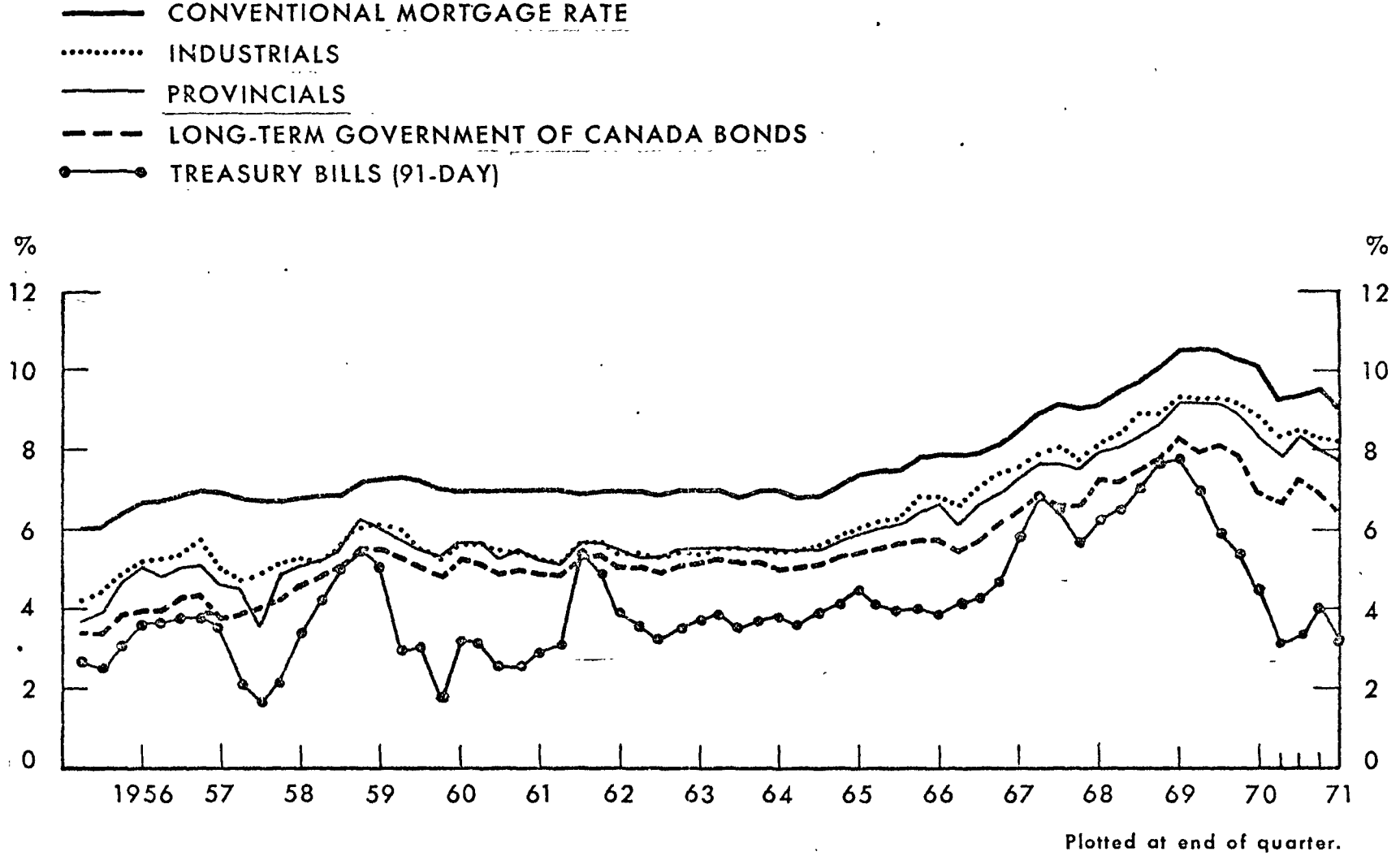
[5] See P. Wonnacott, The Height, Structure, and Significance of Interest Rates, a working paper prepared for the Royal Commission on Banking and Finance, November 1962, p.46.

CHART I – 2

TRENDS IN INTEREST RATES

1956 – 1971



Plotted at end of quarter.

Source: Bank of Canada, Review.

The structure of interest rates on Government securities of various maturities varies considerably over time. The principal determinants of the shape of the yield curve are expectations with respect to future rates (including expected price changes), the possible existence of liquidity preference, and demand and supply conditions in the various markets. Some of these factors are subject to cyclical influences and consequently the structure of rates exhibits a systematic cyclical pattern. In Chart I-3 yield curves are drawn for the trough and peak points for the business cycles between 1957 and 1970. The curves tend to exhibit a steep upward slope at cyclical troughs (Curves 2, 4, 6) due to liquidity preference, expectations of higher rates in the future and the impact on short rates, in particular, of expansionary monetary policy. At cyclical peaks (Curves 1, 3, 5) the curves have shifted upward in their entirety and tend to be flat or negatively-sloped due to the influences of lower expected rates in the future and restrictive monetary policy. The fact that the curves are not as steeply sloped in the downward direction at peaks as they are in the upward direction at troughs is attributed by Kessel to the existence of liquidity preference. "Liquidity preference produces asymmetry in the relationship between short- and long-term rates at cycle peaks and troughs. It accounts for the failure of short-term rates to exceed long-term rates at peaks by as much as they fall below long-term rates at troughs".[6] He points out "At cyclical peaks, in contrast to cyclical troughs, liquidity and expectational forces produce opposite effects on yield curves. Liquidity preference, as always, operates to establish short-term below long-term rates. However, expectations act in the opposite

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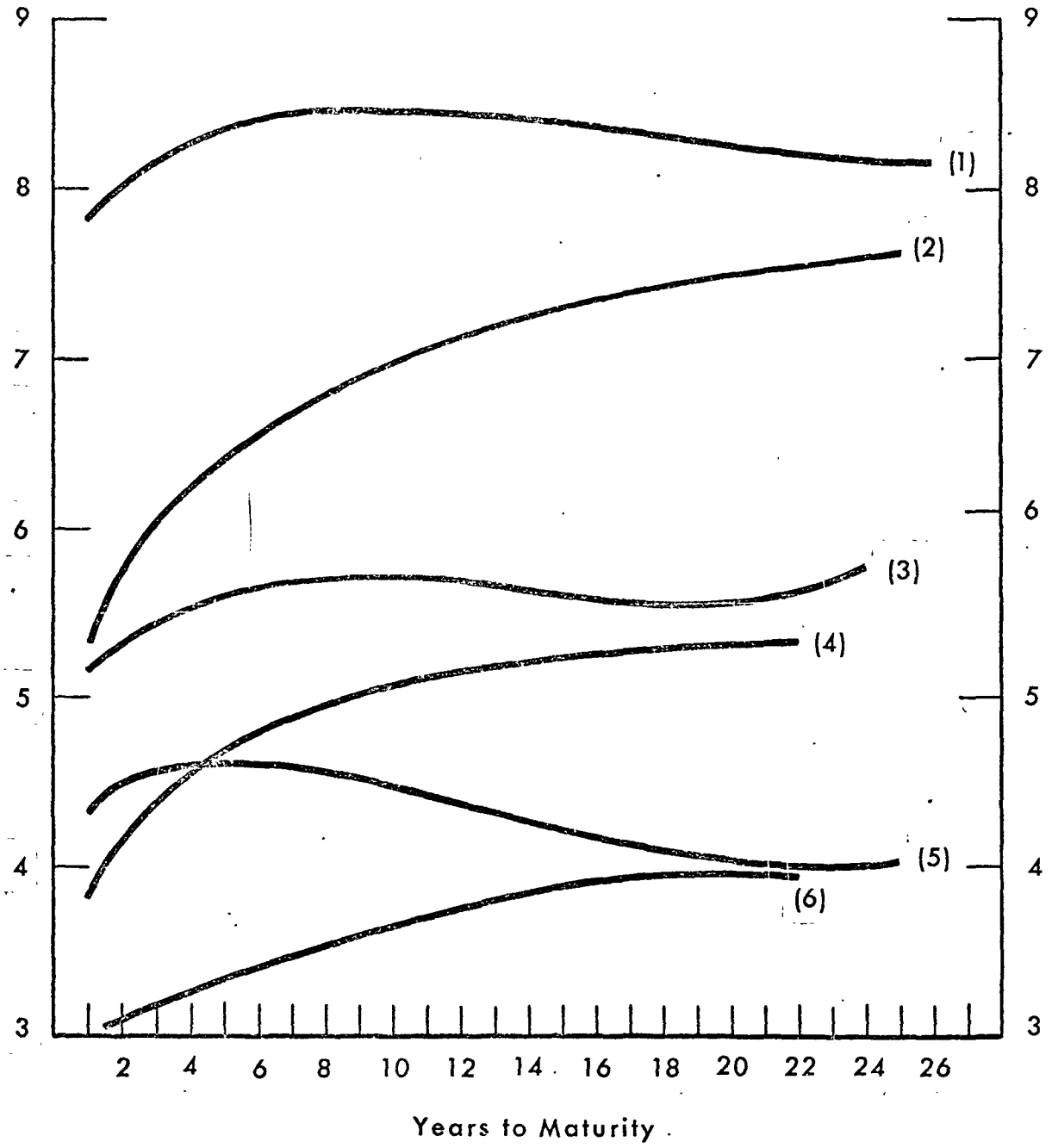
[6] R. Kessel, "The Cyclical Behaviour of the Term Structure of Interest Rates", in Essays on Interest Rates, ed. J. Guttentag (New York: National Bureau of Economic Research, 1971), p. 380.

CHART I – 3

A COMPARISON OF YIELD CURVES FOR PEAK AND TROUGH OF SELECTED CYCLES



(1) NOVEMBER 1969
(2) NOVEMBER 1970
(3) JANUARY 1960
(4) MARCH 1961
(5) APRIL 1957
(6) APRIL 1958

Source: Bank of Canada, Statistical Supplement.

direction. Because the market expects future short-term rates to be lower, the total yield declines as a function of term to maturity. Whether or not the resulting market yield curve is rising, falling, or both depends upon the relative strength of these opposing forces. Because these forces work in opposite directions at cyclical peaks but in the same direction at troughs, short-term yields do not exceed long-term yields at peaks as much as they fall below long-term yields at troughs".[7]

Chart I-4 illustrates the movements in the yield curve over a particular cycle (i.e., 1958-1961). Beginning with the trough at April 1958, Curve 1 has a steep upward slope which decreases as the recovery gets under way, eventually becoming negative by April 1959 and retaining its negative slope, at least over part of the curve, until the peak is reached in January 1960. In the recessionary phase the curve resumes an upward slope, which becomes steepest towards the trough (March 1961). It will be noticed that the greatest variability in rates occurs in the money market, which is consistent with the results of Cagan's study of the amplitude of the cyclical movement in interest rates in the U.S.[8]

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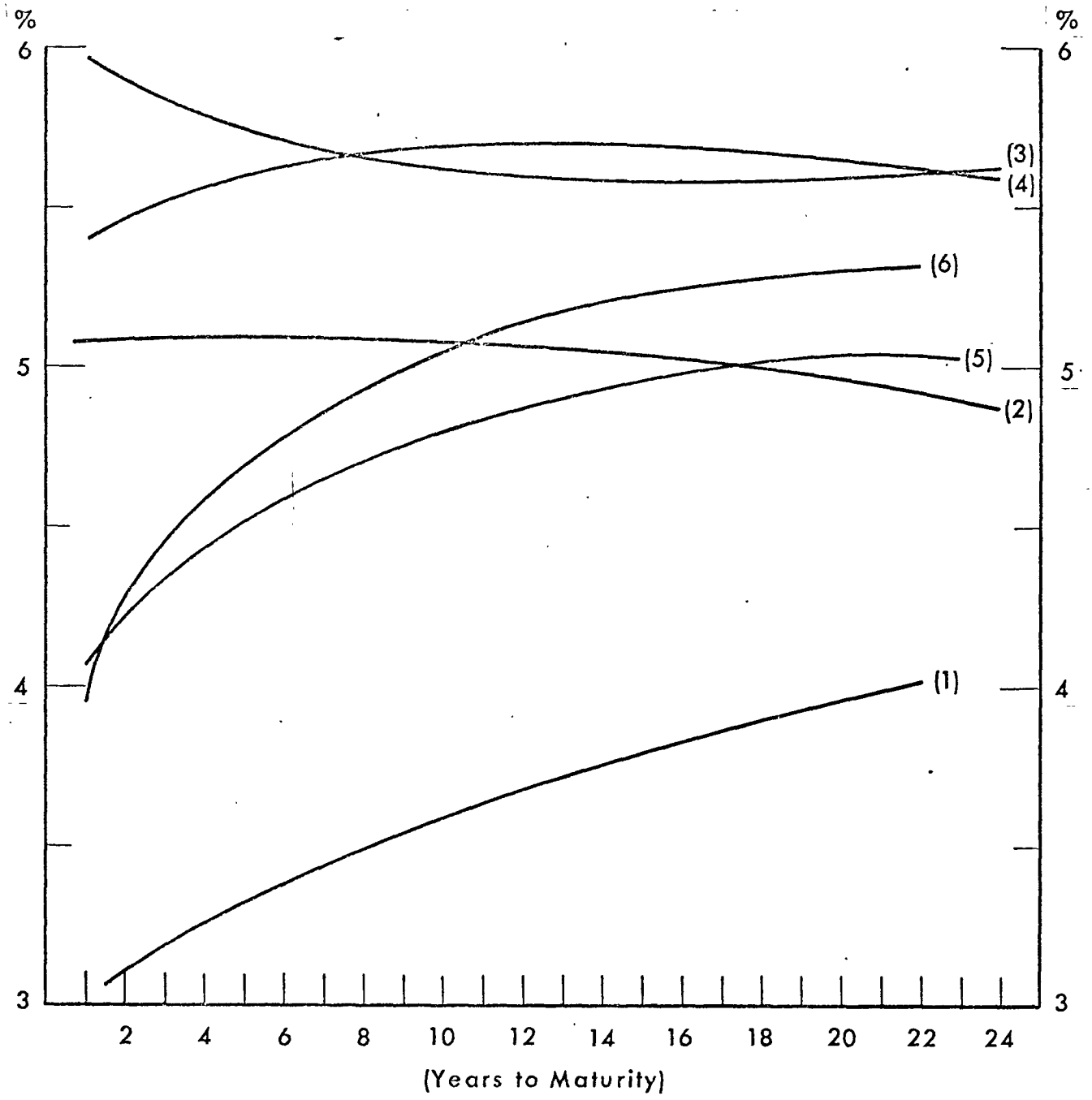
[7] Ibid, p. 381.

[8] P. Cagan, "Changes in the Cyclical Behaviour of Interest Rates", in Essays on Interest Rates, op. cit, pp. 16-21.

CHART I – 4

CHANGES IN THE YIELD CURVE OVER A SELECTED CYCLE



(1) APRIL 1958
(2) APRIL 1959
(3) SEPTEMBER 1959
(4) JANUARY 1960
(5) JUNE 1960
(6) MARCH 1961

Source: Bank of Canada, Statistical Supplement.

II

PORTFOLIO BEHAVIOUR OF A FINANCIAL INTERMEDIARY

1. Introduction

In the following we shall examine the decisions taken by a profit-maximizing financial intermediary (F.I.) in determining the structure and size of its investment portfolio. The inflow of funds from customers, which we assume is responsive to the rate paid on the liabilities of the F.I., and the distribution of these funds among alternative assets are determined simultaneously. The analysis is similar in approach to the studies of Goldfeld and Jaffee,[1] and Hendershott[2] although it differs from the former in that two interest-earning assets are considered rather than one and from the latter in that the focus here is on two-period maximization of profits rather than single-period analysis.

Financial assets with similar variability of their rates of return may differ considerably with respect to the degree of liquidity they possess. We shall consider two categories of competing financial assets which are differentiated according to their liquidity and their rates of return. There exists an active secondary market for the liquid asset but no such market for the non-liquid asset.[3] The possibility of trading the liquid asset introduces the problem of capital valuation changes which must be considered explicitly in a dynamic analysis. The liquid asset we call a bond, which is assumed to be a perpetual, and the non-liquid asset a loan.

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[1] S. Goldfeld and D. Jaffee, "The Determinants of Deposit - Rate Setting by Savings and Loan Associations", Journal of Finance, Vol. XXV (June, 1970), pp. 615-632.

[2] P. Hendershott, "Financial Disintermediation in a Macroeconomic Framework", Journal of Finance, vol. XXVI (Sept., (1971), pp. 843-856.

[3] More precisely, there may exist a secondary market for the non-liquid asset but the price at which the asset could be sold is such that it would entail unacceptable capital losses.

Clearly the F.I. would hold only that asset with the higher rate of return if he were indifferent to liquidity. We assume the F.I. has a preference for liquidity which results primarily from the variability of deposits and the desire for flexibility in the management of its portfolio.[4] The risk of illiquidity is incorporated into a risk function $R(\beta)$ which is specified in terms of the proportion of the total portfolio in the form of loans (β). The function may be interpreted as a penalty in dollar terms for holding the non-liquid asset. It is postulated that $R(0) = 0$ and $R'(\beta)$ and $R''(\beta)$ are > 0.

It is suggested that the major portfolio decision facing the F.I. is the breakdown of the portfolio into a liquid and non-liquid component. The trade-off is between return and illiquidity and the resultant portfolio structure will depend upon the F.I.'s subjective evaluation of each.

It is assumed that the F.I. offers only one type of liability, a deposit. The volume of deposits the F.I. can attract will depend upon the rate paid on deposits and a variety of other factors including the rates paid on competing types of savings instruments, an income or wealth constraint on the part of the general public, etc. These other factors are assumed constant so that variations in the inflow of funds result solely in response to the F.I.'s deposit rate policy (unless an exogenous shift in deposits is specifically assumed).[5] Total assets and deposits are assumed to be net of funds required for reserve purposes.

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[4] For an explicit treatment of deposit variability as a motive for liquidity preference see R. Porter, "A Model of Bank Portfolio Selection", Yale Economic Essays, Vol. 1, no. 2, pp. 323-359, and G.R. Morrison, Liquidity Preference of Commercial Banks (Chicago: University of Chicago Press, 1966).

[5] It is assumed that the intermediary can affect its deposit flows by varying the rate paid on deposits. The responsiveness of deposit flows to deposit rate variations is incorporated in the function $D(r_{dt})$. The rates paid on the assets held by the intermediary are assumed to be taken as given. Since there is no active secondary market in mortgages, the mortgage rate will be affected by portfolio decisions with respect to new funds only. Moreover, the mortgage market reflects the activities of a variety of financial institutions so that the impact of decisions made by one of these participants is likely to be small. In addition it is assumed that the rate on government bonds and the bank lending rate are determined primarily by central bank policy either through open market operations or through moral suasion.

2. The Model

We consider first the one-period case in which the F.I. uses the information on interest rates available in that period in deciding upon its portfolio structure and the level of its deposit rate. No inferences are made regarding the F.I.'s expectations about future rates. The use of periods in this context does not imply that decisions are taken in steps but rather it is a convenient analytical device which will allow us to take into consideration the F.I.'s expectations regarding future rates later in the section. The period could have any time dimension but we assume generally that it is the time required to allow for an alteration of its portfolio. Consequently, there can be no portfolio changes within a period.

We define the following variables

r_{Lt} = the loan rate in period t

r_{bt} = the bond rate in period t

r_{dt} = the deposit rate offered by the F.I. in period t

β_t = the proportion of total assets in the form of loans in period t

$R(\beta_t)$ = illiquidity penalty (per dollar of total assets) for holding loans as opposed to bonds when the proportion of total assets in loans is β_t

$D(r_{dt})$ = the level of deposits with the F.I., which is assumed identical to the level of total assets in the one-period case.

The F.I.'s profits for the period are[6]

$$\Pi = r_L \beta D + r_b(1-\beta)D - r_d D - D\,R(\beta)$$

The first-order conditions for a profit maximum are

$$\frac{\partial \Pi}{\partial \beta} = r_L D - r_b D - D\,R'(\beta) = 0 \qquad (1)$$

$$\frac{\partial \Pi}{\partial r_d} = r_L \beta D' + r_b(1-\beta)D' - r_d D' - D - D'R(\beta) = 0 \qquad (2)$$

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[6] Costs other than interest paid on deposits, such as administrative costs, are not considered explicitly. Such costs would affect the results only if they varied in a manner other than in proportion to the volume of deposits. Consequently, our abstraction from such costs is equivalent to an assumption of no scale effects with respect to the size of D.

The second-order conditions are

$$\frac{\partial^2 \Pi}{\partial \beta^2} = -DR''(\beta) < 0 \tag{3}$$

$$\frac{\partial^2 \Pi}{\partial r_d^2} = r_L \beta D'' + r_b(1-\beta)D'' - r_d D'' - 2D' - D'' R(\beta) < 0 \tag{4}$$

$$\frac{\partial^2 \Pi}{\partial \beta \, \partial r_d} = r_L D' - r_b D' - D'R'(\beta) = 0 \tag{5}$$

since

$$\begin{vmatrix} -DR''(\beta) & r_L D' - r_b D' - D'R'(\beta) \\ r_L D' - r_b D' - D'R'(\beta) & r_L \beta D'' + r_b(1-\beta)D'' - r_d D'' - D''R(\beta) - 2D' \end{vmatrix} > 0. \tag{6}$$

We have assumed that $D' > 0$, $R'(\beta) > 0$, $R''(\beta) > 0$

Comparative Statics

(i) Change in r_L

Differentiating (1) and (2) with respect to r_L and then equating to zero we have

$$-DR''(\beta).\frac{\partial \beta}{\partial r_L} = -D \tag{7}$$

$$[r_L \beta D'' + r_b(1-\beta)D'' - r_d D'' - 2D' - R(\beta)D''] \frac{\partial r_d}{\partial r_L} = -\beta D' \tag{8}$$

Hence $$\frac{\partial \beta}{\partial r_L} = \frac{D}{DR''(\beta)} = \frac{1}{R''(\beta)} > 0$$

and $$\frac{\partial r_d}{\partial r_L} = \frac{-\beta D'}{[r_L \beta + r_b(1-\beta) - r_d - R(\beta)]D'' - 2D'} > 0$$

That is, the F.I. will respond to an increase, for example, in the loan rate by increasing the deposit rate and attracting a greater inflow of funds.

(ii) Change in r_b

Differentiating (1) and (2) with respect to r_b we have

$$-DR''(\beta)\frac{\partial \beta}{\partial r_b} = D \tag{9}$$

$$[r_L \beta D'' + r_b(1-\beta)D'' - r_d D'' - 2D' - R(\beta)D'')\frac{\partial r_d}{\partial r_b} = -(1-\beta)D' \tag{10}$$

Hence $\frac{\partial \beta}{\partial r_b} = \frac{D}{-DR''} = \frac{-1}{R''} < 0$

and $\frac{\partial r_d}{\partial r_b} = \frac{-(1-\beta)D'}{[r_L\beta + r_b(1-\beta) - r_d - R(\beta)]\ D'' - 2D'} > 0$

The interpretation of this result is the same as case (i).

(iii) Exogenous increase in D

We redefine total deposits in the form $D_o + D(r_d)$. Even after this change it is obvious that the maximizing condition (1) remains the same. Condition (2) would now be

$$r_L\beta D' + r_b(1-\beta)D' - r_d D' - (D+D_o) - D'R(\beta) = 0 \qquad (11)$$

It is clear from (1) that since β depends only on r_L and r_b we would have $\frac{\partial \beta}{\partial D_o} = 0$. Now differentiating (11) with respect to D_o we have

$$[r_L\beta D'' + r_b(1-\beta)D'' - r_d D'' - 2D' - D''R(\beta)]\ \frac{\partial r_d}{\partial D_o} = 1$$

or $\frac{\partial r_d}{\partial D_o} = 1/[r_L\beta D'' + r_b(1-\beta)D'' - r_d D'' - 2D' - D''R(\beta)] < 0$

by virtue of (4). An increase in the exogenous part of deposits reduces the deposit rate required to obtain a given volume of funds.

Some Dynamic Solutions

(i) An increase in r_L

Now let us consider period two for a F.I. having attained equilibrium in period one but now facing a new loan rate r_{L2} such that $r_{L2} > r_{L1}$. We further assume that $r_{b1} = r_{b2}$.

The profit function which the F.I. will face in the second period will be

$$\Pi_2 = r_{L1}\beta_1 D_1 + r_{L2}(\beta_2 D_2 - \beta_1 D_1) + r_{b2}\ D_2(1-\beta_2) - r_{d2}\ D_2 - R(\beta_2)D_2 \qquad (12)$$

Now the first-order profit-maximizing conditions are

$$\frac{\partial \Pi_2}{\partial \beta_2} = r_{L2}D_2 - r_{b2}D_2 - R'(\beta_2)D_2 = 0 \qquad (13)$$

$$\frac{\partial \Pi_2}{\partial r_{d2}} = r_{L2}\beta_2 D_2' + r_{b2}(1-\beta_2)D_2' - r_{d2}D_2' - D_2 - R(\beta_2)D_2' = 0 \qquad (14)$$

By inspection it is clear that (13) and (14) are identical to (1) and (2) with the exception of the period subscripts. Solving (13) and (14) for r_{d2} and β_2 will yield values for these variables such that $\beta_2 > \beta_1$ and $r_{d2} > r_{d1}$. This follows from the fact that $r_{L2} > r_{L1}$, (since we know that $\frac{\partial \beta}{\partial r_L}, \frac{\partial r_d}{\partial r_L} > 0$).

(ii) A decrease in r_L

A decrease in r_L in the second period will have no effect whatever on the equilibrium solution established in period one. This follows from our assumption (rather unrealistic) that no loan repayments are made in the second period. The reduction in the loan rate in period two does not induce the F.I. to alter its portfolio since the effective rate on its loans from period one is unchanged. The assumption of no loan repayments will be dropped later on. The assumption of no secondary market for loans will, however, be retained.

When considering the problem of variations in the bond rate we must allow for variations in the valuation of bond holdings and hence of the total portfolio. This problem was not relevant in the one-period case since it was assumed that the F.I. began the period with zero assets. Where $r_{b2} \neq r_{b1}$, total assets in period two (T_2) will not be identical to D_2. The change in value of total assets must also be included explicitly in the profit function.

(iii) A decrease in r_b

The profit function is

$$\Pi_2 = \beta_2 r_{L2} T_2 + (1-\beta_2) r_{b2} T_2 - r_{d2} D_2 - R(\beta_2)T_2 + T_2 - D_2$$

where $T_2 = D_2 + D_1(1-\beta_1)\left(\frac{r_{b1}-r_{b2}}{r_{b2}}\right)$ and $r_{L1} = r_{L2}$.

It will be noticed that the first and second-order conditions here will be the same as equations (1) - (5) and consequently the terms

$\frac{\partial \beta_2}{\partial r_{b2}}$ and $\frac{\partial r_{d2}}{\partial r_{b2}}$ will be unchanged (except for the addition of the appropriate subscript).

Profits must be at least the same as before since the F.I. can always choose to retain the same portfolio it held before the change.

(iv) An increase in r_{b2}

In the case of an increased bond rate the F.I. faces a situation where the value of his total assets has fallen from that of period one and he is constrained to hold the same volume of loans he held in period one. Consequently, the F.I. has only one decision variable since $\beta_2 = \frac{\beta_1 D_1}{T_2}$.

The profit function is (assuming $r_{L1} = r_{L2}$)

$$\Pi_2 = r_{L2}\beta_1 D_1 + (T_2 - \beta_1 D_1) r_{b2} - r_{d2} D_2 - R\left(\frac{\beta_1 D_1}{T_2}\right) T_2 + T_2 - D_2$$

The first- and second-order conditions for a profit maximum are

$$\frac{\partial \Pi_2}{\partial r_{d2}} = D_2' r_{b2} - r_{d2} D_2' - D_2 + R'\left(\frac{\beta_1 D_1}{T_2}\right)\left(\frac{\beta_1 D_1}{T_2}\right) D_2' - R\left(\frac{\beta_1 D_1}{T_2}\right) D_2' = 0$$

and,

$$\frac{\partial^2 \Pi}{\partial r_{d2}^2} = D_2'' r_{b2} - r_{d2} D_2'' - D_2' - D_2' - R''\left(\frac{\beta_1 D_1}{T_2}\right) \left(\frac{\beta_1^2 D_1^2}{T_2^3}\right)(D_2')^2 - R'\left(\frac{\beta_1 D_1}{T_2}\right)$$

$$(D_2')^2\left(\frac{\beta_1 D_1}{T_2^2}\right) + R'\left(\frac{\beta_1 D_1}{T_2}\right)\left(\frac{\beta_1 D_1}{T_2}\right) D_2'' + R'\left(\frac{\beta_1 D_1}{T_2}\right)\left(\frac{\beta_1 D_1}{T_2}\right)(D_2')^2 - R\left(\frac{\beta_1 D_1}{T_2}\right) D_2'' < 0$$

We know that

$$\frac{\partial r_{d2}}{\partial r_{b2}}\left(\frac{\partial^2 \Pi_2}{\partial r_{d2}^2}\right) + k = 0$$

where $k = D_2' + R''\left(\frac{\beta_1 D_1}{T_2}\right)\left(\frac{\beta_1 D_1}{T_2^2}\right)\left[\frac{D_1 r_{b1}(1-\beta_1)}{rb_2^2}\right]\left(\frac{\beta_1 D_1}{T_2}\right)D_2'$

$+ R'\left(\frac{\beta_1 D_1}{T_2}\right)\left(\frac{\beta_1 D_1}{T_2^2}\right)D_2'\left(\frac{r_{b1}(1-\beta_1)}{r_{b2}^2}\right)D_1$

$- R'\left(\frac{\beta_1 D_1}{T_2}\right)\left(\frac{\beta D_1}{T_2^2}\right)D_2'\left(\frac{r_{b1}(1-\beta_1)}{r_{b2}^2}\right)D_1$.

The first two terms on the right side are >0, hence k>0, $\frac{\partial r_{d2}}{\partial r_{b2}}\left(\frac{\partial^2 \Pi_2}{\partial r_{d2}^2}\right) < 0$, and $\frac{\partial r_{d2}}{\partial r_{b2}} > 0$ since $\frac{\partial^2 \Pi_2}{\partial r_{d2}^2} < 0$ by the second-order condition.

In this case it is of considerable importance whether or not we allow for loan repayments. Suppose that a part, α, of loans outstanding is retired each year. If $\beta_2 T_2 \geq (1-\alpha)\beta_1 D_1$ (i.e., the loan constraint is inoperative), then the profit function and the analysis are the same as in case (iii) above.

If $\beta_2 T_2 < (1-\alpha)\beta_1 D_1$ (i.e., the constraint is operative), then the analysis is the same as case (iv) except that wherever $\beta_1 D_1$ appears we replace it by $(1-\alpha)\beta_1 D_1$

Partial Adjustment of Deposits to Changes in the Deposit Rate

So far we have assumed our deposit function D = D(rd) to be one which gives the volume of deposits which will be held with the F.I. at various deposit rates. Here we make a distinction between actual deposits (D_2^a) and desired deposits (D_2). We postulate these two to be related by the partial adjustment mechanism

$$D_2^a = D_1^a + \lambda(D_2 - D_1^a) \tag{21}$$

where λ is the adjustment coefficient. Implicit in our previous discussion where we did not distinguish between desired and actual deposits was the assumption that $\lambda = 1$. Assume that $D_1 = D_1^a$.

We consider again the situations faced by the F.I. in the second period having reached a position of equilibrium in period one. Assume that $r_{L2} > r_{L1}$. The profit function in this case (compare with (12)) would be

$$\Pi_2 = r_{L1}\beta_1 D_1 + r_{L2}(\beta_2 D_2^a - \beta_1 D_1) + r_{b2}(1-\beta_2)D_2^a - r_{d2}D_2^a - R(\beta_2)D_2^a \tag{22}$$

or

$$\Pi_2 = (r_{L1} - r_{L2})\beta_1 D_1 + r_{L2}\beta_2\{(1-\lambda)D_1 + \lambda D_2\} + r_{b2}(1-\beta_2)\{(1-\lambda)D_1 + \lambda D_2\}$$
$$- r_{d2}\{D_1(1-\lambda) + D_2\lambda\} - R(\beta_2)\{(1-\lambda)D_1 + \lambda D_2\} \tag{23}$$

The first-order conditions for a maximum are

$$\frac{\partial \Pi_2}{\partial \beta_2} = r_{L2} - r_{b2} - R'(\beta_2) = 0 \tag{24}$$

$$\frac{\partial \Pi_2}{\partial r_{d2}} = r_{L2}\beta_2\lambda D_2' + r_{b2}(1-\beta_2)\lambda D_2' - R(\beta_2)\lambda D_2' - r_{d2}\lambda D_2' - \lambda D_2 - D_1(1-\lambda) = 0 \tag{25}$$

or

$$r_{L2}\beta_2 + r_{b2}(1-\beta_2) - R(\beta_2) - \frac{D_2}{D_2'} - \frac{D_1}{D_2'}\left(\frac{1}{\lambda} - 1\right) = r_{d2} \tag{26}$$

The second-order conditions will be the same as before.

Now the interesting question concerns the relative magnitude of the solution values of r_{d2} from (14) and (26). We assume that all things are the same in both situations except that in (26) we have only partial adjustment whereas in (14) complete adjustment was instanteous. We discuss

this question under two alternative assumptions.

Case (i) $\lambda < 1$ and hence $\frac{1}{\lambda} - 1 > 0$

Let us call the deposit rate which solves (26) r^*_{d2}, and that which solves (14) r_{d2}. Then we have $r^*_{d2} > r_{d2}$ if

$$\frac{\{D_2 + D_1(\frac{1}{\lambda}-1)\}D_2''}{(D_2')^2} > 2 \tag{27}$$

If

$$\frac{\{D_2 + D_1(\frac{1}{\lambda}-1)\}D_2''}{(D_2')^2} < 2 \tag{28}$$

we shall have $r^*_{d2} < r_{d2}$.

However, if

$$\frac{\{D_2 + D_1(\frac{1}{\lambda}-1)\}D_2''}{(D_2')^2} = 2 \tag{29}$$

then over the range where this is valid there can be no unique determination of the deposit rate. It is possible that, over the entire span of the deposit function, one or more of (27), (28) and (29) conditions could be valid.

Case (ii) $\lambda > 1$ or $\frac{1}{\lambda} - 1 < 0$

In this case we shall have the reverse of conditions (27) and (28) while (29) will remain the same.

Allowing for the Repayment of Loans

Let us assume that a portion α of total loans held by the F.I. is retired every period due to repayments. Consider again the standard situation of a F.I. facing period two after having established an

equilibrium position in the first period.

(i) An increase in the loan rate

Assume $r_{L2} > r_{L1} (r_{b2}=r_{b1})$.

The profit function in this case is

$$\Pi_2 = r_{L1}(1-\alpha)\beta_1 D_1 + r_{L2}\{\beta_2 D_2 - (1-\alpha)\beta_1 D_1\} + r_{b2} D_2(1-\beta_2) - r_{d2} D_2 - R(\beta_2) D_2 \quad (30)$$

The first-order maximizing conditions would again be

$$\frac{\partial \Pi_2}{\partial \beta_2} = r_{L2} D_2 - r_{b2} D_2 - R'(\beta_2) D_2 = 0 \quad (31)$$

$$\frac{\partial \Pi_2}{\partial r_{d2}} = r_{L2}\beta_2 D_2' + r_{b2}(1-\beta_2)D_2' - r_{d2}D_2' - D_2 - R(\beta_2)D'_2 = 0 \quad (32)$$

The conditions (31) and (32) are precisely the same as (13) and (14) and hence the equilibrium β_2 and r_{d2} will be the same as in the case when there were no loan repayments. However, Π_2 represented by (30) would be higher than Π_2 in (12).

(ii) A decrease in the loan rate

Assume $r_{L2} < r_{L1} (r_{b2}=r_{b1})$. It will always be the case that the fall in r_{L1} is such that the part of the portfolio the F.I. would choose to hold in the form of loans is greater than or equal to $(1-\alpha) D_1\beta_1$. The profit function is

$$\Pi_2 = (1-\alpha) r_{L1}\beta_1 D_1 + r_{L2}\{\beta_2 D_2 - (1-\alpha)\beta_1 D_1\} + r_{b2}(1-\beta_2)D_2 - r_{d2}D_2 - R(\beta_2)D_2 \quad (33)$$

This is the same as (30) and the maximizing conditions will also be the same. However, the level of profits will be lower than before, i.e., $\Pi_2 < \Pi_1$, $D_2 < D_1$, $r_{d2} < r_{d1}$, etc.

3. Two-Period Maximization

So far we have assumed that the F.I. maximizes profits in each period individually, making no allowance for anticipated conditions in future periods. In this section we relax that assumption and postulate that the F.I. attempts to maximize profits over an interval of two periods. We assume that the F.I. has expectations about the loan rate and bond yield which will prevail in period two. (At the beginning of the second period it is assumed that the actual second-period rate is known and of course the F.I. always knows the first-period rate.) Profits for the two periods are given by

$$\Pi = \Pi_1 + \rho\Pi_2$$

where ρ is the discount factor. Profits for period one are

$$\Pi_1 = \beta_1 r_{L1} D_1 + (1-\beta_1) r_{b1} D_1 - r_{d1} D_1 - R(\beta_1) D_1.$$

For period two

$$\Pi_2 = \beta_1 r_{L1} D_1 + (\beta_2 T_2 - \beta_1 D_1) r_{L2} + (1-\beta_2) T_2 \, r_{b2} - r_{d2} D_2 - R(\beta_2) T_2 + T_2 - D_2$$

when $\beta_1 D_1 \leq \beta_2 T_2$, that is the loans held in period one do not constitute a constraint on the optimal level of loans in period two, and

$$\Pi_2 = \beta_1 D_1 r_{L1} + (T_2 - \beta_1 D_1) r_{b2} - r_{d2} D_2 - R\left(\frac{\beta_1 D_1}{T_2}\right) T_2 + (T_2 - D_2)$$

when $\beta_1 D_1 > \beta_2 T_2$, that is, the constraint is binding.

Assume that $\beta_1 D_1 \leq \beta_2 T_2$. Given the rapid growth in total assets of most Canadian financial intermediaries and the fact that loan repayments are constantly being made, this is most likely to be the situation. Then

$$\Pi = \beta_1 r_{L1} D_1 + (1-\beta_1) r_{b1} D_1 - r_{d1} D_1 - R(\beta_1) D_1 + \rho\beta_1 D_1 r_{L1}$$
$$+ \rho(\beta_2 T_2 - \beta_1 D_1) r_{L2} + \rho(1-\beta_2) T_2 \, r_{b2} - \rho r_{d2} D_2$$
$$- \rho R(\beta_2) T_2 + \rho T_2 - \rho D_2.$$

The first-order conditions for a profit maximum are

$$\frac{\partial \Pi}{\partial \beta_1} = r_{L1}D_1 - r_{b1}D_1 - R'(\beta_1)D_1 + \rho D_1(r_{L1}-r_{L2}) + r_{L2}\rho\beta_2 \frac{\partial T_2}{\partial \beta_1}$$

$$+ \rho(1-\beta_2)r_{b2}\frac{\partial T_2}{\partial \beta_1} - \rho R(\beta_2)\frac{\partial T_2}{\partial \beta_1} + \rho\frac{\partial T_2}{\partial \beta_1} = 0 \tag{36}$$

$$\frac{\partial \Pi}{\partial r_{d1}} = \beta_1 r_{L1}D_1' + (1-\beta_1)r_{b1}D_1' - D_1 - r_{d1}D_1' - R(\beta_1)D_1'$$

$$+ \rho\beta_1(r_{L1} - r_{L2})D_1' + r_{L2}\rho\beta_2\frac{\partial T_2}{\partial r_{d1}} + \rho(1-\beta_2)r_{b2}\frac{\partial T_2}{\partial r_{d1}}$$

$$- \rho R(\beta_2)\frac{\partial T_2}{\partial rd_1} + \rho\frac{\partial T_2}{\partial r_{d1}} = 0 \tag{37}$$

$$\frac{\partial \Pi}{\partial \beta_2} = \rho T_2 r_{L2} - \rho T_2 r_{b2} - \rho R'(\beta_2)T_2 = 0 \tag{38}$$

$$\frac{\partial \Pi}{\partial r_{d2}} = \rho\beta_2 r_{L2}D_2' + \rho(1-\beta_2)r_{b2}D_2' - \rho D_2 - \rho r_{d2}D_2' - \rho R(\beta_2)D_2' = 0 \tag{39}$$

It can easily be shown that from the second-order conditions the following relationships may be derived.

$$\frac{\partial^2 \Pi}{\partial \beta_1^2} = -R''(\beta_1)D_1 < 0 \tag{40}$$

$$\frac{\partial^2 \Pi}{\partial \beta_1 \partial r_{d1}} = 0 \tag{41}$$

$$\frac{\partial^2 \Pi}{\partial \beta_1 \partial \beta_2} = \rho r_{L2}\frac{\partial T_2}{\partial \beta_1} - \rho r_{b2}\frac{\partial T_2}{\partial \beta_1} - \rho R'(\beta_2)\frac{\partial T_2}{\partial \beta_1} = 0 \tag{42}$$

$$\frac{\partial^2 \Pi}{\partial \beta_1 \partial r_{d2}} = 0 \tag{43}$$

$$\frac{\partial^2 \Pi}{\partial r_{d1}^2} = \beta_1 r_{L1}D_1'' + (1-\beta_1)r_{b1}D_1'' - D_1' - r_{d1}D_1'' - D_1' - R(\beta_1)D_1''$$

$$+ \rho\beta_1(r_{L1}-r_{L2})D_1'' + r_{L2}\rho\beta_2\frac{\partial^2 T_2}{\partial r_{d1}^2} + \rho(1-\beta_2)r_{b2}\frac{\partial^2 T_2}{\partial r_{d1}^2}$$

$$- \rho R(\beta_2)\frac{\partial^2 T_2}{\partial r_{d1}^2} + \rho\frac{\partial^2 T_2}{\partial r_{d1}^2} < 0 \tag{44}$$

$$\frac{\partial^2 \Pi}{\partial r_{d1} \partial \beta_2} = r_{L2}\rho\frac{\partial T_2}{\partial r_{d1}} - \rho r_{b2}\frac{\partial T_2}{\partial r_{d1}} - \rho R(\beta_2)\frac{\partial T_2}{\partial r_{d1}} = 0 \tag{45}$$

$$\frac{\partial^2 \Pi}{\partial r_{d1} \partial r_{d2}} = 0 \tag{46}$$

$$\frac{\partial^2 \Pi}{\partial \beta_2^2} = -\rho R''(\beta_2)T_2 < 0 \tag{47}$$

$$\frac{\partial^2 \Pi}{\partial \beta_2 \partial r_{d2}} = \rho r_{L2}D_2' - \rho r_{b2}D_2' - \rho R'(\beta_2)D_2' = 0 \tag{48}$$

$$\frac{\partial^2 \Pi}{\partial r_{d2}^2} = \rho\beta_2 r_{L2}D_2'' + \rho(1-\beta_2)r_{b2}D_2'' - \rho D_2' - \rho r_{d2}D_2'' - \rho D_2' - \rho R(\beta_2)D_2'' < 0 \tag{49}$$

The Effects of Changes in Expectations

(i) Revision of the expected loan rate

Differentiating equations (36) to (39) with respect to r_{L2}:

(a) $$\frac{\partial^2 \Pi}{\partial \beta_1^2}\left(\frac{\partial \beta_1}{\partial r_{L2}}\right) - \rho D_1 + \rho\beta_2\frac{\partial T_2}{\partial \beta_1} = 0$$

$$\frac{\partial^2 \Pi}{\partial \beta_1^2}\left(\frac{\partial \beta_1}{\partial r_{L2}}\right) = \rho D_1\left[1 + \frac{(r_{b1} - r_{b2})\beta_2}{r_{b2}}\right] = \rho D_1\left[\frac{r_{b1}}{r_{b2}} + (1-\beta_2)\right]$$

and $\frac{\partial \beta_1}{\partial r_{L2}} < 0$ by the second-order conditions.

That is, if the F.I.'s expectation of the loan rate in period two is revised upward, it will hold fewer loans in period one than it would have otherwise to allow a greater switch into loans in the second period.

(b) $$\frac{\partial^2 \Pi}{\partial r_{d1}^2}\left(\frac{\partial r_{d1}}{\partial r_{L2}}\right) - \rho\beta_1 D_1' + \rho\beta_2\frac{\partial T_2}{\partial r_{d1}} = 0$$

$$\frac{\partial^2 \Pi}{\partial r_{d1}^2}\left(\frac{\partial r_{d1}}{\partial r_{L2}}\right) = \rho D_1'\left[\beta_1 - \beta_2(1-\beta_1)\frac{(r_{b1} - r_{b2})}{r_{b2}}\right]$$

When $r_{b2} \geq r_{b1}$, then $\frac{\partial r_{d1}}{\partial r_{L2}} < 0$. However, when $r_{b2} < r_{b1}$, $\frac{\partial r_{d1}}{\partial r_{L2}} < 0$ only if $\beta_1 > \beta_2(1-\beta_1)\frac{(r_{b1} - r_{b2})}{r_{b2}}$. That is, if the F.I. does

not expect the bond rate to fall and thereby enjoy capital gains on his bond holdings, then an upward revision in the expected loan rate will result in a first-period deposit rate which is lower than it would have been otherwise. The F.I. will wish to decrease the inflow of funds in period one when he expects an even higher rate on loans in period two than previously anticipated. When the bond rate is expected to fall, however, the additional profits in period two resulting from an upward revision of the loan rate must be sufficient to offset the positive influence on r_{d1} of anticipated capital gains.

$$\text{(c)}\quad \frac{\partial^2 \Pi}{\partial \beta_2^2}\left(\frac{\partial \beta_2}{\partial r_{L2}}\right) + \rho T_2 = 0$$

and hence $\dfrac{\partial \beta_2}{\partial r_{L2}} > 0$

$$\text{(d)}\quad \frac{\partial^2 \Pi}{\partial r_{d2}^2}\left(\frac{\partial r_{d2}}{\partial r_{L2}}\right) + \rho \beta_2 D_2' = 0$$

and hence $\dfrac{\partial r_{d2}}{\partial r_{L2}} > 0$

The results (c) and (d) are what one would anticipate.

(ii) Revision of the expected bond yield

Differentiating equations (36) to (39) with respect to r_{b2}:

$$\text{(a)}\quad \frac{\partial^2 \Pi}{\partial \beta_1^2}\left(\frac{\partial \beta_1}{\partial r_{b2}}\right) + r_{L2}\rho\beta_2 D_1\left(\frac{r_{b1}}{r_{b2}^2}\right) + \rho(1-\beta_2)D_1 - \rho R(\beta_2)D_1\left(\frac{r_{b1}}{r_{b2}^2}\right) + \rho D_1\left(\frac{r_{b1}}{r_{b2}^2}\right) = 0$$

$$\frac{\partial^2 \Pi}{\partial \beta_1^2}\left(\frac{\partial \beta_1}{\partial r_{b2}}\right) = -\rho D_1\left(\frac{r_{b1}}{r_{b2}^2}\right)\left[\beta_2 r_{L2} - R(\beta_2)\right] - \rho D_1(1-\beta_2) - \rho D_1\left(\frac{r_{b1}}{r_{b2}^2}\right)$$

Looking at the expression $\beta_2 r_{L2} - R(\beta_2)$, when $\beta_2 = 0$, the expression is zero and $\frac{\partial(\beta_2 r_{L2} - R(\beta_2))}{\partial \beta_2} > 0$ (from equation (38)).

Therefore, $\beta_2 r_{L2} - R(\beta_2) > 0$ and $\frac{\partial \beta_1}{\partial r_{b2}} > 0$. That is, when the expected bond yield in period two is revised upwards and hence the value of bond holdings expected to depreciate even more, the proportion of total assets held in loans in period one will increase.

(b) $$\frac{\partial^2 \Pi}{\partial r d_1^2}\left(\frac{\partial r_{d1}}{\partial r_{d2}}\right) = r_{L2}\rho\beta_2\left(\frac{r_{b1}}{r_{b2}^2}\right)(1-\beta_1)D_1 - (1-\beta_1)\rho(1-\beta_2)D_1' + \rho R(\beta_2)(1-\beta_1)$$

$$\left(\frac{r_{b1}}{r_{b2}^2}\right)D_1' - \rho(1-\beta_1)D_1'\left(\frac{r_{b1}}{r_{b2}^2}\right).$$

$$\frac{\partial^2 \Pi}{\partial r_{d1}^2}\left(\frac{\partial r_{d1}}{\partial r_{b2}}\right) = (1-\beta_1)(1-\beta_2)\rho D_1' + \rho(1-\beta_1)\left(\frac{r_{b1}}{r_{b2}^2}\right)D_1'[r_{L2}\beta_2 - R(\beta_2)]$$

$$+ \rho(1-\beta_1)D_1'\left(\frac{r_{b1}}{r_{b2}}\right)$$

Hence $\frac{\partial r_{d1}}{\partial r_{b2}} < 0$ for reasons similar to those expressed in (a).

The inflow of funds in period one would be diminished in response to upward revisions of the expected bond rate (and hence downward revisions of the expected value of bond holdings brought forward into period two).

(c) $$\frac{\partial^2 \Pi}{\partial \beta_2^2}\left(\frac{\partial \beta_2}{\partial r_{b2}}\right) + \rho r_{L2}(1-\beta_1)D_1\left(\frac{-r_{b1}}{r_{b2}^2}\right) - \rho[D_2 - (1-\beta_1)D_1]$$

$$- \rho R'(\beta_2)(1-\beta_1)D_1\left(\frac{-r_{b1}}{rb_2^2}\right)$$

$$\frac{\partial^2 \Pi}{\partial \beta_2^2}\left(\frac{\partial \beta_2}{\partial r_{b2}}\right) = [D_2 - D_1(1-\beta_1)]\rho + \rho(1-\beta_1)D_1\left(\frac{r_{b1}}{r_{b2}^2}\right)[r_{L2} - R'(\beta_2)]$$

and hence $\frac{\partial \beta_2}{\partial r_{b2}} < 0$

(d) $$\frac{\partial^2 \Pi}{\partial r_{d2}^2}\left(\frac{\partial r_{d2}}{\partial r_{b2}}\right) + \rho(1-\beta_2)D_2' = 0$$

Hence $\frac{\partial r_{d2}}{\partial r_{b2}} > 0$

The results (c) and (d) are what one would have expected.

The formulation of the profit maximization problem presented above and the use of a two-period planning horizon in particular, clarify the effects of the income and speculative influences on the F.I.'s portfolio decisions.

The effects of changes in actual period-one rates are easily derived by differentiating equations (36) to (39) with respect to r_{L1} and r_{b1}. The derivations are not included here but the results are listed in the table below, which provides a summary of the results obtained in the two-period case. The entries show the sign of the partial derivative of the column variable by the row variable.

TABLE II-1

Summary of Conclusions of Two-Period Analysis

	r_{d1}	β_1	r_{d2}	β_2
r_{L1}	+	+	0	0
r_{L2}	?	-	+	+
r_{b1}	+	-	0	0
r_{b2}	-	+	+	-

The question mark in row two column one indicates that the sign of $\frac{\partial r_{d1}}{\partial r_{L2}}$ is dependent upon the condition determined in (i)(b).

Of course, the F.I. will continually make multi-period decisions but qualitatively there will be no difference between two-period maximization and say four-period maximization. However, there is a significant difference between the one and two-period cases as is shown above.

4. Interest Rate Expectations

One possible approach to the determination of expected interest rates is that developed by Modigliani and Sutch,[7] whose primary concern was an explanation of the "preferred habitat theory" of the relationship between short and long-term rates. Their basic hypothesis is expressed in the equation

$$RL = \alpha + \beta\ TBR + \sum_{i=0}^{n} d_i\ TBR_{t-i} + u$$

where RL = the long-term rate on federal government bonds

TBR = the 90-day Treasury bill rate.

The impact of two types of expectations, namely regressive or Keynesian expectations[8] (the rate tends toward a normal level with the latter based on past experience) and extrapolative expectations[9] (deviations from the normal rate are expected to continue) are incorporated in the weighting scheme d_i. The d_i

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[7] F. Modigliani and T. Sutch, "Innovations in Interest Rate Policy", American Economic Review, Vol. 56 (May, 1966), pp. 178-197.

[8] J. Keynes, The General Theory of Employment, Interest and Money (New York: Harcourt, Brace and Co., 1936) pp. 201-204.

[9] J. Duesenberry, Business Cycles and Economic Growth (N.Y.: McGraw-Hill, 1958) p. 318.

are composed of the difference between two lag structures

$$\text{i.e., } d_i = a_1\mu_i - a_2\delta_i$$

where μ_i and δ_i are weighting schemes determined by regressive and extrapolative expectations, respectively. The lag structure of the d_i will not in general follow a geometric form. Since most recent values of the variable being considered are emphasized in the extrapolative case we would expect the δ_i to fall rapidly while the regressive weights, μ_i, would decrease more gradually. Hence the d_i might be expressed to rise initially, perhaps beginning with negative values, and then fall subsequently.

Rather than estimate the weights directly, given the limited number of observations and the existence of collinearity among the lagged values of TBR, the weights are constrained to lie along a polynominal with the degree of the polynominal and the length of the lag determined by experimentation with various lag structures.

Another approach to the formulation of expectations regarding interest rates (the conclusions of which are not necessarily inconsistent with those implied by Modigliani-Sutch approach) is the method of adaptive expectations, which may be explained in the following general way. We postulate that a variable X is dependent upon the expected value of another variable Z, that is

$$X_i = \alpha_0 + \alpha_1 Z_t^* + u_t \tag{50}$$

where Z_t^* denotes the formulation of an expectation on Z in period t. In addition it is assumed that expectations are revised by some fraction of the error in the expected value determined in the previous period, that is

$$Z_t^* - Z_{t-1}^* = \gamma(Z_t - Z_{t-1}^*) \qquad 0<\gamma\leq 1$$

or

$$Z_t^* = \gamma Z_t + (1-\gamma)\, Z_{t-1}^* \tag{51}$$

Substituting from (51) into (50) we have

$$X_t = \alpha_0 + \alpha_1 \{\gamma Z_t + (1-\gamma)\, Z^*_{t-1}\}$$

Repeated substitution for the expected value of Z yields

$$X_t = \alpha_0 + \alpha_1 \{\gamma Z_t + (1-\gamma)\, \gamma Z_{t-1} + (1-\gamma)^2\, \gamma Z_{t-2} + \ldots .\}$$

$$= \alpha_0 + \alpha_1 \sum_{i=0}^{\infty} (1-\gamma)^i\, \gamma Z_{t-i}$$

That is, the expected value of Z is expressed as a weighted average of the variable's present and past actual values where the weights decline geometrically.

The adaptive approach to formulation of expectations is the one used in the following chapters in this study. As a practical matter it is not feasible to estimate the weights directly and hence in the estimated equations below different weighting schemes were attempted using various values of γ.

5. General Form of the Demand Equation

On the basis of the above discussion we conclude that the demand equation for a financial asset on the part of a financial intermediary has the general form[10]

$$\left(\frac{A(1)}{TA}\right)^* = \beta_0 + \beta_1\, r(1) + \beta_2\, r(2) + \beta_3\, r^e(1) + \beta_4\, r^e(2) \qquad (52)$$

where $\left(\frac{A(1)}{TA}\right)^*$ = The desired proportion of the portfolio in the form of the asset A(1).

$r(i)$ = The actual rate of return on asset A(i)

$r^e(i)$ = The expected rate of return on asset A(i)

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[10] A linear relationship is assumed for the sake of simplicity. The signs of the coefficients are expected to be consistent with the conclusions summarized in Table II-1.

It is assumed that differences between a desired and actual portfolio position are corrected according to the partial adjustment mechanism

$$\left(\frac{A}{TA}\right)_t - \left(\frac{A}{TA}\right)_{t-1} = \lambda\left[\left(\frac{A}{TA}\right)^*_t - \left(\frac{A}{TA}\right)_{t-1}\right] \tag{53}$$

where λ is the adjustment coefficient. Rearranging equation (53)

$$\left(\frac{A}{TA}\right)_t = \lambda\left(\frac{A}{TA}\right)^*_t + (1-\lambda)\left(\frac{A}{TA}\right)_{t-1} \tag{54}$$

Substituting from (52) into (54)

$$\left(\frac{A(1)}{TA}\right)_t = \alpha_0 + \alpha_1\, r(1)_t + \alpha_2\, r(2)_t + \alpha_3\, r^e(1)_t + \alpha_4\, r^e(2)_t + \alpha_5\left(\frac{A(1)}{TA}\right)_{t-1} \tag{55}$$

where $\alpha_0 = \lambda\beta_0$, $\alpha_1 = \lambda\beta$, etc., and $\alpha_5 = 1-\lambda$

Equation (55) is the basic form of the demand equation which will be used later in this study with appropriate modifications for particular institutions.

III

THE CHARTERED BANKS

1. The Role of Government Securities in the Portfolio of Chartered Banks

An understanding of the role of government securities in the portfolio of chartered banks is of particular importance in that it facilitates prediction of the likely response of banks to monetary policy, a topic which has generated a good deal of controversy.

There are basically two opposing views with regard to the manner in which the banks manage their stock of government securities. On the one hand are the proponents of the availability doctrine among whose numbers are included perhaps the majority of central bankers.[1] The central proposition of the availability theory with regard to bank management of its stock of government securities is the so-called "lock-in" effect. Essentially, this theory suggests that during periods of rising income and interest rates, banks tend to maintain and perhaps add to their stock of government bond holdings due to (1) capital losses which would be realized upon sale (2) a decrease in overall liquidity of the portfolio which results from a reduction in the market value of the government securities component and hence an increase in the loans/total assets ratio.

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(1) See L. Rasminsky's description of the transmission mechanism of monetary policy in "The Role of the Central Banker Today", the Canadian Banker, vol. 74, no. 1, Spring, 1967, p. 29. For a discussion of the availability doctrine see A. Tussing, "Can Monetary Policy Influence the Availability of Credit", Journal of Finance, vol. XXI (March, 1966), pp. 1-13.

In contrast to this interpretation of the banks' use of government securities is that of Kane and Malkiel[2], Levy[3], Goldfeld[4] and others. Kane and Malkiel maintain that the problem facing the banks can be described in the following model of portfolio choice.

$$\max \quad U = U\,(E(\pi), \sigma^2(\pi))$$

$$\text{subject to} \quad L + G = \bar{D} + \bar{N}$$

$$L \geq 0$$

$$G \geq 0$$

$$\text{where} \quad E(\pi) = L.\ E(r) + G.\ E(g)$$

$$\sigma^2(\pi) = L^2\,\sigma_r^2 + G^2\,\sigma_g^2 + 2LG\,\rho_{rg}\sigma_r\sigma_g$$

L = bank loans

G = government security holdings

$\bar{D}$ = total deposits, a constant

$\bar{N}$ = bank net worth, a constant

r = rate of return on L

g = rate of return on G

$\sigma^2(\pi)$ = the variance of π

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(2) R. Kane and B. Malkiel, "Bank Portfolio Allocation, Deposit Variability and The Availability Doctrine", Quarterly Journal of Economics, vol. LXXIX (Feb., 1965) pp. 113-134.

(3) M. Levy, Cycles in Government Securities II: Determinants of Changes in Ownership (N.Y.: National Industrial Conference Board, 1965)

(4) S. Goldfeld, Commercial Bank Behaviour and Economic Activity (Amsterdam: North-Holland Publishing Co., 1966)

They assume, as expected

$$\frac{\partial U}{\partial E(\pi)} > 0, \quad \frac{\partial U}{\partial \sigma^2(\pi)} < 0$$

and

$$\frac{d\sigma^2(\pi)}{dE(\pi)}_{u=k} = - \frac{\frac{\partial U}{\partial E(\pi)}}{\frac{\partial U}{\partial \sigma^2(\pi)}} > 0$$

i.e. that the indifference curves have the desired convexity property.

It is their contention that the "conventional theory", which was outlined above, concludes that government bond holdings should be maintained or increased and loans not extended, in spite of an increased demand for them, because it has considered only the risk of extending loans while ignoring the risk of not doing so. To incorporate the latter, they categorize loan demands according to the deposit history of the prospective borrowers. Prime borrowers (L* borrowers in their analysis) are those who consistently maintain a large and stable deposit level with the bank. By retaining these deposit accounts the bank reduces the variability of its total deposits. Refusal to extend loans to these customers during periods of increased economic activity will likely result in the loss of these accounts to competitors and a consequent increase in deposit variability.

Two assumptions are made in relating deposit variability to the arguments in the bankers' utility functions: (a) increased deposit variability worsens total risk; (b) increased deposit variability reduces expected profits (through increased brokerage fees, etc.). The notion of deposit variability is included in their formal analysis by the inclusion in their risk and profit functions of a shift parameter R_{jo} "which measures (as of time zero) the quality of the relationship the banker has been able to establish with the jth customer."

Then from the above two assumptions

$$\frac{\partial E_j}{\partial R_{jo}} > 0, \quad \frac{\partial \sigma_j^2}{\partial R_{jo}} \leq 0. \quad (j = 1, \ldots, n)$$

n = no. of depositors.

E_j = expected value of the jth account's deposit flow

σ_j^2 = the variance of the jth account's deposit flow ,

It follows that improvement in customer relations renders the bank better off.

$$\frac{dU_j}{dR_{jo}} = \frac{\partial U}{\partial E_j} \cdot \frac{\partial E_j}{\partial R_{jo}} + \frac{\partial U}{\partial \sigma_j^2} \cdot \frac{\partial \sigma_j^2}{\partial R_{jo}} > 0 \qquad (1)$$

$(j = 1, \ldots, n)$

Their thesis is that simply receiving a loan request from a prime customer alters the bank's optimum portfolio. Refusing the request decreases Rjo and by (1) decreases the utility of the existing portfolio. However, it does not follow that making the loan increases U, for aside from increasing Rjo, it also increases the loans/government bonds ratio which decreases the liquidity of the portfolio, thereby increasing risk and lowering U.

Moreover, the bank's decision must be viewed in the context of long-run profit maximization. For deposit accounts that are expected to grow, reducing the quality of customer relations by loan refusal will have a significant impact on long-run profits. This is reinforced by the regular customer's tendency to borrow from the same bank even during periods of monetary ease, a period when banks have difficulty lending available funds.

Similar to the above approach is the work by Michael Levy[5]. He views bank investment in governments as a residual investment to accommodate funds

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(5) M. Levy, op. cit.

available after all profitable loan demand has been supplied. His outline of cyclical bank portfolio behaviour is as follows. The existence of a recession and the consequent sparse demand for bank loans induces the central bank to increase the money supply. The expansionary monetary policy results in idle lending capacity on the part of the banks and hence residual buying of governments. The ensuing recovery sees bank lending capacity restricted by tight monetary policy in the face of growing loan demand and hence residual selling of governments by banks.

Like Kane and Malkiel, he divides bank loans into two categories (a) low risk, and (b) high risk. Borrowers in the first category usually maintain high and stable levels of deposits while the deposits of borrowers in the second category are normally minimal. For low risk borrowers, lending will continue up to the point where the prime lending rate equals the marginal cost of the last loan. Included in his concept of marginal cost is a credit item which measures the bank's net benefit from its relation with the marginal borrower. This corresponds to the shift parameter R_{jo} used by Kane and Malkiel. The benefit would be considerable for low-risk loans and near zero for high-risk loans. During periods of increased demand for bank loans, if total demand for low-risk loans exceeds the bank's lending capacity, the bank would be induced by the existence of the benefit emanating from the customer's deposit position to reduce its holdings of government bonds and extend loans. If demands were still greater than the bank's capacity at the point where the marginal cost including the benefit was equal to the existing prime lending rate, the bank would have to engage in non-price credit rationing. If idle lending capacity still exists after all low-risk demands are supplied, then high-risk loan requests are considered.

Levy's conclusions are consistent with those of Hodgman[6], Freimer and Gordon[7], and Modigliani and Jaffee[8] on the inevitability of credit rationing at some point. Of interest from a policy point of view is the fact that credit rationing by banks may not occur, and indeed the preponderance of evidence in the U.S. suggests it does not occur, until substantial selling of government securities by banks has taken place.

In line with the positions of Kane and Malkiel and Levy is that of Goldfeld who views the role of government securities in bank portfolios as that of a buffer stock. He concludes that banks are willing to take the capital losses resulting from the sale of government bonds during periods of rising interest rates to maintain good relations with its prime customers. He points out, "The long-run profits of a bank probably depend to a greater extent on the bank's ability to retain customers who use the essential banking services ... than upon skillful short-run choices by the portfolio managers among alternative types of earning assets."[9] Like Levy, he regards the volume of government bond holdings by banks as determined by a residual decision. His representative equation for the demand for an asset A is

$$\Delta A_t = b_o + b_1 A_{t-1} + b_2 r_t' + b_3 r_t'' + \ldots + b_{n-1} C_t + b_n C_{t-1}$$

r' = the own rate

r_t'' = the rate on an alternative asset

C_t = a constraint

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(6) C.D. Hodgman, "Credit Risk and Credit Rationing", Quarterly Journal of Economics, May 1960, vol. LXXIV, pp. 258-278.

(7) M. Freimer and M. Gordon, "Why Bankers Ration Credit", Quarterly Journal of Economics, Aug. 1968, vol. LXXIX, pp. 397-416.

(8) D. Jaffee and F. Modigliani, "Theory and Test of Credit Rationing", American Economic Review, Dec. 1969, vol. LIX, pp. 850-872.

(9) S. Goldfeld, op. cit., p. 15.

It should be noted that no explicit consideration is given to risk in this formulation and included is an implicit rejection of the homogeneity assumption with regard to the constraint C.

2. Review of Bank Portfolio Structure

The analysis begins in 1957 to allow time for structural changes to be completed following the revision of the Bank Act in 1954. Chart III-1 and Table III-1 provide a summary of the behaviour of various components of the chartered banks' assets in the period 1957-1971.

The asset class showing the fastest growth is the general loans classification which increased from 38 per cent of total bank assets in 1957 to 53 per cent in 1971. This was largely due to rapid growth in personal loans, which increased by 628 per cent between 1958 and 1971, compared to a 305 per cent increase for business loans and 277 per cent for farm loans. The banks entered the personal instalment loans field in 1958 and since then have competed vigorously with the sales finance and consumer loan companies until today they are the largest lenders in the field. The growth in farm loans was assisted by the government guarantee against default in some of these loans under the Farm Improvements Loan Act. Of the $1,388 million in loans to farmers at the end of 1971, $332 million were under this act. Of lesser importance has been the Small Business Loans Act which provides a government guarantee similar to that described above. Loans under this act comprised only 0.7 per cent of total business loans at the end of 1971. As the graph indicates, the growth in general loans has been a steady process with no significant fluctuations between 1958 and 1970. The upward trend was sustained by the repeal of the 6 per cent ceiling in the 1967 Bank Act Revision, which opened up a variety of new loan opportunities.

MAJOR ASSETS OF CHARTERED BANKS (1)

(millions of dollars)

	Total Assets	B. of C. Notes & Deposits	% of Total Assets	TBs & Bonds	% of Total Assets	Other Cdn. Sec.	% of Total Assets	Total Mortgages	% of Total Assets	General Loans	% of Total Assets
1957	10812	866	8.0	2640	24.4	962	8.9	586	5.4	4063	37.6
1958	12089	1001	8.3	3512	29.1	1164	9.6	790	6.5	4138	34.2
1959	12047	953	7.9	2801	23.3	1063	8.8	968	8.0	4701	39.0
1960	12800	992	7.8	3055	23.9	1005	7.9	971	7.6	5032	39.3
1961	14015	1096	7.8	3796	27.1	1054	7.5	953	6.8	5647	40.3
1962	14477	1162	8.0	3368	23.3	1114	7.7	921	6.4	6445	44.5
1963	15804	1230	7.8	3942	24.9	1134	7.2	891	5.6	7119	45.0
1964	16605	1237	7.4	3719	22.4	1166	7.0	851	5.1	8222	49.5
1965	18926	1417	7.5	3734	19.7	1205	6.4	815	4.3	9751	51.5
1966	20146	1549	7.7	3885	19.3	1167	5.8	783	3.9	10455	51.9
1967	22868	1547	6.8	4629	20.2	1200	5.2	840	3.7	11847	51.8
1968	26380	1683	6.4	5562	21.1	1369	5.2	1043	4.0	13252	50.2
1969	27564	1652	6.0	5064	18.4	1376	5.0	1325	4.8	14886	54.0
1970	30424	1703	5.6	6598	21.7	1649	5.4	1457	4.8	15726	51.7
1971	36475	2070	5.7	7330	20.1	2287	6.3	2308	6.3	19327	53.0

(1) End of period values.

SOURCE: Bank of Canada, Review.

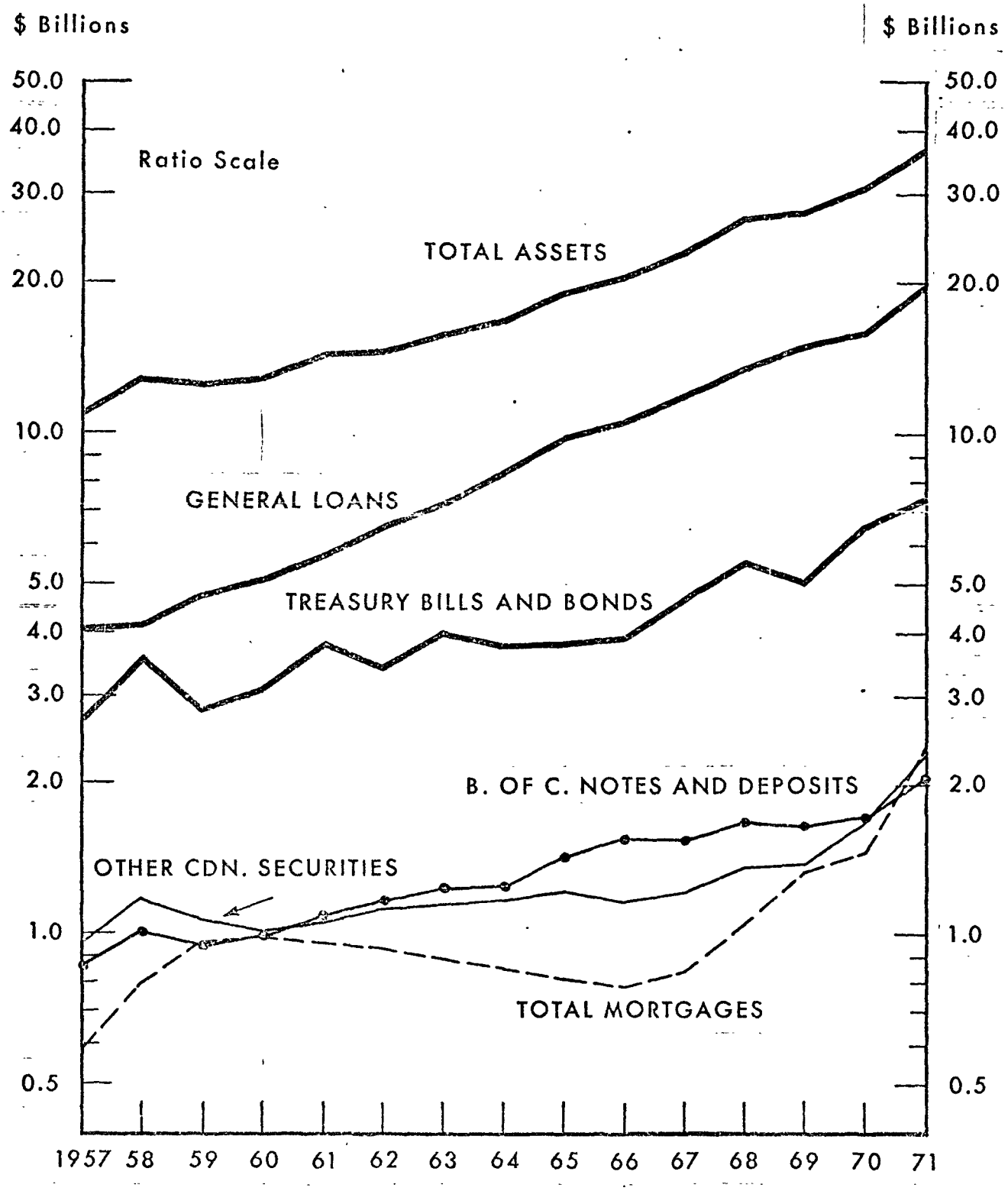
In contrast to the pattern of general loans is the government securities component of bank assets which, although showing an increase in absolute terms along with all other assets shown except NHA mortgages, has decreased in terms of percentage of total bank assets from 24 per cent in 1957 to 20 per cent in 1971. Treasury bill holdings remained roughly constant as a percentage of total assets between 1957 and 1967, at just below 7 per cent, and increased slightly from 1967 to 1971, probably in response to the institution of a secondary reserve ratio in the 1967 Bank Act revision. Graph III-1 indicates that, unlike the smooth pattern for general loans, bank holdings of government securities, particularly government bonds, have exhibited considerable year-to-year fluctuations.

Bank reserves grew along with total assets, remaining a relatively constant percentage of total assets, between 7.5 per cent and 8.5 per cent in the period 1957 to 1966. However, there was a significant decrease in their relative size between 1967 and 1971, their percentage of total assets falling from 7.7 per cent to 5.7 per cent. This may be attributed to the initiation of a dual reserve ratio in the 1967 Bank Act Revision, which reduced the average reserve ratio. Moreover, the relative growth in time deposits (an increase of 60 per cent from 1967 to 1971, compared to 33 per cent for demand deposits excluding deposits of the Government of Canada) resulting from the repeal of the 6 per cent ceiling in 1967 and the subsequent increased competition on the part of banks for these deposits, has allowed even greater economizing on reserves under the dual rate system.

Mortgage loans under the NHA plan grew from their commencement in 1954 to almost $1,000 million in 1959. In that year the NHA rate exceeded the 6 per cent ceiling and NHA loans fell until 1967, when the ceiling was removed. Also in 1967, banks were allowed to enter the conventional mortgage field (with some limitations) and in less than three years the volume of such loans grew to $300 million.

CHART III-1

GROWTH IN SELECTED CHARTERED BANK ASSETS



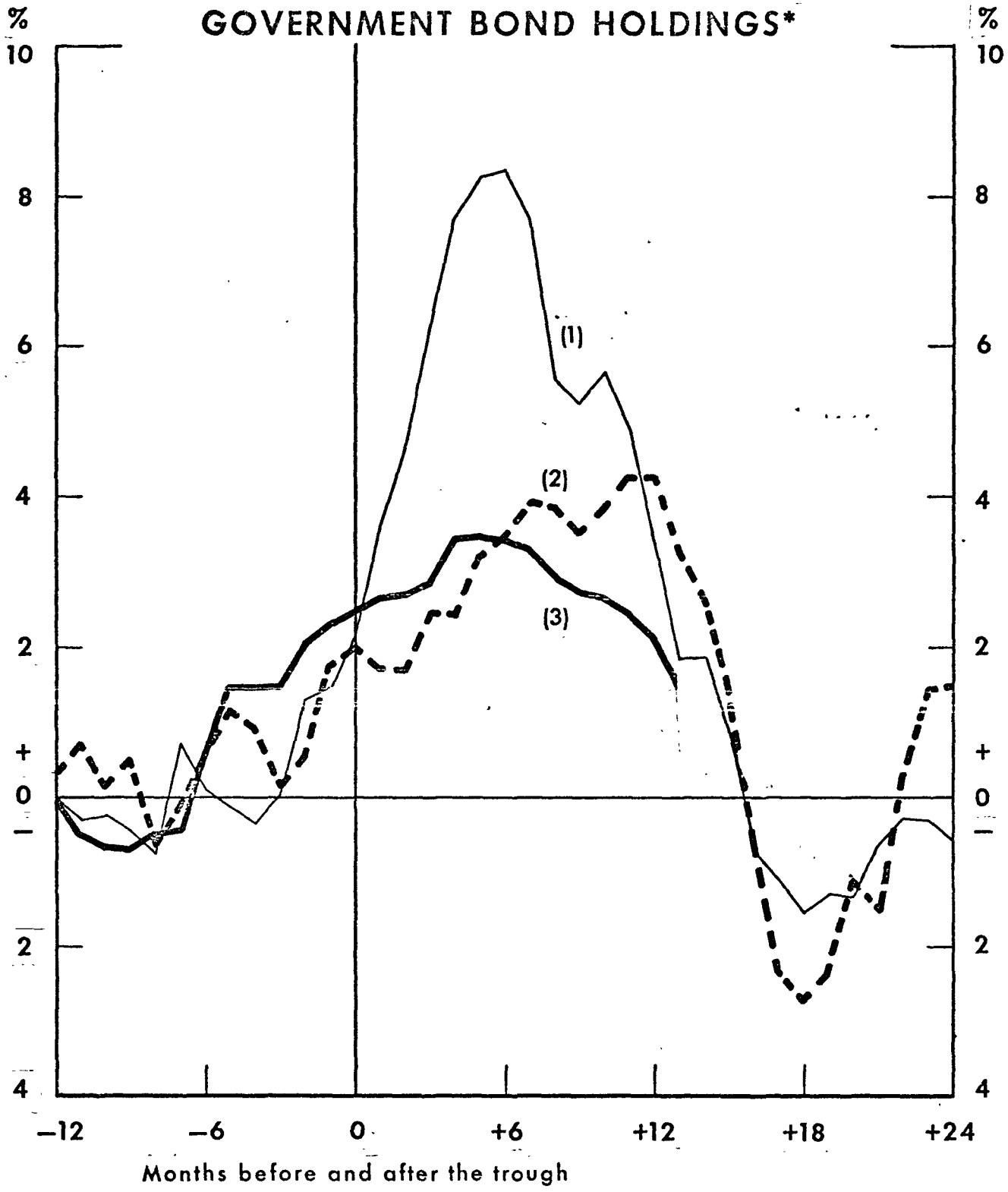
Source: Bank of Canada, Review.

Chartered bank holdings of federal securities have exhibited a distinct cyclical pattern which appears clearly related to the cyclical fluctuations in overall economic activity. The banks tend to buy government securities during the recessionary phase of the cycle and in the early part of the recovery period. As the expansion of economic activity accelerates, the banks reduce their holdings, presumably to accommodate the growing demand for loans. Chart III-2 provides a comparison of the behaviour of the ratio of government securities to total bank assets over the recovery phases of the current and previous two business cycles. The curves show for each period the difference between the actual ratio and the value it reached at the previous peak in the business cycle. Noticeable in the diagram, apart from the cyclical pattern mentioned above, is the downward trend over time in the proportions of the banks' total assets held in government securities.

3. Specification and Estimation of Chartered Bank Demand Equations for Government of Canada Securities

The business of banking involves, essentially, the distribution of a continuous inflow of funds, which originate from deposits, sale of various assets, repayment of loans, the issuing of debentures (since 1967), etc., among alternative asset categories in an attempt to maximize profits. The nature of the distribution will depend upon institutional considerations, tradition, and the return-risk attributes of the alternative assets. Of particular importance to banks is the maintenance of a sufficiently liquid portfolio to enable them to meet sudden demands on their reserves that result from a lack of synchronization of the inflow and outflow of funds. A stock of liquid assets is kept in anticipation of contingencies of this sort and this accounts for an important function of the government securities held by banks. In addition, government securities of longer term to maturity are held both for their liquidity, since there is a ready market for them (although now the risk of capital loss upon sale becomes of greater significance) and for the income they generate.

CYCLICAL BEHAVIOUR OF CHARTERED BANK GOVERNMENT BOND HOLDINGS*



* Differentials are plotted; actual - previous peak level of the ratio of chartered bank government bond holdings to total major assets.

(1) Business cycle April 1957-April 1960; reference trough date is April 1958.

(2) Business cycle March 1960-March 1963; reference trough date is March 1961.

(3) Business cycle November 1969-December 1971; reference trough date is November 1970.

Source: Bank of Canada, Review.

It was also suggested earlier that customer relations and cyclical considerations are important factors and the volume of government securities held by banks might be determined, to a large extent, in a residual fashion. In summary then, the proportion of bank total assets held in the form of federal government securities is postulated to depend upon return-risk considerations, and the extent to which the banks' lending capacity has been utilized.

Equation (2) is a general form, which incorporates the conclusions reached in Chapter II along with a variable which measures the impact of cyclical factors, and may be used as a representation of the banks' demand for federal government securities.

$$\left(\frac{GS}{TA}\right)_t = \beta_0 + \beta_1 BR_t + \beta_2 LR_t + \beta_3 BR_t^e + \beta_4 LR_t^e + \beta_5 \left(\frac{GNP - GNPP}{GNP}\right)_t + \beta_6 \left(\frac{GS}{TA}\right)_{t-1} + \beta_7 D2 + \beta_8 D3 + \beta_9 D4 \qquad (2)$$

GS = chartered banks' holdings of federal government securities
TA = total major assets of the chartered banks.
BR = an average rate on three to five year Government securities.
LR = the prime bank lending rate.
BR^e = the expected rate on BR.
LR^e = the expected lending rate.
GNPP = potential GNP in current dollars.
GNP = current dollar gross national product.
D2 = a seasonal dummy which takes the value one in the second quarter of each year and zero elsewhere. D3 and D4 are defined similarly.

The suggestions of Goldfeld and others that the proportion of total assets in the form of loans is, for the most part, demand - determined is accounted for in the term $\left(\frac{GNP - GNPP}{GNP}\right)$ which reflects the cyclical variation in economic activity and consequently the extent of utilization of the banks' lending capacity. The variable GNPP is a measure of potential GNP.[10] On the basis of the earlier

(10) The particular series used here is that developed by the Economic Council of Canada. For a discussion of the methodology involved in the construction of the series see the Sixth Annual Review, pp. 10-14. The series is adjusted to a current dollar basis by application of the actual GNP deflator, to permit a comparison with the current dollar GNP series used.

discussion of the cyclical behaviour of the banks' holdings of government bonds, where the evidence suggested that the banks attempt to accommodate the demand for loans by altering their stock of governments, we would expect the coefficient of $\frac{(GNP - GNPP)}{GNP}$ to be negative.

The signs of the other estimated coefficients are expected to be consistent with the results of the analysis in Chapter II, which are summarized in Table II-1. Moreover, since the banks hold Treasury bills primarily for liquidity purposes (and after 1967 to meet the secondary reserve requirements), while bonds are held for income as well as liquidity considerations, one would anticipate that current and expected interest rate levels would play a more significant role where the dependent variable in equation (2) is defined to exclude Treasury bill holdings than when it includes all government securities. Also, since adjustment to the desired ratio of government security holdings to total assets implies shifting out of loans, for which a highly-developed secondary market does not exist, we should expect a relatively low speed of adjustment.

Equation (2) was estimated using OLS* for the period 1957 I - 1971 IV, using quarterly data, unadjusted for seasonality. The selection of the initial period was designed to allow for institutional adjustments following the Bank Act Revision of 1954. The dependent variable was defined alternatively as total bank holdings of federal government securities (GS) and as total holdings less Treasury bills (OB). Because of the high degree of collinearity among time series on interest rates, equations were estimated using both the levels of current rates and their differentials. The data used (with the exception of GNPP) were obtained from the CANSIM data bank available at the Department of Finance. The values of chartered bank holdings of Treasury bills and other federal bonds are recorded on the basis of face value and amortized value, respectively, and hence are not altered by subsequent changes in the yields on these assets.

The estimated equations {(3)-(6)} are presented in Table III-2. The explanatory power of the equations is quite good but the Durbin - Watson statistic

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* Ordinary least squares.

suggests the presence of autocorrelation among the residuals.[11] The results summarized in Table III - 2 may be compared with the conclusions of the theoretical model as presented in Table II - 1 in the column below the variable β_1. The variables BR and LR correspond to the first-period bond and loan rates, respectively, while BR^e and LR^e correspond to the expected second-period values for these variables. In comparing the signs of the estimated coefficients with the expected signs as outlined in Table II - 1, it should be recalled that the dependent variable in the estimated equations in Table III - 2 is the ratio of government securities to total assets, whereas β_1 represents the ratio of loans to total assets. The signs on the coefficients of all explanatory variables are consistent with our expectations and, with the exception of BR all prove to be statistically significant using a one-tailed t-test at a .025 level of significance. Since the low t-value on the own rate may be due to the existence of multicollinearity, the rate differential was also used. The coefficient of (BR-LR) has the expected sign and enters significantly. The results would also appear to lend some support to the contention that current and expected interest rates are more significant in the case of OB than GS. As pointed out in Chapter II, the actual weighting schemes used in deriving the BR^e and LR^e series were arrived at on the basis of considerable experimentation with a range of γ values (.01 to .09) and lag periods. In equations (3)-(14) a value of .50 was selected for the expectations coefficient for both BR^e and LR^e on the basis of the statistical significance of the estimated coefficients and their signs, and the contribution made by the variables to the explanatory power of the equation.

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(11) Using OLS when the lagged dependent variable is included as an explanatory variable and the disturbances are serially correlated will yield estimated coefficients which are not consistent. For a discussion of the sign and magnitude of the bias in the estimated coefficients under various assumptions regarding the specification of the model see J. Johnston, Econometric Methods (N.Y.: McGraw-Hill, 1972), pp. 307-312 and also E. Malinvaud, Statistical Methods in Econometrics (Amsterdam: North-Holland Publishing Co., 1966), pp. 458-467. In addition the Durbin-Watson test for serial correlation in the residuals is no longer accurate. For a discussion of this problem see J. Johnston, op. cit., pp. 303 - 320.

BANKING SECTOR REGRESSION RESULTS

EQUATION	DEPENDENT VARIABLE	INDEPENDENT VARIABLES										STATISTICS		
		K	BR	LR	(BR-LR)	BR^e	LR^e	$\frac{(GNP-GNPP)}{GNP}$	LAGGED DEPENDENT VARIABLE	D2	D3	D4	$\bar{R}^2$	S.E.E.	D-W
(3)	$GS/_{TA}$	.0391 (1.584)	.0125 (.814)	-.0379 (-3.060)		-.0256 (-1.530)	.0506 (3.545)	-.1256 (-2.057)	.7477 (10.127)	.0034 (.590)	.0188 (1.635)	.0086 (1.247)	.877	0.0106	1.18
(4)	$OB/_{TA}$	.0263 (1.397)	.0152 (1.168)	-.0375 (-3.649)		-.0267 (-1.864)	.0475 (4.005)	-.0891 (-1.762)	.7751 (11.203)	.0031 (.658)	.0118 (1.233)	.0053 (.926)	.912	.0089	1.06
(5)	$GS/_{TA}$	.0420 (1.641)			.0333 (2.621)	-.0469 (-3.277)	.0462 (3.144)	-.1723 (-2.890)	.7103 (9.509)	.0060 (1.043)	.0261 (2.283)	.0127 (1.843)	.868	0.0111	1.17
(6)	$OB/_{TA}$	.0304 (1.559)			.0337 (3.195)	-.0461 (-3.854)	.0440 (3.598)	-.1329 (-2.730)	.7246 (10.633)	.0057 (1.184)	.0188 (1.997)	.0092 (1.617)	.905	0.0093	1.05
Using Hildreth - Lu Transformation															
(7)	$GS/_{TA}$	.0721 (1.971)	.0101 (.760)	-.0350 (-2.825)		-.0245 (-1.576)	.0471 (3.012)	-.1044 (-1.670)	.6667 (7.142)	.0023 (.455)	.0152 (1.323)	.0067 (1.048)			1.73
(8)	$OB/_{TA}$	.0569 (1.907)	.0140 (1.312)	-.0337 (-3.322)		-.0265 (-2.053)	.0422 (3.223)	-.0698 (-1.382)	.6903 (7.599)	.0021 (.518)	.0086 (.922)	.0036 (.693)			1.72
(9)	$GS/_{TA}$	.0914 (2.259)			.0233 (2.091)	-.0389 (-2.754)	.0351 (2.291)	-.1254 (-2.007)	.6037 (6.117)	.0033 (.642)	.0180 (1.553)	.0084 (1.309)			1.65
(10)	$OB/_{TA}$	.0838 (2.487)			.0234 (2.687)	-.0376 (-3.237)	.0311 (2.422)	-.0811 (-1.623)	.5980 (6.305)	.0026 (.662)	.0101 (1.085)	.0045 (.872)			1.63
Two - Stage Estimates															
(11)	$GS/_{TA}$	.0379 (1.507)	.0011 (.1196)	-.0315 (-3.235)		-.0133 (-1.477)	.0432 (3.943)	-.1136 (-1.532)	.7651 (10.242)	.0027 (.420)	.0171 (1.219)	.0077 (.971)	.976	.0107	1.17
(12)	$OB/_{TA}$	.0264 (1.371)	.0039 (.510)	-.0308 (-3.779)		-.0140 (-1.800)	.0391 (4.246)	-.0877 (-1.421)	.7919 (11.338)	.0033 (.605)	.0121 (1.033)	.0054 (.810)	.910	.0090	1.06
(13)	$GS/_{TA}$	.0448 (1.677)			.0146 (1.786)	-.0245 (-2.830)	.0224 (2.592)	-.2071 (-2.926)	.7210 (9.249)	.0090 (1.377)	.0336 (2.481)	.0163 (2.093)	.859	.0114	1.13
(14)	$OB/_{TA}$	.0344 (1.687)			.0161 (2.362)	-.0247 (-3.360)	.0211 (2.903)	-.1745 (-3.024)	.7314 (10.248)	.0091 (1.691)	.0276 (2.478)	.0134 (2.082)	.897	.0096	1.02

The figures given in parentheses under the estimated coefficients are t-values.

GS = Chartered banks' holdings of federal government securities, millions of dollars.
TA = Total major assets of the chartered banks, millions of dollars.
BR = An average rate on GS (3 to 5 years).
LR = The prime bank lending rate.
BR^e = The expected rate on BR.
LR^e = The expected lending rate.
GNPP = Potential GNP in millions of current dollars.
D2 = A seasonal dummy = 1 in the second quarter of each year and 0 elsewhere; other seasonal dummies are defined similarly.
K = A constant.
GNP = Current dollar gross national product.

The negative sign on the variable $\frac{GNP-GNPP}{GNP}$ is in accord with the view that the banks add to their stock of government bonds during the recessionary phase of the cycle when monetary policy is expansionary and the demand for bank loans light and subsequently liquidate a part of this stock when the demand for loans accelerates in the recovery phase. The value of the adjustment coefficient implied by equations (3)-(6) is somewhat low (in the range .23 to .29), although this is likely due to an upward bias in the estimate of the lagged dependent variable's coefficient.[12]

There are two sources of bias in the equations presented below. The first is simultaneous equation bias arising from the existence of a relationship between BR and the disturbance term and the second is generated by the inclusion of the lagged dependent variable as an explanatory variable, while there is evidence of autocorrelation among the residuals. Moreover, the OLS estimates will be inconsistent so that the bias in the estimated coefficients will persist even for large sample sizes. Two procedures were attempted to eliminate these sources of bias.

To eliminate the problem of simultaneous equation bias, a two-stage procedure was used which involved first obtaining an estimat of BR and then replacing the own rate with its estimated values in the regression equations. To eliminate the upward bias in the coefficient of the lagged dependent variable, the Hildreth-Lu estimation procedure, which yields consistent estimates provided that the disturbance terms are related according to a first-order autoregressive scheme, was applied to equations (3)-(6).[13]

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(12) See J. Johnston, op. cit., pp. 307 - 312.

(13) The procedure is described in C. Hildreth and J. Lu, Demand Relations with Autocorrelated Disturbances, Technical Bulletin no. 276, Michigan State University Agricultural Experiment Station, Department of Agricultural Economics, East Lansing, November, 1960.

The results of the implementation of the Hildreth-Lu procedure are presented in equations (7)-(10). They are, in general, very similar to those obtained in equations (3)-(6) with the notable exception (aside from the improvement in the Durbin-Watson statistic) that the estimated value of the adjustment coefficient has increased significantly in all cases. The estimated values are now in the range .31 to .40. This implies that close to 95 per cent of total adjustment would take between 6 and 8 quarters.

Computed values of the variable BR were obtained through estimation of the following relationship.

$$BR = \alpha_0 + \alpha_1 \text{ TBRC} + \alpha_2 \text{ BRUS} + u$$

where TBRC = 90-day Treasury bill rate in Canada.

BRUS = the long-term rate on federal government bonds in the U.S.

The rate of change in the price level was also included as an explanatory variable but it proved to be insignificant. The estimated values of BR from the above relationship (which had an $\bar{R}^2 = .98$) were entered in place of the observed series in equations (3)-(6) of Table III-2 and the results of the reestimation are presented in equations (11)-(14) of that table. It is apparent that there is in general very little difference between the original estimates and the two-stage results.[14]

4. Stability of the Estimated Coefficients

It will be noted that the data period used in the estimation of the equations in Table III-2 is 1957 I - 1971 IV, during which interval there occurred a substantial revision in the Bank Act (1967). This legislation is likely to have resulted in a change in the behaviour of banks with respect to the management of their portfolio, a possibility which has not yet been considered explicitly above. A casual examination of the results of estimating equations of the form

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(14) Because of the similarity in the two-stage and OLS estimates, corrections for both types of bias were not attempted simultaneously.

(3) and (4) in Table III-2 for the two periods 1957 I - 1967 II and 1967 II - 1971 IV reveals that the signs of the coefficients remain unchanged but their magnitudes do not. However, more evidence would be desirable before arriving at a conclusion regarding the stability of the estimated coefficients.

Two tests were carried out in this connection. First a dummy variable was included in equations (3) and (4) during the period 1967 III - 1971 IV to pick up the effect of a behavioural change in this period. The variable proved to be significant in both cases. Next a test developed by Chow[15] was used to test the constancy of the set of regression coefficients in equation (2).

In this case, we test the hypothesis that the vector of coefficients is stable over the period 1957-1971. More formally, we write

$$Y_1 = X_1 \beta_1 + u_1 \qquad (15)$$

$$Y_2 = X_2 \beta_2 + u_2 \qquad (16)$$

where equation (15) is estimated over the period 1957 I - 1967 II and equation (16) is estimated for the period 1967 III - 1971 IV. Both (15) and (16) have the same form as equation (2). The null hypothesis is

$$H_o : \beta_1 = \beta_2 \ (=\beta^*)$$

We compute the F statistic[16]

$$F = \frac{Q_3/k}{Q_2/(n-2k)}$$

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(15) G.C. Chow, "Tests of Equality between Sets of Coefficients in Two linear Regressions", Econometrica, vol. 28, pp. 291-605, July, 1960. For discussions of the test procedure see F. Fisher, "Tests of Equality Between Sets of Coefficients in Two Linear Regressions: An Expository Note", Econometrica, vol. 38, no. 2 (March, 1970), pp. 361-366; also G. Menges and H. Diehl "Time Stability of Structural Parameters", in Econometric Analysis for National Economic Planning, by P. Hart, G. Mills and J. Whitaker (London: Butterworths Pub. Co., 1964).

(16) The vector of parameters in the hypothesized true regression plane is estimated by pooling the two data periods and estimating a regression equation for the entire period 1957 I - 1971 IV.

where

$$Q_1 = (Y-X\hat{\beta}^*)' (Y-X\hat{B}^*)$$

$$Q_3 = (\hat{\hat{Y}}_1-X_1\hat{\beta}^*) (\hat{\hat{Y}}_1-X_1\hat{\beta}^*) + (\hat{\hat{Y}}_2-X_2\hat{\beta}^*) (\hat{\hat{Y}}_2-X_2\hat{\beta}^*)$$

$\hat{\hat{Y}}_i$ = estimated values of Y from the ith sample regression

$\hat{\beta}^*$ = an estimate of the parameters in the true regression plane obtained by pooling the data in the two sample periods

$$Q_2 = Q_1 - Q_3$$

In the case of equation (3), the computed F statistic is 2.90 whereas the critical value of F at the .05 level is 2.07; consequently, we reject the null hypothesis that the vector of regression coefficients is stable. In the case of equation (4), the computed F statistic is 3.65 and so we again reject the null hypothesis of no change in the set of regression coefficients.

It might be the case that the effect of the Bank Act revision of 1967 was to alter the coefficients of some of the explanatory variables but not all of them. For example, it could be that the responsiveness to various interest rates, current and expected, may have altered but the coefficient of the variable which represents cyclical fluctuations and the adjustment coefficient remain unchanged. The procedure involved in testing the stability over time of a subset of the regression coefficients in equations (3) and (4) may be described as follows.[17]

The model has the general form

$$Y = X\beta + u. \qquad (17)$$

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(17) See F. Fisher, op. cit., and also D. Huang, Regression and Econometric Method (New York: John Wiley and Sons, 1970), pp. 112-116.

Rewriting the model to indicate the relationship existing before and after the institutional change we have.[18]

$$\begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix} = \begin{bmatrix} X_1 & 0 & W_1 & 0 \\ 0 & X_2 & 0 & W_2 \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \\ \alpha_1 \\ \alpha_2 \end{bmatrix} + \begin{bmatrix} u_1 \\ u_2 \end{bmatrix} \tag{18}$$

The hypothesis to be tested is,

$$H_o: \ \beta_1 = \beta_2 \ (= \beta^*)$$

Hence we have

$$\begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix} = \begin{bmatrix} X_1 & W_1 & 0 \\ X_2 & 0 & W_2 \end{bmatrix} \begin{bmatrix} \beta_1^* \\ \alpha_1 \\ \alpha_1 \end{bmatrix} + \begin{bmatrix} u_1 \\ u_2 \end{bmatrix} \tag{19}$$

The least-squares estimates of the vector of coefficients in (19) is given by

$$\begin{bmatrix} b \\ a_1 \\ a_2 \end{bmatrix} = \left[\begin{pmatrix} X_1 & W_1 & 0 \\ X_2 & 0 & W_2 \end{pmatrix}' \begin{pmatrix} X_1 & W_1 & 0 \\ X_2 & 0 & W_2 \end{pmatrix} \right]^{-1} \begin{bmatrix} X_1 & W_1 & 0 \\ X_2 & 0 & W_2 \end{bmatrix}' \begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix} \tag{20}$$

and the sum of squared residuals resulting from these estimates is

$$Q_1 = \left[\begin{pmatrix} Y_1 \\ Y_2 \end{pmatrix} - \begin{pmatrix} X_1 & W_1 & 0 \\ X_2 & 0 & W_2 \end{pmatrix} \begin{pmatrix} b \\ a_1 \\ a_2 \end{pmatrix} \right]' \left[\begin{pmatrix} Y_1 \\ Y_2 \end{pmatrix} - \begin{pmatrix} X_1 & W_1 & 0 \\ X_2 & 0 & W_2 \end{pmatrix} \begin{pmatrix} b \\ a_1 \\ a_2 \end{pmatrix} \right] \tag{21}$$

The least-squares estimates of the coefficients in each of the equations in (18) are given by

$$\begin{bmatrix} b_1 \\ a_1 \end{bmatrix} = \left[\begin{pmatrix} X_1 & W_1 \end{pmatrix}' \begin{pmatrix} X_1 & W_1 \end{pmatrix} \right]^{-1} \begin{bmatrix} X_1 & W_1 \end{bmatrix}' Y_1 \tag{22}$$

and

$$\begin{bmatrix} b_2 \\ a_2 \end{bmatrix} = \left[\begin{pmatrix} X_2 & W_2 \end{pmatrix}' X_2 \ W_2 \right]^{-1} \begin{bmatrix} X_2 & W_2 \end{bmatrix}' Y_2 \tag{23}$$

18) The explanatory variables are partitioned into those whose coefficients are assumed to be constant throughout the period examined (i.e., X) and those whose coefficients are assumed to vary in the two periods (i.e., W). In (17) Y is n x 1, X is n x k and u is n x 1. In (18) Y_1 is n_1 x 1, Y_2 is n_2 x 1, X_1 is n_1 x p, X_2 is n_2 x p, W_1 is n_1 x q, W_2 is n_2 x q, β_1 and β_2 are p x 1, and α_1 and α_2 are q x 1.

The addition of the sum of squared residuals resulting from each of the estimates (22) and (23) is

$$Q_2 = \left[Y_1 - (X_1\ W_1)\begin{pmatrix} b_1 \\ a_1 \end{pmatrix}\right]' \left[Y_1 - (X_1\ W_1)\begin{pmatrix} b_1 \\ a_1 \end{pmatrix}\right] + \left[Y_2 - (X_2\ W_2)\begin{pmatrix} b_2 \\ a_2 \end{pmatrix}\right]' \left[Y_2 - (X_2 W_2)\begin{pmatrix} b_2 \\ a_2 \end{pmatrix}\right] .$$

Then $Q_3 = Q_1 - Q_2$

and the test to be performed is

$$F = \frac{Q_{3/p}}{Q_2/(n_1+n_2-2_p-2_q)}$$

where p is the number of elements in β^*, q the number of elements in each of α_1 and α_2, n_1 the number of observations in the first period (i.e., 1957 I - 1967 II) and n_2 the number of observations in the second period (1967 III - 1971 IV).

First, we test the null hypothesis that the coefficients of $\frac{(GNP - GNPP)}{GNP}$ and the lagged dependent variable (as well as the constant term and seasonal dummies) remain unchanged throughout the estimation period, while the coefficients of the other variables are allowed to assume different values before and after 1967. The relationship to be estimated over the total data period is

$$\frac{GS}{TA} = \alpha_o + \alpha_1 (BR)\ S1 + \alpha_2 (LR)\ S1 + \alpha_3 (BR^e)\ S1 + \alpha_4 (LR^e)\ S1$$
$$+ \alpha_1' (BR)\ S2 + \alpha_2' (LR)\ S2 + \alpha_3' (BR^e)\ S2 + \alpha_4' (LR^e)\ S2$$
$$+ \alpha_5 \left(\frac{GNP-GNPP}{GNP}\right) + \alpha_6 \left(\frac{GS}{TA}\right)_{t-1}$$

where S1 = 1 in the interval 1957 I to 1967 II and 0 elsewhere.

S2 = 1 in the interval 1967 III to 1971 IV and 0 elsewhere.

The conclusion of the test was that the null hypothesis of no change in the coefficients specified above ought to be accepted for equations of forms (3) and (4) in Table III-2. The computed F - statistic with $\frac{GS}{TA}$ as the dependent variable was .43 and for $\frac{OB}{TA}$ was .30, compared to a critical value at the .05 level of 2.34. This implies that the speed of adjustment to the desired portfolio structure, as well as the responsiveness to cyclical and seasonal factors, remained unaltered over the period 1957 I - 1971 IV.

A similar test of the stability of the coefficients of the interest rate variables, however, led to a rejection of the null hypothesis of no change. The computed F statistics for the $\frac{GS}{TA}$ and $\frac{OB}{TA}$ equations were 2.90 and 3.65, respectively, compared to a critical value at the .05 level of 2.07. The change in the responsiveness of the chartered banks to current and expected interest rates implied by the above tests reflects, among other things, the effects of the repeal of the 6 per cent ceiling on bank loan rates, which opened up a variety of new investment opportunities for the banks.

IV

NON-BANK FINANCIAL INTERMEDIARIES AND NON-FINANCIAL CORPORATIONS

1. Introduction

In this section the demand for Government securities by certain financial institutions and by non-financial corporations is considered. The financial institutions examined include trust and mortgage loan companies, life insurance companies, fire and casualty insurance companies and pension funds. Because of institutional, legal and operating similarities, trust and mortgage loan companies are considered together as are the remaining institutions. The trust and loan companies, particularly the former, manage their asset portfolios in a manner which is responsive to changing market conditions. Consequently, the model developed in Chapter II provides a useful analytical framework. In the case of the other group of institutions, however, adjustment in response to altered market conditions is very slow and an alternative hypothesis regarding the specification of the demand equation will be proposed.

Since the institutional and legal frameworks in which each institution operates are fundamental to an understanding of its portfolio behaviour, these topics are considered prior to a quantitative analysis of their asset management.

2. Trust and Mortgage Loan Companies

In the post-war period, the assets of the trust and mortgage loan companies (i.e., those assets associated with the business of financial intermediation) grew at a rapid rate. In the period 1951-1971, for example, the

total assets of these financial institutions grew at an average annual rate of 14.0 per cent compared to a growth rate of 8.1 per cent for the chartered banks. Consequently, the relative size of the trust and mortgage loan companies, in comparison with the banking system, has increased from 11.0 per cent (i.e., total assets of trust and loan companies as a percentage of total assets of the chartered banks) in 1951 to 31.9 per cent in 1971. An important reason for the exceptional growth in these institutions has been their willingness to compete with the chartered banks for deposits by offering a variety of liabilities (particularly in the case of trust companies) to suit the preferences of savers. Trust and mortgage loan companies concentrate their investment activities for the most part in mortgage lending and hence are important participants in the mortgage market. Of the total assets of these companies at the end of 1971, 65.6 per cent were held in the form of mortgage loans.

Although the laws governing trust and loan companies are very similar, as is the financial intermediary business in which they engage, they do differ sufficiently to warrant a brief description of the activities of each.

A Trust Companies

(i) Nature of Their Business and Legal Framework

Trust companies engage in two quite distinct types of business activities. On the one hand they are the prime participants in the fiduciary business in which capacity they act as trustees in the management of trusts established by living persons, as executors in the case of wills and as agents in the case of property management. The funds received in the performance of these activities are referred to as estate, trust and agency funds (E.T. & A.), the management of which is governed by provincial trustee laws requiring that each such account be managed separately. In the case of

agency funds the trust companies do not assume responsibility for the management of the assets but rather administer them according to the instructions of the owner. Since the trust companies are rigidly constrained in the distribution of these funds among various assets and since available data on this part of their business are inadequate, we shall be concerned only with the other aspect of their activities.

The second type of business in which they are engaged is financial intermediation which involves obtaining a pool of funds, principally from deposits and guaranteed investment certificates (G.I.C.'s), which is then invested in a variety of assets in order to maximize the difference between the return on their investment portfolio and the cost of obtaining and administering the funds, subject to the companies' preferences for return and risk. The funds available to trust companies for the purpose of intermediation are categorized as guaranteed funds and company funds. The former consist of chequable and non-chequable deposits and G.I.C.'s, while the latter are composed of paid-in capital, reserves, and funds borrowed from the chartered banks. Guaranteed funds must be backed by specifically segregated assets but, as the Royal Commission on Banking and Finance pointed out, this restriction has not had any significant effects on the intermediary operations of the trust companies.[1]

Trust and mortgage loan companies are subject to a myriad of legal restrictions on both the asset and liability sides. Those companies chartered federally come under the provisions of the federal Trust Companies Act while companies chartered provincially are governed by the corresponding acts in their respective provinces (only Newfoundland and P.E.I. do not have such statutes). Since those companies chartered federally or in Ontario account for

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[1] Canada, Royal Commission on Banking and Finance, Report, (Ottawa: Queen's Printer, 1964), p. 176. This report is hereafter referred to as RCBF.

such an overwhelming proportion of total trust company assets, only the federal and Ontario regulations will be examined here, and then only insofar as they are relevant to the problem of determining the trust companies' demand for Government of Canada securities.[2]

Although trust companies are not subject to a legal cash reserve ratio, in Ontario (and all federally chartered companies after 1970) they are required to maintain a ratio of liquid assets (cash, chartered bank deposits and government securities, including federal, provincial and municipal debt) to deposits, which can be withdrawn in less than one hundred days, of 20 per cent or more. In fact trust companies have consistently exceeded this required ratio by a considerable margin so the regulation has never proven to be a constraint on their investment policies.

Investment in equities and industrial bonds is restricted to companies which have an acceptable history of dividend payments, the criteria being spelled out in terms of the size of dividend payments and their regularity. Total investment in equities may not exceed 20 per cent of guaranteed and company funds. These regulations have still left a wide scope for investment in this field.

Unsecured personal and commercial loans have not been allowed although the "basket clause", which permits investment in otherwise excluded assets up to 15 per cent of company funds, and its extension in 1970, have allowed some scope for activity in these areas also. The loan-to-value-of-property ratio of 75 per cent on mortgage loans has not inhibited their expansion in this area, as is indicated in Table IV-1 below.

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[2] For a more thorough discussion of the laws governing trust companies see M. Baum, "The Near-Banks: Trust Companies of Canada", Tulane Law Review April, 1971.

On the liability side, the total amount of trust company assets, and hence their total holdings of government bonds, is subject to the restriction that guaranteed funds cannot exceed fifteen times the amount of company funds. This was extended to twenty times in the 1970 amendment to the federal Act.

(ii) Review of Trust Company Portfolio Structure

Table IV-1 provides data for the period 1956-1971 showing the size of the major components of the aggregate of trust company portfolios, both in absolute terms and as a percentage of total assets. [3] These assets include only those arising from guaranteed and company funds, and not their E.T. & A. business.

The most notable feature of the table is the alteration of the structure of the aggregate portfolio in favour of mortgages, from 36.3 per cent of total assets in 1956 to 60.0 per cent in 1971. The relative increase in mortgage holdings was at the expense of bond and note holdings in general, but chiefly government bonds of various types. The proportion of total assets held in the form of federal government securities fell by about 60 per cent in this interval, while the proportion in provincial and municipal bonds decreased by over 58 per cent. Although the percentage of trust company assets held in the form of federal government securities fell from 17.8 per cent in 1956 to 7.0 per cent in 1971, their significance among financial institutions in regard to investment in federal bonds increased substantially. Relative to total holdings by non-bank financial institutions, trust company holdings rose from 7.4 per cent in 1956 to 21.2 per cent in 1970. This fact is primarily attributable to the outstanding growth in the overall size of trust company assets. The average annual growth rate for total assets over the period 1956 to 1971 was a remarkable 16.7 per cent.

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[3] In aggregating, it should be kept in mind that the portfolio preferences of individual trust companies vary widely. See the RCBF's comments on this point (pp. 100-181).

(millions of dollars)

YEAR	CASH	% of T.A	GOV'T of CANADA SECURITIES	% of T.A	PROV. & MUN. BONDS	% of T.A	NOTES & OTHER BONDS(1)	% of T.A	MORTGAGES	% of T.A	TOTAL ASSETS (T.A)
1956	45	6.11	131	17.80	114	15.49	88	11.96	267	36.28	736
1957	38	4.91	135	17.44	118	15.25	102	13.18	274	35.40	774
1958	39	4.10	171	17.98	163	17.14	112	11.78	343	36.07	951
1959	42	3.99	187	17.76	146	13.87	144	13.68	407	38.65	1053
1960	41	3.22	264	20.72	168	13.19	198	15.54	468	36.73	1274
1961	54	3.40	286	17.99	213	13.40	239	15.03	630	39.62	1590
1962	54	2.85	299	15.79	230	12.14	262	13.83	845	44.61	1894
1963	71	3.06	318	13.70	268	11.55	305	13.14	1103	47.52	2321
1964	86	3.01	385	13.46	306	10.70	381	13.32	1449	50.66	2860
1965	98	2.81	387	11.10	321	9.20	427	12.24	1975	56.62	3488
1966	88	2.24	438	11.16	356	9.07	525	13.38	2169	55.29	3923
1967	93	2.14	455	10.45	396	9.10	624	14.33	2414	55.46	4353
1968	121	2.43	518	10.40	405	8.13	765	15.36	2727	54.76	4980
1969	231	4.00	594	10.29	381	6.60	731	12.67	3264	56.56	5771
1970	327	4.98	539	8.21	414	6.31	921	14.03	3829	58.33	6564
1971	257	3.44	526	7.04	483	6.47	1137	15.22	4480	59.97	7470

Source: Bank of Canada, Review.

* End of period values.

(1) includes term & notice deposits, short-term paper, corporate & institutional bonds.

A closer examination of their portfolio reveals that their investments in government bonds tend to be concentrated in the 3-10 year maturity class, with the next most important group being the less than three year classification. Relatively few bonds are held with term to maturity greater than 10 years.

The trust companies have shown more interest than the loan companies in attracting short-term funds and this is one reason for their more rapid rate of growth. Having a greater proportion of their liabilities in the form of short-term deposits, however, has also made trust company investment activities more susceptible to variations in credit conditions. Tight monetary policy typically results in a considerable degree of rate competition between the liabilities of trust companies and alternative savings instruments. Since their deposits exhibit a high degree of responsiveness to interest rate differentials, trust companies face a reduced inflow of funds during periods of tight credit conditions. These periods are usually associated with a strong demand for mortgage loans and the trust companies typically attempt to accommodate to some extent the demand for these loans by running down their stock of federal and provincial bonds.

B Mortgage Loan Companies

(i) The Institutional Background

The mortgage loan companies are even more highly concentrated than the trust companies with the largest half dozen companies controlling the vast majority of total loan company assets. Whereas there is a considerable diversity among trust companies with regard to the structure of their portfolios, the loan companies are much more homogeneous in that they all concentrate on investment in mortgage loans.

Funds are raised by the loan companies through the acceptance of deposits and the issuing of debentures, with the latter very similar in maturity structure to the G.I.C.'s of the trust companies. One significant difference between the two types of institutions from a legal point of view is that the loan companies are not required to segregate the assets generated by deposits and debentures from those associated with company funds, as are the trust companies. It is unlikely, however, that this distinction has had much influence on their investment behaviour. In most other respects, the laws governing loan companies are the same as those which apply to trust companies, including the required ratio of capital to liabilities and the liquid assets reserve ratio.

Debentures provide the prime source of funds for the loan companies and they have relied on this source increasingly in recent years. This is evidenced in the fact that debentures as a percentage of total liabilities has risen from 55.4 per cent at the end of 1956 to 62.6 per cent in 1971. This trend reflects their propensity on the asset side to concentrate on longer-term assets, specifically mortgages and longer-term bonds.

Not all loan companies accept deposits but for those that do, the deposits are primarily chequable and almost all held by individuals. Debentures are also sold chiefly to individuals and are for most companies continually on sale "over the counter". They tend to concentrate on debentures of five-year maturity to avoid having to pay higher rates on long-term debentures when mortgage rates have fallen and the rates on mortgage loans held are renegotiated after five years.

Like the trust companies, they are permitted to invest in most types of financial assets, with restrictions almost identical to those outlined above for the former. The regulations on investment management by loan companies do

not appear to have constituted a constraint for them since they have tended to concentrate in mortgages and have not shown an inclination to trade securities actively.

The mortgage loan companies have not grown as fast as the trust companies largely because of the latter's more active policy of tailoring liabilities to suit the preferences of depositors. The postwar demand for mortgages and the exclusion of banks from this field were the major reasons for the growth in trust companies and mortgage loan companies, but in spite of this impetus the loan companies actually regressed relative to most other financial institutions due to their reluctance to actively seek out funds.

(ii) Review of Mortgage Loan Company Portfolio Structure

Table IV-2 illustrates the major components in the portfolios of loan companies for the period 1956-71. Mortgage loans have remained a fairly constant and large percentage of total assets. The majority of these are conventional residential mortgages and there has been relatively little investment in NHA mortgages due to their lower rate of return, longer term to maturity and higher costs of handling. For example, at the end of 1971, only 12.8 per cent of total mortgage loans were under NHA.

Holdings of all types of government securities fell in percentages terms during this period but the decrease was particularly noticeable in the case of federal government securities, which fell from 8.2 per cent of total assets in 1956 to 3.9 per cent in 1971. The offsetting increases occurred in various minor asset categories such as real estate holdings, equities, and investments in affiliated companies. Noticeable also is the trend towards minimization of cash holdings; at the end of 1956, cash holdings were 13.6 per cent of demand and savings deposits and 3.4 per cent of total deposits and debentures outstanding. By the end of 1969, these figures had fallen to 7.7 per cent and 1.4 per cent, respectively.

MORTGAGE LOAN COMPANIES - SELECTED MAJOR ASSETS*

(millions of dollars)

YEAR	CASH	% of T.A	GOV'T of CANADA SECURITIES	% of T.A	PROV. & MUN. BONDS	% of T.A	NOTES & OTHER BONDS (1)	% of T.A	MORTGAGES	% of T.A	TOTAL ASSETS (T.A)
1956	16	2.48%	53	8.20	16	2.48	12	1.86	505	78.17	646
1957	21	3.04	57	8.26	17	2.46	14	2.03	531	76.96	690
1958	16	2.07	67	8.67	26	3.36	17	2.20	585	75.68	773
1959	23	2.98	68	8.80	29	3.75	18	2.11	646	83.57	854
1960	16	1.69	77	8.15	32	3.39	19	2.01	715	75.66	945
1961	18	1.62	96	8.65	37	3.33	18	1.62	836	75.32	1110
1962	28	2.15	93	7.15	39	3.00	18	1.38	989	76.08	1300
1963	20	1.30	107	6.93	43	2.79	29	1.88	1188	76.94	1544
1964	63	3.25	120	6.20	53	2.74	34	1.76	1492	77.07	1936
1965	54	2.21	117	4.80	49	2.01	33	1.35	1839	75.43	2438
1966	32	1.25	125	4.86	54	2.10	35	1.36	1949	75.84	2570
1967	38	1.37	133	4.80	59	2.13	61	2.20	2073	74.78	2772
1968	61	2.05	122	4.10	55	1.85	79	2.65	2235	75.05	2978
1969	34	1.03	135	4.10	60	1.82	53	1.61	2508	76.18	3292
1970	45	1.19	121	3.20	56	1.48	112	2.96	2868	75.91	3778
1971	43	1.03	164	3.94	78	1.88	167	4.02	3152	75.79	4159

Source: Bank of Canada, Review

* End of period values.

(1) Includes term and notice deposits, short-term paper, corporate & institutional bonds.

Because the loan companies rely heavily on debentures as a source of funds, and to only a minor extent on deposits, they are affected less by changing credit conditions than are the trust companies. They show a tendency to accommodate the demand for mortgage loans during periods of tight credit conditions by rearranging their portfolio, but the adjustment is smaller than in the case of the trust companies.

(iii) Specification and Estimation of Trust and Mortgage Loan Company Equations

The trust companies have shown a tendency toward a rather active management of their portfolios, a tendency which is facilitated by the absence of the constraints imposed by the existence of lines of credit such as those extended by the banks. Although there is evidence that these institutions attempt to accommodate mortgage loan demands through liquidation of bonds, the proportion of their portfolio in the form of federal bonds does not appear in general to be determined residually but rather is decided upon on the basis of return and risk considerations.

The mortgage loan companies, on the other hand have exhibited an even greater tendency to concentrate their investments in mortgages than have the trust companies and have been less active traders of financial assets. Although the two types of institutions are similar in many respects, the management of their investment portfolios was thought to be sufficiently different to warrant estimation of separate demand equations for federal government securities for each, as well as an aggregate equation.

Again the basis for our empirical experimentation is equation (55) of chapter II, adjusted to include the cyclical factor $\left(\frac{GNP-GNPP}{GNP}\right)$, i.e., equation (2) of chapter III. Our expectations with respect to the signs of the various explanatory variables (the alternative rate is now the conventional mortgage rate) are unchanged from the discussion in the previous chapter, although

we would anticipate that in the case of trust and loan companies the adjustment coefficient would be lower than it was for the banks since such a large part of the assets of the former is in the form of instruments with longer-term maturities. The estimated equations are presented in Table IV-3. The estimation period is 1957 I - 1971 IV, and the time series data on trust and loan company assets are the recorded book values.

Because of a very high degree of collinearity between the rate on federal bonds (BR) and the conventional mortgage rate (MR), only the rate differential was entered as an explanatory variable. The appearance of this differential in a more significant fashion in equation (2) than in (3) is consistent with the conclusion reached above, on the basis of a casual examination of historical data, that the trust companies are more responsive to short-run changes in the returns on alternative assets than are the mortgage loan companies. Other experiments with rate differentials also suggested the existence of a greater degree of substitution among the assets held by trust companies compared to those held by loan companies. For example, inclusion of the difference between the rates on federal and provincial bonds in equation (1)-(3) in Table IV-3 suggested the existence of substitution between these securities in equations (1) and (2) but not in the case of (3). When the actual value of BR was replaced by its estimated value in equations (5)-(7), however, the variable (BR-MR) proved to be insignificant in all cases.

Although the Durbin-Watson statistic in equations (1) and (2) would suggest the absence of autocorrelation in the residuals, these equations, along with equation (3), were re-estimated using the Hildreth-Lu procedure because of the possible bias in this statistic resulting from the inclusion of the lagged dependent variable. The re-estimated versions of equations (1) and (2)

TABLE IV-3

TRUST AND LOAN COMPANIES - REGRESSION RESULTS

EQUATION	DEPENDENT VARIABLE	INDEPENDENT VARIABLES: K	(BR - MR)	BR^e	MR^e	(GNP - GNPP)/GNP	LAGGED DEPENDENT VARIABLE	D2	D3	D4	STATISTICS: $\bar{R}^2$	S.E.E.	D - W
(1)	GS/TA	.0101	.0128	-.0256	.0207	-.1853	.7510	.0090	.0248	.0181	.939	.0074	1.99
		(.694)	(1.764)	(-2.817	(2.440)	(-3.555)	(10.618)	(2.034)	(2.399)				
(2)	TCGS/TCTA	.0152	.0215	-.0385	.0317	-.2624	.7174	.0137	.0363	.0296	.918	.0112	2.00
		(.720)	(1.955)	(-2.80)	(2.455)	(-3.418)	(9.069)	(2.112)	(2.584)	(3.830)			
(3)	MLGS/MLTA	.0102	.0040	-.0136	.0098	-.1078	.7497	.0063	.0154	.0072	.946	.0051	2.40
		(.980)	(.811)	(-2.153)	(1.683)	(-3.056)	(9.919)	(2.060)	(2.307)	(1.895)			
USING HILDRETH-LU TRANSFORMATION													
(4)	MLGS/MLTA	.005	.0034	-.0130	.0095	-.1123	.7721	.0066	.0162	.0077			1.98
		(.642)	(.767)	(-2.349)	(1.884)	(-3.488)	(11.802)	(2.187)	(2.658)	(2.080)			
TWO-STAGE ESTIMATES													
(5)	GS/TA	.0098	.0006	-.0114	.0074	-.1471	.7965	.0069	.0184	.0149	.935	.0077	2.00
		(.6530)	(.122)	(-1.981)	(1.362)	(-2.583)	(11.585)	(1.461)	(1.749)	(2.625)			
(6)	TCGS/TCTA	.0149	.0022	-.0157	.0101	-.2059	.7740	.0106	.0272	.0252	.912	.0116	2.02
		(.680)	(.284)	(-1.799)	(1.234)	(-2.450)	(10.092)	(1.540)	(1.757)	(3.025)			
(7)	MLGS/MLTA	.0101	.0001	-.0090	.0055	-.0959	.7704	.0056	.0133	.0061	.945	.0051	2.41
		(.958)	(.031)	(-2.203)	(1.494)	(-2.475)	(10.470)	(1.745)	(1.830)	(1.525)			

The figures given in parentheses under the estimated coefficients are t-values. The dollar variables below are measured in millions of dollars.

GS = Holdings of Government of Canada debt by trust and mortgage loan companies,

TCGS = Holdings of Government of Canada debt by trust companies.

MLGS = Holdings of Government of Canada debt by mortgage loan companies.

TA = Total assets of trust and mortgage loan companies..

TCTA = Total assets of trust companies.

MLTA = Total assets of mortgage loan companies.

K = Constant.

BR = Average rate on long-term Government of Canada bonds. (The superscript "e" denotes an expected rate.)

MR = Conventional mortgage rate.

GNPP = Potential GNP in millions of current dollars.

GNP = Current dollars gross national product.

were virtually identical to the originals and so are not presented here. In equation (3), however, the Durbin-Watson statistic suggests the possibility of negative autocorrelation, in which case the estimated coefficient of the lagged dependent variable would be biased downward. This suspicion is substantiated by the results obtained in equation (4) where the coefficient of the lagged dependent variable is higher and the Durbin-Watson statistic is much improved using a transformation based on a first-order autoregressive scheme with the coefficient $\rho = -.25$.

Since the assets of the trust and loan companies are generally less liquid than those of the banks, one would expect a slower rate of adjustment to a desired portfolio position. Such an inference would appear to be supported by the results obtained in Table IV-3, which imply an adjustment period of 8 to 12 quarters compared to a year and a half to two years for just over 90 per cent of total adjustment in the case of the chartered banks.

3. Life Insurance Companies

(i) Institutional & Legal Background[4]

Prior to the establishment of Canadian companies in Canada, life insurance policies were written by agents of British and American companies. The first Canadian life insurance company, The Canada Life Assurance Company, was founded in Hamilton in 1847. More than twenty years passed before another Canadian company, The Ontario Mutual Life Insurance Company, was founded in 1870, and this was followed by The Sun Mutual Life Insurance Company in 1871. The early life insurance companies (Canadian, British and foreign) were a

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[4] For a thorough treatment of the development of the life insurance industry in Canada see A., Pedoe, Life Insurance Annuities & Pensions (Toronto: University of Toronto Press, 1970). The categorization of life insurance companies as Canadian, British and Foreign (i.e., other than British) in the discussion below follows the breakdown used by the Department of Insurance in its publications.

small part of the Canadian financial market. In 1870, for example, their assets were a mere 2 per cent of total financial intermediary assets - less than the assets of fire insurance companies. This situation had changed dramatically by 1906, when life companies were second only to the chartered banks among private financial intermediaries.

Legislation in 1875 established a Superintendent of Insurance in the Department of Finance whose powers were extended in 1877 to include supervision of life as well as other insurance companies. Under the new acts companies were required to maintain assets in Canada sufficient to cover their obligations in Canada; this applied only to new business. Annual statements were to be published by the government and available to the public. Each company was to be inspected annually by the Superintendent, who would report his findings to the Minister of Finance. Company statements were required to indicate actuarial reserve liabilities at least equal to policyholders' claims. Finally, the Acts prescribed mortality tables and a rate of interest to be used in computing the companies' liabilities to its policyholders.

The purpose of this legislation, according to the first Superintendent of Insurance, was to ensure solvency of the companies and publicity with respect to the companies' investments. This theme was reiterated in the Superintendent's 1962 submission to the Royal Commission on Banking and Finance.

> "The main purposes of the legislation and of the Departmental examination of companies in implementation of that legislation, have been to ensure that each and every company licenced or registered within the Department is in a sound condition."

The legislation of the 1870's led to several British and American companies' ceasing business in Canada because they refused to make the necessary deposits to cover their Canadian businesses. (Foreign companies were required to deposit requisite securities with the Minister of Finance to comply with the rule that assets sufficient to cover their obligations in

Canada must be maintained.) Once the machinery of supervision was set up, legislation concerned itself mainly with regulation of life company investments. Since investment restrictions are of considerable importance in determining the life insurance companies' demand for federal debt, it is worthwhile to outline briefly the nature of these regulations.

(ii) Regulations Governing Investment Activities

To assure the security of principal and income of investments, life insurance companies are restricted by law with respect to the investments they can undertake. The basic legislation affecting investment powers of life insurance companies was passed in 1910; changes since then have largely relaxed the earlier restrictions.

There are no restrictions governing investment in:

(i) direct or guaranteed debt of the central, provincial, or state governments of Canada, the U.S., the U.K. and its colonies, the Commonwealth countries, and the countries in which the company carries on business;

(ii) direct or guaranteed debt of municipalities or school corporations in Canada or in countries in which the company does business;

(iii) bonds issued or guaranteed by the International Bank for Reconstruction and Development;

(iv) corporation bonds secured by a charge on real estate, plant and equipment;

(v) fully and properly secured equipment trust certificates of railways in the U.S. and Canada.

Life insurance companies may also make collateral loans on the security of bonds, debentures, shares or mortgages that are themselves eligible for investment, as well as loans on the security of life insurance policies issued by federally registered companies.

Before a life insurance company may invest in corporation debentures or preferred stocks of corporations, certain 'tests' must be passed. In the first place, no Canadian life insurance company may invest in another life insurance company, although no such restriction applies to foreign companies. This law is presumably for the benefit of purchasers of insurance. The Superintendent of Insurance argues that foreign companies taking over Canadian ones continue to operate the original company in Canada, while a Canadian company merges the two operations, thereby depriving some policyholders of the company they chose to do business with. Eligible corporations must also meet certain requirements with respect to their history of dividend payments and earnings.

Restrictions with respect to the purchase of common shares are much more severe than those on bonds and preferred shares. The corporation must have paid a dividend on its common stock of at least a specified rate in each of the preceding five years. Furthermore, no life insurance company may hold more than 30 per cent of either the common shares or all the shares of any particular corporation. Finally, the book value of holdings of common shares can be no more than 25 per cent (15 per cent prior to 1965) of a life insurance company's ledger assets.

Mortgage loans in excess of 75 per cent (66 2/3 per cent prior to 1965 and 60 per cent before 1961) of the value of the real estate covered may only be made if the excess is guaranteed by the government or a government agency of the country where the real estate is located.

Life insurance companies have, since 1950, been able to invest in real estate or leaseholds for the production of income, but this investment is limited to 10 per cent of the company's ledger accounts. In addition, the following conditions must be met:

(i) the lease must be guaranteed by a corporation whose stocks are eligible investments;

(ii) the net revenue from the investment must yield a reasonable return and repay at least 85 per cent of the investment within the term of the lease, but not exceeding thirty years;

(iii) the total investment in any one parcel or leasehold must not exceed 2 per cent of the company's ledger assets.

A life insurance company may invest up to 5 per cent of its assets in Canada in the purchase of land and the construction on that land of low or moderate cost rental housing and other buildings (but not hotels) necessary for providing community services. Estimated earnings must pay 6 per cent on the investment and amortize the cost of the project (apart from the cost of the land) within the useful life of the project or 50 years. Should the net yield fall below 3 per cent in any year over the useful life of the project, the Minister of Public Works will reimburse the company on condition that they pay over to a reserve account all net earnings in any year in excess of 7 per cent.

A 'basket clause' was introduced in 1948 that permitted a company to invest up to 5 per cent (now 7 per cent) of its total ledger assets in bonds, shares, and debentures not otherwise eligible for investment. The basket clause also removed the first two restrictions, but not the third one, on investments in leaseholds. However, the 'basket clause' does not remove the limitations on common and total shares of any one corporation that may be held, nor does it remove the limitations with respect to investment in common stocks (25 per cent of ledger assets) and real estate for the production of income (5 per cent of ledger assets).

The valuation of assets in official returns is closely regulated. The total value of securities held by a company may not exceed the sum of the amortized values of redeemable securities issued or guaranteed by the government of Canada, the provinces, the U.S. and the U.K., and the market value of all other securities. However, should market values be unduly depressed,

the Minister of Finance may authorize the use of values in excess of market values, but not exceeding the values used in the next preceding annual statement, and not exceeding the book values at the date of the statement to be filed in the case of securities acquired since the date of that statement. The Superintendent of Insurance may also procure a special appraisal of the value of a real estate asset or the security for a mortgage loan.

(iii) Sources of Life Insurance Company Funds

It should be noted that companies engaged in the business of life insurance in Canada include federally registered companies, provincially-registered companies and fraternal benefit societies. Since provincial companies account for only 3 to 5 per cent of total life insurance business and the total assets of the fraternal benefit societies amount to less than 5 per cent of those of the federally-registered companies, these two types of institutions are not considered in the discussion below.

In 1970 there were 45 Canadian, 14 British, and 40 foreign federally registered insurance companies operating in Canada. Table IV-4(a) below gives some indication of the life insurance in force in Canada after 1955. Table IV-4(b) shows the amount of life insurance effected in Canada between the years 1956 and 1970.

TABLE IV-4(a)

Life Insurance in Force in Canada,

1956-1970

(millions of dollars)

Year	Canadian Companies		British Companies		Foreign Companies		Total	
	Ordinary; Industrial $	Group $	Ordinary; Industrial $	Group $	Ordinary; Industrial $	Group $	Ordinary; Industrial $	Group $
1956	14,876	4,907	781	39	5,868	2,616	21,525	7,562
1957	16,363	5,889	93	58	6,624	3,205	24,924	9,163
1958	17,737	6,774	1,081	89	7,225	3,541	26,092	10,404
1959	19,284	8,411	1,223	110	7,776	4,069	28,284	12,590
1960	20,671	9,748	1,396	159	8,179	4,497	30,246	14,403
1961	22,192	11,132	1,583	195	8,617	4,745	32.212	16,072
1962	23,300	12,607	1,812	229	9,072	5,214	34,184	18,049
1963	24,782	14,354	2,055	274	9,566	5,774	36,402	20,402
1964	26,566	16,644	2,322	384	10,125	6,632	39,012	23,660
1965	28,369	19,531	2,611	460	11,034	7,652	42,013	27,643
1966	30,245	22,377	2,923	598	11,858	8,823	45,027	31,798
1967	32,282	26,162	3,303	691	12,776	9,591	48,361	36,444
1968	34,432	29,978	3,733	784	13,445	10,839	51,610	41,602
1969	36,193	34,567	4,132	964	14,286	12,642	54,612	48,173
1970	38,306	38,469	4,608	1,119	14,928	13,687	57,842	53,274

Source: 1970 Report of the Superintendent of Insurance for Canada, Volume 1, p.42C.

TABLE IV-4 (b)

Life Insurance Effected in Canada,

1956-70

(millions of dollars)

Year	Canadian Companies		British Companies		Foreign Companies		Total	
	Ordinary; Industrial $	Group $	Ordinary; Industrial $	Group $	Ordinary; Industrial $	Group $	Ordinary; Industrial $	Group $
1956	2,062	636	155	4	951	312	3,167	952
1957	2,329	709	207	19	1,398	274	3,934	1,002
1958	2,539	806	208	17	1,280	280	4,027	1,103
1959	2,611	1,126	214	11	1,259	402	4,083	1,539
1960	2,749	1,138	255	46	1,203	301	4,207	1,486
1961	2,945	1,357	280	30	1,253	348	4,378	1,735
1962	2,860	1,222	326	24	1,258	337	4,444	1,582
1963	3,129	1,533	364	43	1,378	486	4,871	2,063
1964	3,518	1,549	405	89	1,500	742	5,423	2,380
1965	3,693	2,176	468	56	1,776	799	5,936	3,031
1966	3,950	1,855	524	136	1,923	652	6,397	2,644
1967	4,296	2,675	621	54	2,098	648	7,015	3,376
1968	4,671	3,015	725	78	2,243	784	7,639	3,877
1969	4,823	3,673	776	174	2,305	1,386	7,904	5,234
1970	4,971	3,300	838	131	2,276	1,401	8,084	4,831

Source: 1970 Report of the Superintendent of Insurance for Canada, Vol. 1, p. 41C.

It is clear from these two tables that the role of group insurance has changed dramatically since 1956. In 1956, group insurance was 25 per cent of total insurance in force in Canada, while in 1970 it was 47 per cent. Similarly, group insurance was 23 per cent of insurance effected in Canada in 1956, but 37 per cent of insurance effected in Canada in 1970. What is also clear from Tables IV-4(a) and IV-4(b) is that the British companies are far less involved than the Canadian and foreign ones in group insurance.

The manner in which life insurance companies collect their funds sets them apart from most other financial intermediaries. Life insurance companies collect a large percentage of their funds "on the basis of contracts involving a series of payments stretching into the future". Furthermore, "these long-term savings are not generally subject to sudden withdrawal".[5] The size of the pool of funds under the administration of the life companies is thus basically determined by three factors - the age composition of policyholders, the composition of the business, and the rate of growth of the business. In general, "the younger are the policyholders, the larger will be the volume of funds coming under the administration of life companies".[6] With respect to the composition of the business, "a swing toward annuities including group annuities associated with pension funds will greatly increase the funds under administration".[7] Finally, "rapidly growing companies tend to generate a sort of momentum which will prolong an increase in their funds or assets even beyond a period in which new business has been growing into a period in which new business declines or even ceases altogether".[8]

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5 RCBF, p. 237

6 W. Hood, Financing Economic Activity in Canada, Royal Commission on Canada's Economic Prospects (Ottawa: Queen's Printer, 1958), p. 342.

7 Ibid, pp. 343-344.

8 Ibid, p. 344.

Life insurance companies have exhibited a tendency toward conservatism, both with respect to their investment practices and their ability to innovate on the liability side. Neufeld has suggested that their relatively slow growth in recent years (their total assets grew by 6.0 per cent between the years 1964 and 1970, compared to 11.6 per cent for trusteed pension funds and 14.6 per cent for mutual funds) reflects their inability to respond by way of tailoring new types of liabilities to the growth in trusteed pension funds on the one hand and mutual funds on the other.[9]

(iv) Investment Patterns

The high degree of predictability of the cash flow of life insurance companies has allowed them to hold a relatively small part of their portfolios in the form of liquid assets. They have traditionally invested heavily in long-term bonds and mortgages and have shown little inclination towards equity investment, holding considerably less stock than would be permitted under the investment restrictions.

Life insurance company portfolios are not managed in a particularly active fashion and responses to actual and expected interest rate differentials are usually restricted to current investment flows. Consequently, the adjustment period required to alter the structure of their portfolios in response to variations in market conditions is considerably longer than in the case of deposit-type financial institutions. This is illustrated in Chart IV-1 and Table IV-5 which show a gradual shift by life insurance companies out of bonds and into mortgages as their primary type of asset in the period 1956-1970. Notable in the graph and table is the diminishing role played by Government of Canada securities among life insurance company assets, falling from 10 per cent of total assets in 1956 to 3.4 per cent in 1970. Notable also is the considerable increase in holdings of equities in the period 1967-1970.

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[9] E. Neufeld, The Financial System of Canada (Toronto: Macmillan Co., 1972), p.277.

Although the investment patterns of Canadian, British and foreign life insurance companies are basically similar, there do exist interesting differences. Tables IV-6 to IV-8 indicate the structure of the asset holdings of these three types of institutions. The switch out of bonds and into mortgage loans is particularly noticeable in the case of British and foreign companies, each of which has more than doubled the percentage of total assets held in the form of mortgage loans in the period 1956-1970.

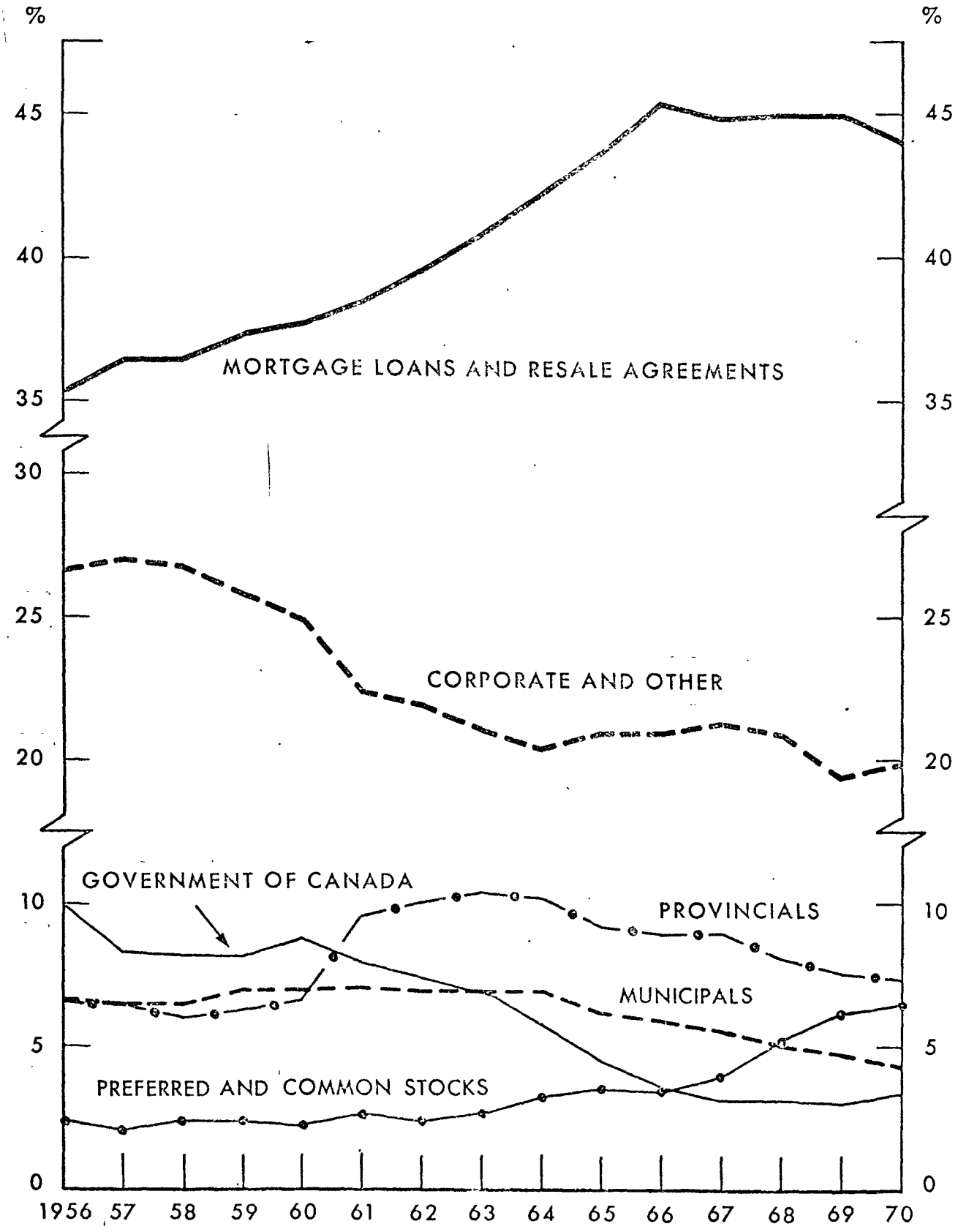
There is a considerable difference in the propensity of each type of institution to invest in common and preferred shares. British companies showed the greatest tendency towards equity investment, with stock holdings varying between 11.3 and 17.6 per cent of total assets. Canadian companies gradually increased their stock holdings in the period from 5.3 per cent of total assets in 1956 to 7.7 per cent in 1970, while foreign companies exhibited virtually no interest in equity investment whatever.

As mentioned above, British and foreign life insurance companies must deposit with the Receiver General, vest in trust, or secure by policies in Canada, assets sufficient to cover their Canadian liabilities. These companies also deposit funds with the Chief Agent, but these are usually funds which are about to be transferred to the Receiver General, since the companies receive no credit for assets not held in the forms outlined above. As Tables IV-9 and IV-10 illustrate, the funds under the control of the Chief Agent show far more variability than those on deposit with the Receiver General, etc. Since the size of these assets is relatively small no further consideration will be given to them here.

Finally, it should be pointed out that the asset holdings of life insurance companies do show some cyclical variability. In general, during periods of prosperity the insurance companies show a tendency to accommodate the demand for mortgage loans, shifting back into bonds in the recessionary

CHART IV – 1

LIFE INSURANCE COMPANIES — ASSET STRUCTURE



Source: Bank of Canada, Statistical Supplement.

TABLE IV-1

Assets of Life Insurance Companies
1958-1970
(Assets are at Book Value and in millions of $)

A.	1958	% T.A.	1959	% T.A.	1960	% T.A.	1961	% T.A.	1962	% T.A.	1963	% T.A.	1964	% T.A.	1965	% T.A.	1966	% T.A.	1967	% T.A.	1968	% T.A.	1969	% T.A.	1970	% T.A.
.3	570	8.2	617	8.2	699	8.7	667	7.8	677	7.4	670	6.7	611	5.7	525	4.6	433	3.6	410	3.2	437	3.2	442	3.1	503	3.4
.4	414	6.0	462	6.2	526	6.6	823	9.6	920	10.0	1,023	10.3	1,075	10.1	1,048	9.2	1,063	8.8	1,142	8.9	1,124	8.2	1,094	7.6	1,110	7.5
.5	456	6.5	507	6.8	547	6.8	601	7.0	626	6.8	676	6.8	727	6.8	722	6.3	716	5.9	720	5.6	700	5.1	678	4.7	660	4.4
.9	1,854	26.7	1,924	25.7	1,983	24.8	1,918	22.4	2,013	21.9	2,039	21.1	2,175	20.4	2,388	20.9	2,533	20.9	2,741	21.2	2,843	20.8	2,780	19.4	2,967	19.8
.1	160	2.3	171	2.3	176	2.2	218	2.6	220	2.4	257	2.6	338	3.2	407	3.6	429	3.5	510	3.9	715	5.2	887	6.2	972	6.5
	47	.7	59	.8	49	.6	23	.3	19	.2	15	.1	11	.1	7	-	5	-	3	-	-	-	-	-	-	-
1.0	111	1.6	116	1.6	121	1.5	107	1.2	131	1.4	147	1.5	139	1.3	163	1.4	184	1.5	250	1.9	269	2.0	300	2.1	338	1.7
.2	75	1.1	70	.9	70	.9	62	.7	54	.6	54	.5	67	.6	89	.8	94	.8	88	.7	38	.3	83	.6	83	.6
5.4	2,529	36.4	2,787	37.3	3,011	37.6	3,291	38.4	3,639	39.5	4,043	40.7	4,492	42.2	4,984	43.6	5,485	45.2	5,787	44.8	6,141	44.9	6,440	44.9	6,538	44.0
3.4	250	3.6	267	3.6	285	3.6	303	3.5	311	3.4	321	3.2	345	3.3	386	3.4	423	3.5	456	3.5	533	3.9	638	4.5	713	4.8
4.5	305	4.4	323	4.3	344	4.3	358	4.2	372	4.0	385	3.9	398	3.8	411	3.6	450	3.7	486	3.8	553	4.1	660	4.6	759	5.1
.7	54	.8	42	.8	49	.6	46	.5	45	.5	58	.6	49	.5	66	.6	56	.5	60	.5	76	.6	89	.6	122	.9
1.6	121	1.7	130	1.7	147	1.8	157	1.8	178	1.9	195	2.0	211	2.0	228	2.0	256	2.1	259	2.0	238	1.7	243	1.7	275	1.8
0.0	6,946	100.0	7,475	100.0	8,007	100.0	8,574	100.0	9,205	100.0	9,543	100.0	10,638	100.0	11,424	100.0	12,127	100.0	12,912	100.0	13,667	100.0	14,334	100.0	14,960	100.0

Supplement

Table IV-6

Assets of Canadian Life Insurance Companies, 1956-1970
(% of Total Assets at Book Value)

Year	Bonds	Stocks	Mortgage Loans on Real Estate	Agreements of Sale of Real Estate	Real Estate	Policy Loans	Cash	Investment income due and accrued	Outstanding insurance premiums and annuity considerations	Other Assets	Assets in Segregated Funds	Shares of company's capital stock (purchased under mutualization plan)
1956	50.7	5.3	33.4	.1	2.8	4.8	1.0	.9	.8	.2	-	-
1957	49.7	5.0	34.2	.1	3.2	5.0	.9	.9	.9	.1	-	-
1958	48.8	4.8	34.3	.1	3.4	4.9	1.1	.9	.9	.2	-	.6
1959	47.8	5.0	35.3	.1	3.3	4.9	.8	1.0	.9	.2	-	.7
1960	46.8	5.2	36.2	.1	3.3	5.0	.8	1.0	.8	.2	-	.6
1961	46.0	5.5	37.2	-	3.2	4.9	1.0	1.0	.8	.2	-	.2
1962	44.9	5.7	38.1	-	3.1	4.9	.8	1.0	.8	.4	.1	.2
1963	44.2	5.5	39.2	-	3.0	4.7	1.0	1.0	.7	.4	.2	.1
1964	43.1	5.8	39.9	.1	2.9	4.6	.8	1.0	.7	.5	.5	.1
1965	41.2	5.9	41.2	.1	3.0	4.5	.9	1.0	.7	.6	.8	.1
1966	39.3	6.1	42.4	.1	3.2	4.9	.7	1.0	.7	.6	1.0	-
1967	38.5	6.4	42.1	.1	3.3	5.0	.8	1.0	.7	.6	1.5	-
1968	36.8	7.2	41.8	.1	3.4	5.4	.8	1.0	.7	.7	2.1	-
1969	34.5	7.9	41.3	.1	3.8	6.3	.8	1.0	.6	1.0	2.7	-
1970	33.9	7.8	39.8	.1	4.2	6.9	1.0	1.0	.6	1.1	3.6	-

Source: Report of the Superintendent of Insurance for Canada, 1957-70.

Table IV-7

Assets of British Life Insurance Companies on Deposit with the Receiver General, Vested in Trust, or Secured by Policies in Canada 1956-1970

(% of Total Assets at Market Value)

Year	Bonds	Stocks	Mortgage Loans on Real Estate	Real Estate	Policy Loans	Other Assets	Segregated Funds
1956	64.6	17.4	15.4	.3	2.3	-	-
1957	63.3	14.2	19.5	.5	2.4	.1	-
1958	60.0	16.9	20.4	.6	2.1	-	-
1959	58.4	15.7	21.3	2.2	2.3	.1	-
1960	59.8	13.6	22.0	2.3	2.2	.1	-
1961	56.3	15.4	23.8	1.9	2.1	.5	-
1962	56.8	11.3	26.2	3.2	2.0	.5	-
1963	54.3	13.1	27.4	2.6	1.9	.7	-
1964	51.5	14.5	28.7	2.3	1.9	1.1	-
1965	46.2	14.2	33.6	2.2	1.9	1.9	-
1966	43.3	12.7	37.2	2.1	2.2	2.5	-
1967	41.9	14.4	36.6	1.9	2.4	2.8	-
1968	38.9	16.8	35.8	2.6	2.6	3.3	-
1969	35.9	17.6	36.6	2.5	3.2	2.2	2.0
1970	34.9	17.5	36.2	2.4	3.7	2.3	3.0

Source: Report of the Superintendent of Insurance for Canada, 1957-70.

Table IV-8

Assets of Foreign Life Insurance Companies on Deposit with the Receiver General, Vested in Trust, or Secured by Policies in Canada 1956-1970

(% of Total Assets at Market Value)

Year	Bonds	Stocks	Mortgage Loans on Real Estate	Real Estate	Policy Loans	Other Assets	Segregated Funds
1956	76.0	.1	19.2	.2	5.1	-	-
1957	72.8	.1	21.9	.3	4.9	-	-
1958	72.3	.1	22.3	.4	4.9	-	-
1959	70.6	.1	24.0	.4	4.9	-	-
1960	71.3	.1	23.4	.4	4.8	-	-
1961	70.3	.1	24.4	.3	4.9	-	-
1962	69.2	.1	25.6	.3	4.8	-	-
1963	66.5	.1	28.5	.3	4.6	-	-
1964	61.6	.1	32.6	1.0	4.7	-	-
1965	59.2	.1	35.1	.9	4.7	-	-
1966	55.8	.1	38.5	.9	4.7	-	-
1967	54.5	.1	39.8	.8	4.8	-	-
1968	51.5	.1	42.2	.8	5.0	.4	-
1969	47.1	.1	46.1	.8	5.6	.1	.2
1970	46.2	.2	46.6	.7	5.9	.1	.3

Source: Report of the Superintendent of Insurance for Canada, 1957-70.

Assets of British Life Insurance Companies
Under the Control of the Chief Agent, 1956-1970

(% of Total Assets at Market Value)

Year	Bonds	Stocks	Mortgage Loans on Real Estate	Real Estate	Investments	Cash	Investment Income, due and accrued	Outstanding Insurance Premiums and Annuity Considerations	Other Assets
1956	17.2	17.6	47.9	6.7	-	5.8	1.9	2.7	2
1957	5.3	16.9	49.8	11.3	-	8.2	3.3	5.0	.2
1958	18.2	6.5	31.9	13.3	-	8.7	4.2	6.3	10.9
1959	11.7	16.7	32.9	13.5	-	9.0	4.6	6.7	4.9
1960	27.6	14.6	23.4	8.3	-	6.2	5.6	7.2	7.1
1961	32.3	16.0	18.5	14.4	-	5.1	4.9	5.9	2.9
1962	25.8	27.0	18.6	2.5	-	7.9	6.1	6.7	5.4
1963	28.6	17.1	20.6	2.5	-	3.3	6.6	6.5	14.8
1964	14.0	20.6	34.7	6.7	-	4.7	6.8	5.6	6.9
1965	25.8	20.5	22.8	11.4	-	2.5	6.6	5.1	5.3
1966	16.3	22.4	15.4	21.4	-	4.2	8.5	7.5	4.3
1967	17.9	9.1	14.7	22.7	-	5.3	11.0	7.3	12.0
1968	9.8	24.3	15.7	2.3	-	7.8	15.3	9.1	15.7
1969	13.2	20.7	9.8	9.6	-	7.3	16.3	8.2	14.9
1970	-	-	-	-	69.2	4.8	12.7	6.4	6.9

Source: Report of the Superintendent of Insurance for Canada, 1957-70

Assets of Foreign Life Insurance Companies
Under the Control of the Chief Agent, 1956-1970

(% of Total Assets at Market Value)

Year	Bonds	Stocks	Mortgage Loans on Real Estate	Real Estate	Investments	Cash	Investment Income, due and accrued	Outstanding Insurance Premiums and Annuity Considerations	Other Assets
1956	1.4	-	.5	.8	-	34.9	43.6	18.4	.4
1957	1.3	-	.4	.8	-	32.9	44.9	18.9	.8
1958	.8	-	.2	.9	-	38.8	41.5	17.3	.5
1959	1.3	-	.2	.8	-	35.8	43.4	17.8	.7
1960	.3	-	.5	.8	-	36.6	41.5	18.2	2.1
1961	1.4	-	.6	1.0	-	33.2	42.5	18.7	2.6
1962	.7	-	1.1	.8	-	34.8	41.6	17.9	3.1
1963	2.4	.2	1.9	1.1	-	32.7	41.9	16.9	2.9
1964	4.5	-	2.7	1.1	-	29.5	40.8	17.9	3.5
1965	3.3	1.1	4.2	.4	-	28.8	40.6	17.9	3.7
1966	.7	1.0	3.0	2.0	-	29.6	40.9	19.6	3.2
1967	3.6	.9	3.1	.6	-	28.3	41.3	17.9	4.3
1968	1.0	.9	2.8	.2	-	27.9	42.4	20.4	4.4
1969	1.4	.8	2.6	.4	-	30.8	38.8	18.7	6.5
1970	-	-	-	-	4.6	37.5	36.8	17.8	3.3

Source: Report of the Superintendent of Insurance for Canada, 1957-70

phase of the cycle. However, because of the contractual nature of their liabilities, they are not significantly affected by the impact of a varying monetary policy over the cycle in the manner that the deposit-type institutions are. Policyholders consider life insurance contracts to be long-term commitments and not liquid savings, which can be reduced to meet temporary cash needs.

4. Pension Funds

An important change in the structure of the Canadian financial system in the postwar period is the growth in the importance of pension funds as a savings vehicle. This reflects the continuing trend in the organization of society towards industrialization and urbanization and the associated tendency for people to provide for their own retirement period (usually in conjunction with employer contributions). This development has been further encouraged by the inclusion of pension arrangements in union - employer negociations and by special tax provisions with respect to pension contributions. In the period 1960-1970 the assets of pension funds (including insured, trusteed, universal plans and federal government annuities) grew at an average annual rate of 13.5 per cent.

The discussion below will concentrate on the major types of pension funds and in particular on the investment activities of trusteed pension fund.[10]

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10 For a more complete treatment of pension arrangements see National Trust Company, A Study of Canadian Pension Plans, 3rd ed., 1969 and A. Pedoe, op. cit.

A Types of Pension Plans

There are three basic types of plans: (i) insured, (ii) universal, and (iii) trusteed. The growth in the total assets of each (including also federal government group annuities) is illustrated in Chart IV-2. A cursory description of (i) and (ii) will be undertaken along with a more comprehensive treatment of (iii).

(i) Insured Plans

Although insurance companies have developed a variety of types of plans, the most common vehicle for insured pension plans has been the group annuity policy, which covers a number of employees under one contract.

Investment of the funds received through insurance companies' pension business (excluding segregated funds) is subject to the same laws outlined earlier with regard to the investment activities of life insurance companies. These regulations differ in some important respects from those applying to the management of trusteed pension funds, as will be noticed below. "This difference between the regulatory treatment of the two types of financial institutions was largely resolved in 1961 by the addition to the relevant federal legislation of an enabling provision; corresponding provisions have since been added to the Insurance Acts of several provinces".[11] The amendments to the Canadian and British Insurance Companies Act permitted insurance companies to introduce segregated funds, free of the restrictions imposed on investment in equities, provided that these funds were segregated from the regular life insurance and annuity business.

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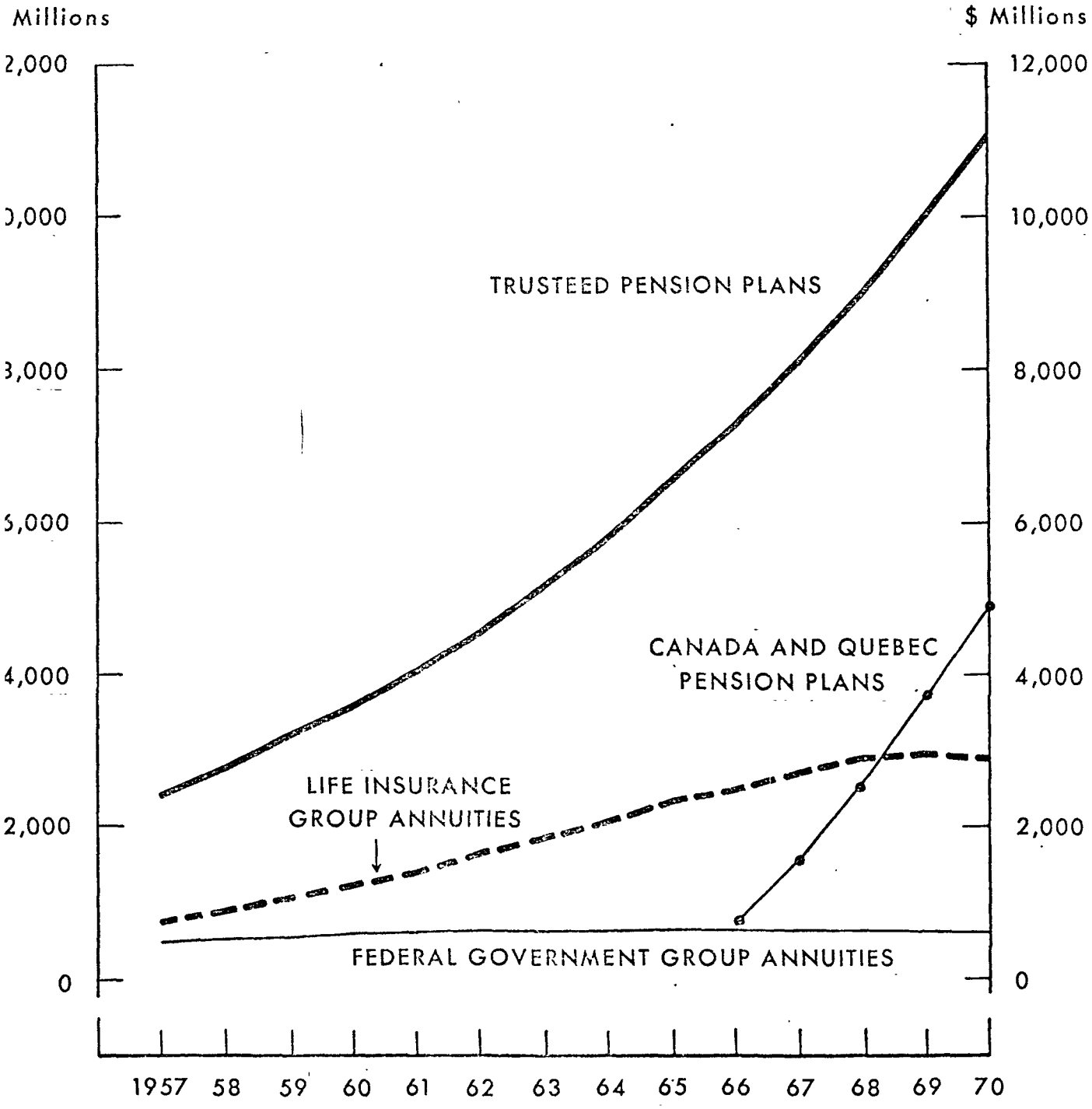
[11] The Canadian Committee on Mutual Funds and Investment Contracts, Report (Ottawa: Queen's Printer, 1969), pp. 11-12.

CHART IV – 2

ASSETS OF PENSION PLANS IN CANADA
1957 – 1970



Source: Statistics Canada, Trusteed Pension Plans Financial Statistics;
Dept. of National Health and Welfare, Canada Pension Plan Branch.

Insurance companies have attempted to tailor the different types of pension contracts covered by segregated funds to meet the various requirements of their customers. "Some clients have a completely separate fund allocated to them which is administered solely on their behalf, and which represents the entire assets of their pension fund. Others participate in the pooled segregated funds but have the right (which is not always exercised) to have a portion of their pension fund invested in a Deposit Administration Plan."[12]

Since the regulations controlling the investment of funds received by insurance companies through pension plans (other than segregated funds) are the same as those governing investment of funds from their other business, it is unlikely that any distinction is made between the two sources of funds from the point of view of investment patterns. Consequently, all such funds were aggregated in the previous section which investigated the investment behaviour of life insurance companies. Since the volume of segregated funds is quite small relative to the other business of life insurance companies, separate treatment is not given to these funds here.

(ii) Universal Plans

The Canada Pension Plan was established in 1965, at which time the Province of Quebec decided to exercise its option and initiate its own pension program. In both cases contributions are made by employed persons, with equal contributions made by employers. The size of the contributions are adjusted from time to time to account for variations in the Consumer Price Index. In the case of the federal plan, funds in excess of those required for benefit

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12 Statistics Canada, Trusteed Pension Plans Financial Statistics, 1970 (Ottawa: Statistics Canada, 1971), p. 52. For a discussion of the nature of the Deposit Administration technique for funding insured pension plans, see A. Pedoe, p. 363.

payments and administrative expenses are used by the Canada Pension Plan Investment Fund to purchase special non-marketable securities issued by the provincial and federal governments. Similarly, surplus funds of the Quebec Pension Plan are invested by the Quebec Deposit and Investment Fund, although in this case the allowable investments cover a broad range of assets including equities. The growth in assets of the Canada and Quebec plans since their commencement is indicated in Chart IV-2.

(iii) Trusteed Plans

Statistics Canada defines a trusteed pension fund as "an arrangement under which contributions to a pension plan are deposited with a trustee who is responsible for holding and investing the funds, and paying the benefits in accordance with the terms of a trust agreement. The trustee may be one or more natural persons, a trust company, or a pension fund society. Under this type of arrangement there is no guarantee that sufficient funds will be on hand to meet the cost of accrued benefits, in direct contrast to the insured arrangement wherein accrued benefits are guaranteed".[13]

The data used in the discussion below are from the results of an annual survey conducted by Statistics Canada covering all organizations in Canada which operate trusteed pension plans with invested assets. The following types of organizations were covered:

(i) Municipalities and municipal enterprises for all provinces;

(ii) Federal and provincial crown corporations;

(iii) Federal and provincial boards and commissions;

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[13] Trusteed Pension Plans Financial Statistics 1970, p. 7.

(iv) The provincial civil service for five of the provinces (Prince Edward Island, Nova Scotia, New Brunswick, Manitoba and British Columbia);

(v) Teachers' federations for seven of the provinces (excludes Quebec, Newfoundland and New Brunswick);

(vi) Religious and charitable organizations;

(vii) Educational institutions and health organizations;

(viii) Trade and employer associations;

(ix) Co-operatives;

(x) Incorporated companies, partnerships and sole proprietorships.

Table IV-11 indicates the relative sizes of contributory versus non-contributory funds as well as the types of trust arrangements for the period 1960-1970.[14]

Due largely to differing regulations regarding investment activities, trusteed pension plans exhibit a variety of investment policies. In this respect, it is useful to separate the totality of pension plans into public sector plans, which include organizations (i) to (v) above, and private sector plans, which include the rest. Public sector plans are constrained through legal restrictions to invest a relatively large part of their portfolios in government bonds. As a result, these plans tend to hold a smaller proportion of total assets in the form of equities than do private plans and also exhibit less adaptability to changing economic conditions than the latter.

B Investment Patterns

Table IV-12 shows that public sector funds tend to be heavily invested in fixed income securities relative to private sector funds. Both types, however, have exhibited a tendency to increase the proportion of total assets held in the form of equities over time, although the shift is considerably greater in the case of private sector funds.

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[14] A contributory fund is one in which the employee as well as the employer contributes towards the cost of the plan.

SUMMARY OF PRINCIPAL CHARACTERISTICS OF TRUSTEED PENSION FUNDS

(millions of dollars)

	TRUSTEED PENSION FUNDS				TRUST ARRANGEMENTS							
	Contributory		Non-Contributory		(a) Corporate Trustee		(b) Individual Trustee		Combinations of (a)&(b)		Pension fund Societies	
	Number	Book Value of Assets	Number	Book Value of Assets	Number	Book Value of Assets	Number	Book Value of Assets	Number	Book Value of Assets	Number	Book Value of Assets
960	845	2,863	294	720	906	918	194	2,234	3	3	36	428
961	1,003	3,182	359	854	1,109	1,120	210	2,370	7	77	36	469
962	1,143	3,596	403	934	1,256	1,288	229	2,588	23	139	38	515
963	1,339	4,091	465	1,036	1,487	1,530	250	2,866	29	169	38	562
964	1,593	4,598	525	1,168	1,732	1,814	320	3,156	29	186	37	610
965	2,086	5,178	911	1,363	2,306	2,124	625	3,531	32	224	34	662
966	2,267	5,733	1,200	1,517	2,530	2,430	862	3,943	42	166	33	711
967	2,408	6,344	1,381	1,724	2,737	2,837	975	4,331	46	190	31	710
968	2,447	7,047	1,588	1,925	2,962	3,209	1,018	4,729	53	257	32	777
969	2,495	8,004	1,577	1,999	2,996	3,629	981	5,110	63	408	32	856
970	2,376	8,897	1,483	2,162	2,856	3,984	910	5,697	61	449	32	929

Source: Statistics Canada, Trusteed Pension Plans Financial Statistics.

	Bonds		Stocks		Mortgages		Real estate lease-backs and miscellaneous		Pooled funds		Mutual funds		Total	
	$'000,000	%	$'000,000	%	$'000,000	%	$'000,000	%	$'000,000	%	$'000,000	%	$'000,000	%
Public sector[1] -														
1960.....	1,174	83.7	16	1.1	130	9.3	50	3.6	3	0.2	29	2.1	1,402	100.0
1961.....	1,302	84.2	21	1.3	150	9.7	36	2.3	3	0.2	35	2.3	1,547	100.0
1962.....	1,434	82.4	34	1.9	186	10.7	41	2.3	3	0.2	43	2.5	1,741	100.0
1963.....	1,598	81.1	58	3.0	213	10.8	48	2.4	10	0.5	43	2.2	1,970	100.0
1964.....	1,769	80.1	84	3.8	232	10.5	60	2.7	13	0.6	50	2.3	2,208	100.0
1965.....	1,971	78.3	143	5.7	255	10.1	108	4.3	17	0.7	22	0.9	2,516	100.0
1966.....	2,187	76.9	189	6.7	293	10.3	130	4.6	21	0.7	24	0.8	2,844	100.0
1967.....	2,384	74.5	254	7.9	323	10.1	182	5.7	31	1.0	26	0.8	3,200	100.0
1968.....	2,618	73.3	344	9.6	352	9.8	194	5.4	38	1.1	28	0.8	3,574	100.0
1969.....	2,871	71.0	442	10.9	387	9.6	251	6.2	60	1.5	31	0.8	4,042	100.0
1970.....	3,258	69.5	510	10.9	509	10.9	299	6.4	77	1.6	33	0.7	4,686	100.0
Private sector[2]														
1960.....	1,583	72.6	242	11.1	169	7.8	88	4.0	99	4.5	-	-	2,181	100.0
1961.....	1,708	68.6	370	14.9	191	7.7	98	3.9	122	4.9	-	-	2,489	100.0
1962.....	1,823	65.4	463	16.6	228	8.2	104	3.7	170	6.1	1	--	2,789	100.0
1963.....	1,982	62.8	553	17.5	266	8.4	121	3.8	229	7.3	6	0.2	3,157	100.0
1964.....	2,096	58.9	692	19.4	310	8.7	141	4.0	311	8.8	8	0.2	3,558	100.0
1965.....	2,211	54.9	846	21.0	368	9.1	179	4.5	411	10.2	10	0.3	4,025	100.0
1966.....	2,300	52.2	1,028	23.3	383	8.7	191	4.3	492	11.2	12	0.3	4,406	100.0
1967.....	2,377	48.8	1,260	25.9	401	8.2	237	4.9	579	11.9	14	0.3	4,868	100.0
1968.....	2,396	44.4	1,610	29.8	424	7.9	309	5.7	642	11.9	17	0.3	5,398	100.0
1969.....	2,414	40.5	1,983	33.3	476	8.0	378	6.3	689	11.6	21	0.3	5,961	100.0
1970.....	2,508	39.4	2,170	34.1	513	8.0	440	6.9	720	11.3	22	0.3	6,373	100.0

[1] Includes the following types of organizations: municipalities and municipal enterprises, provincial crown corporations and government agencies, federal crown corporations and government agencies, and educational institutions and organizations.

[2] Includes the following types of organizations: religious and charitable, health, trade and employee associations, cooperatives, incorporated and unincorporate businesses and others.

Source: Statistics Canada, Trusteed Pension Plans Financial Statistics.

There is a notable variation of investment patterns among the types of trusteed pension plans as indicated in Table IV-13. Federal crown corporation plans, for example, have shown a tendency to invest less in bonds and more in equities and mortgages than the other organizations.

Chart IV-3 illustrates the proportion of the total assets of all trusteed pension funds invested in various financial assets. The tendency towards disinvestment of bonds in general, and Government of Canada debt in particular, is evident. The shift to equities reflects an attempt to realize a more significant appreciation of the value of investment portfolios to meet growing benefit requirements as plans mature and more members reach retirement age.

5. Fire and Casualty Insurance Companies

Since 1955 the number of federally registered fire and casualty insurance companies has declined from 399 to 256 in 1970. Foreign-owned companies have always been in the majority and of the 256 companies operating in 1970, 68 per cent were non-Canadian. Most companies are federally registered with provincially licenced companies accounting for about 10 per cent of the premiums written in 1970. Total assets of these companies grew at an average annual rate of 10 per cent in the period 1962-70.

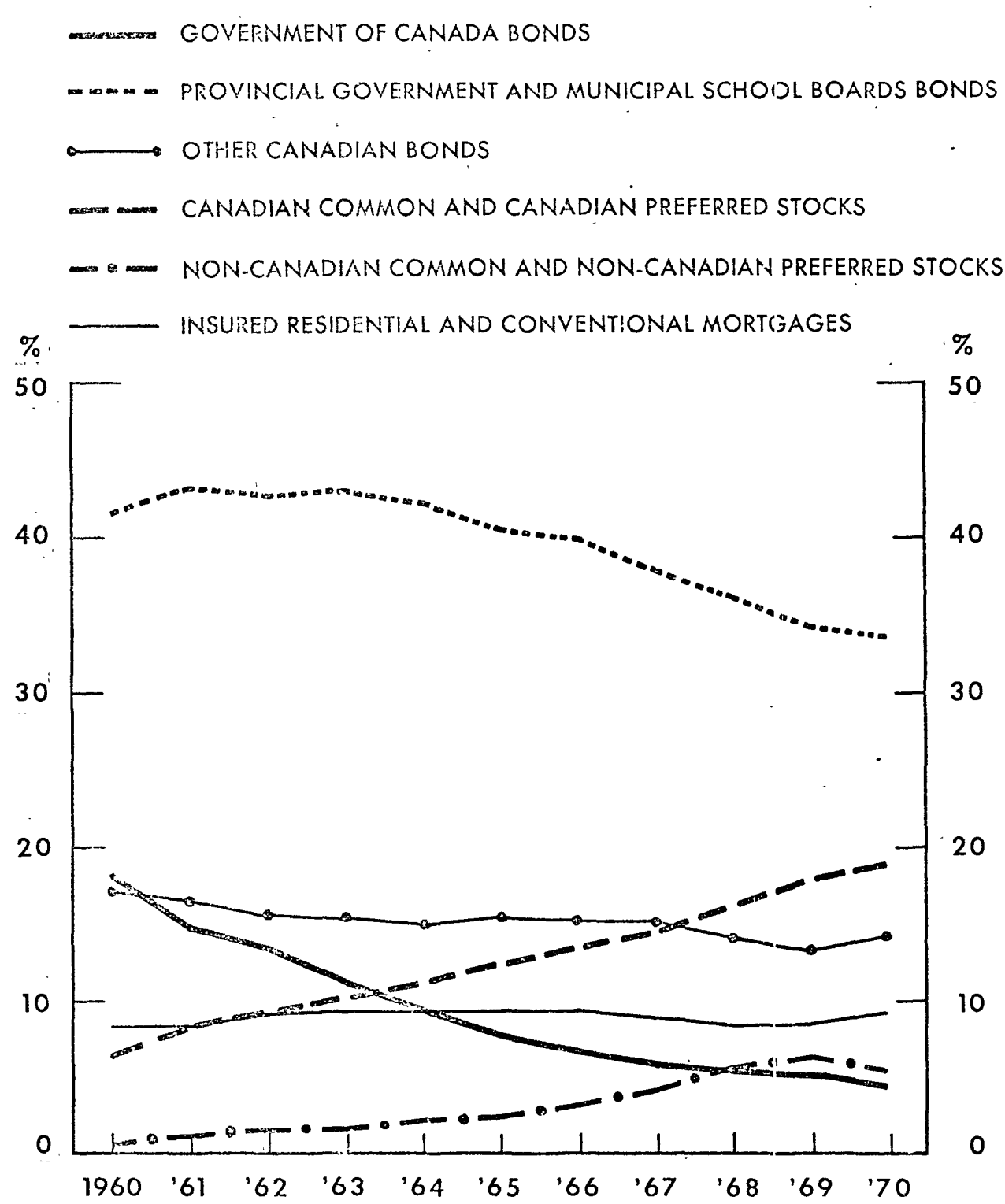
Although life insurance companies and fire and casualty insurance companies are subject to the same piece of legislation, their investment patterns have differed considerably because of the nature of their liabilities. Whereas claims against life companies are long-term and exhibit a high degree of predictability, the liabilities of fire and casualty companies are much shorter in maturity (between one and five years) and have a much higher degree of variability. Consequently, fire and casualty companies hold a noticeably greater proportion of their total assets in relatively liquid financial claims than do life companies. Detailed information on the structure of the portfolio

		ities and Municipal enterprises	Crown corporations and government agencies	Crown Corporations and government agencies	and charitable	nal		employee associations	tives		
BONDS											
	1960	91.6	96.0	66.8	78.3	89.6	79.9	78.4	65.8	72.8	64.8
	1961	91.1	94.5	64.1	77.6	95.7	59.8	61.4	66.1	68.8	59.4
	1962	90.0	91.9	60.3	74.3	96.2	59.9	46.6	69.2	65.5	49.9
	1963	88.6	91.8	56.6	72.8	96.4	58.8	44.0	66.5	62.9	48.7
	1964	88.5	90.2	55.3	72.3	94.9	57.4	51.5	59.3	59.1	48.9
	1965	88.4	89.6	54.6	68.8	88.4	53.8	48.5	57.3	55.1	34.6
	1966	88.3	87.8	50.6	67.5	88.2	50.6	46.7	56.2	51.9	31.4
	1967	87.1	86.6	46.1	65.4	85.2	46.4	45.1	54.1	48.5	29.1
	1968	86.6	86.2	41.9	62.2	85.4	40.4	41.2	51.2	44.1	20.9
	1969	85.2	83.9	38.2	61.1	81.8	32.9	36.3	50.1	40.2	29.3
	1970	83.4	75.8	37.8	58.9	80.6	36.7	29.0	50.8	39.0	29.6
STOCKS											
	1960	2.9	1.3	5.6	8.7	.2	11.1	16.5	15.6	11.1	6.3
	1961	3.2	2.2	.5	10.2	.2	13.1	13.7	12.2	14.8	5.3
	1962	3.2	2.8	2.0	11.2	.2	15.6	13.1	11.0	16.6	6.8
	1863	3.2	3.1	4.8	12.1	.2	16.9	14.0	12.0	17.5	5.4
	1964	3.5	3.4	7.2	12.9	.2	19.4	14.0	11.8	19.5	4.8
	1965	3.3	3.7	13.4	14.7	.3	22.2	12.6	12.9	21.2	6.0
	1966	3.4	6.0	15.0	16.7	.7	28.3	11.6	13.5	23.4	5.5
	1967	3.4	6.4	18.7	17.8	1.4	33.2	12.3	14.7	26.0	5.5
	1968	4.0	6.7	23.1	19.4	2.4	40.5	13.4	16.2	29.8	4.9
	1969	4.7	8.7	26.0	21.1	3.0	44.4	14.6	17.4	33.4	5.7
	1970	4.4	11.4	25.3	21.9	3.4	40.0	14.9	19.6	34.3	4.9
MORTGAGES											
	1960	2.2	.4	25.9	4.6	.3	4.4	.8	.3	7.8	1.3
	1961	2.0	1.1	26.9	6.3	.7	5.2	1.3	.2	7.7	1.4
	1962	3.3	3.2	28.3	7.8	.6	6.8	1.9	1.3	8.3	2.5
	1963	4.0	2.9	28.8	8.5	.6	3.7	2.8	2.1	8.5	4.0
	1964	4.2	3.8	27.2	7.2	.9	3.6	3.6	2.8	8.8	5.0
	1965	4.0	4.2	26.4	10.4	1.1	5.7	3.6	4.8	9.2	4.0
	1966	4.3	3.9	27.6	10.2	1.1	5.1	3.3	5.0	8.8	4.3
	1967	4.0	3.6	27.9	11.4	1.3	4.5	2.8	5.5	8.3	2.5
	1968	4.1	3.5	27.5	11.6	.9	3.6	1.0	5.6	8.0	1.2
	1969	3.7	4.2	27.4	11.2	1.1	3.9	1.1	3.9	8.1	.5
	1970	5.2	8.1	29.2	12.8	1.5	4.2	1.2	5.4	8.1	.3

Source: Statistics Canada, Trusteed Pension Plans Financial Statistics.

CHART IV – 3

PERCENT DISTRIBUTION OF CERTAIN ASSETS, TRUSTEED PENSION FUNDS (1960 – 1970)



Source: Statistics Canada, Trusteed Pension Plans Financial Statistics.

of fire and casualty companies is available only for recent years. In Table IV-14 it will be noticed that in 1971 over half of total assets were held in the form of bonds and debentures. Of these, Government of Canada, provincial and corporate bonds represent almost equal shares, while municipal and foreign securities were held in lesser amounts. Apparent in Table IV-14 also is the proportionately larger stock of equities held by fire and casualty companies than by life companies. Because of their fixed dollar insurance claims, the latter have preferred to invest in fixed return instruments. With increasing property damage and bodily injury claims due, in large part, to cost factors, and the constraints on the extent to which these increased costs can be covered by premium rate adjustments, fire and casualty companies have shown a tendency to increase the extent of their investment in equities.

6. Data Availability

In the case of chartered banks and trust and loan companies, quarterly data were readily available and quite reliable. This, unfortunately, is not the case for insurance companies and pension funds. In fact, with the exception of the estimates for fire and casualty insurance companies provided in Statistics Canada's publication Financial Institutions from 1966 onward, quarterly data on the assets of these institutions are not available. Consequently, it was decided to estimate the required series of Government securities held by these institutions by utilizing the existing information. More specifically, the series used are the available annual series along with the quarterly flows provided in the Financial Flows accounts of Statistics Canada.

Fire and Casualty Insurance Companies - Asset Structure (1966-1971)

	1966		1967		1968		1969		1970		1971	
	$ (Mil)	% T.A.	$ (Mil)	% T.A.	$ (Mil)	% T.A.	$ (Mil)	% T.A.	$ (Mil)	% T.A.	$ (Mil)	% T.A.
›v't. of Canada	509	24.9	515	22.4	526	20.9	573	20.8	565	18.3	504	15.0
:ovincials	360	17.6	434	18.8	483	19.2	488	17.7	586	19.0	643	19.1
ınicipals	137	6.7	155	6.7	160	6.4	166	6.0	198	6.4	217	6.4
›rporate bonds & debentures	216	10.6	262	11.4	296	11.8	343	12.4	433	14.0	564	16.7
›rtgages	21	1.0	26	1.1	32	1.3	34	1.2	43	1.4	57	1.7
:eferred & common shares	277	12.0	292	12.7	350	13.9	385	14.0	434	14.1	506	15.0
›reign Securities	86	4.2	82	3.6	75	3.0	73	2.6	81	2.6	92	2.7
›tal Assets	2,041	100.0	2,304	100.0	2,516	100.0	2,758	100.0	3,088	100.0	3,370	100.0

ource: Statistics Canada, Financial Institutions.

The annual series used for life insurance companies and trusteed pension funds are provided by the Bank of Canada and Statistics Canada, respectively. In the case of life insurance companies, the series measures the book value of the assets held in Canada of all the federally-registered life insurance companies, including their segregated assets, the assets associated with funds obtained through pension business (principally group annuities), and those associated with their accident and sickness branches. Similarly, the assets of total trusteed pension funds are recorded at book value.

The information on financial flows of life insurance companies takes as its basic source the Bank of Canada's report on the Canadian investment transactions of life insurance companies, which is based on data provided by the Canadian Life Insurance Association. Up until June 1963 the data were based upon the transactions of 12 companies whose net premium income comprised approximately 74% of the total for all federally-registered companies. Thereafter the data cover 16 companies and about 80% of net premium income. This information is supplemented with data from semi-annual reports filed by federally-registered life insurance companies with the Department of Insurance recording their Canadian transactions in investments and loans. Although the reports are filed every six months, transactions in securities are allocated to the appropriate quarter by determining the dates on which the transactions were made. Additional information is contained in the insurance companies' quarterly statement of assets published as a supplement to the Canada Gazette. The data on which the flows are based also include the segregated assets of life insurance companies and the assets associated with their accident and sickness branches. In the 1962-67 preliminary accounts the sample used in the determination of the flows included 27 federally-registered companies which

accounted for 96 per cent of the assets of all federally-registered life insurance companies. In current determination of the flows, all federally-registered companies are included in the survey and these companies control over 90 per cent of the assets of all life insurance companies, federally or provincially registered. The quarterly flows for trusteed pension funds are based on a quarterly survey conducted by the Labour Division of Statistics Canada. The funds included in the sample account for 85 per cent of the total assets of all trusteed pension funds.

For the chartered banks and trust and loan companies, the dependent variables in the regression analysis were measured at book value to eliminate valuation changes resulting from variations in interest rates. The usual accounting practice in recording the sale of a security is to reduce the appropriate asset account by the book value of the asset sold, with any difference between the purchase and selling price being recorded as a profit or loss. The flow of funds accounts, however, are concerned with dollar-value transactions and therefore record sales at market prices. Consequently, a discrepancy will arise between the sum of quarterly flows and year-to-year changes in the annual series which are recorded at book value. Also differences will be introduced by errors of estimation in the periods where the coverage of institutions was not complete. Since there is no way of associating valuation changes or estimation errors with particular quarters, the residuals were distributed equally over the four quarters in the construction of the quarterly series on the holdings of federal securities by life insurance companies and trusteed pension funds.

In the case of fire and casualty companies, balance sheet data are available from 1966 onward but there is no published information on stocks available prior to this period other than the annual reports of individual companies in the Report of the Superintendent of Insurance. The data used for these companies prior to 1966 were obtained from the worksheets used by the Financial Flows Section of Statistics Canada in the preparation of the preliminary flow accounts for the period 1962-67.

7. Specification and Estimation of Equations for Insurance-type Institutions

As mentioned above, the maturity structure of the investment portfolio of the insurance-type financial institutions corresponds to the long-term contractual nature of their liabilities. Financial assets, once purchased, are typically held to maturity and short-run variations in security prices are not reflected in portfolio adjustments by these institutions. Consequently, it is unlikely that expectations with respect to interest rate changes from quarter to quarter will have a significant effect on their portfolio behaviour, as was the case with the deposit-type institutions. An examination of Charts IV-1 and IV-3 reveals that life insurance companies and trusteed pension funds have carried out a gradual reduction in the proportion of total assets in the form of government securities. In the case of life insurance companies, the reduction in Government securities was contemporaneous with increases in mortgages, provincial bonds and stocks, while in the case of pension funds, domestic and foreign stocks have exhibited a consistent upward trend. Also evident in Graph IV-1 is the impact of the 1965 revision of the Canadian and British Insurance Companies Act on the asset structure of life insurance companies.

As a result of the earlier discussion of institutional considerations and historical investment behaviour, the equations estimated for the insurance-type institutions omitted the expectations variables included in the case of deposit-type institutions but attempted to include variables to account for the long-term nature of the investments of these institutions, the importance of stocks as an alternative financial asset, and the effect of institutional changes. With a large part of the assets of life insurance companies and trusteed pension funds in the form of long-term bonds, the deterioration in the value of currency over time becomes a significant factor. To reflect this influence the rate of change in prices is included as an explanatory variable in the regression analysis. The growing attractiveness of stocks is represented in an index of stock market prices.

In Table IV-15 the results of the regression analysis of the insurance-type institutions are summarized. Equation (8) was obtained using OLS and represents the demand for Government securities by life insurance companies. Although the coefficient of the variable representing the differences between the rate on Governments and that on conventional mortgages appears with the correct sign, it is not statistically significant, as was the case with other interest rates tried and other forms of the equation which were estimated. It was mentioned above that life insurance companies do not rearrange their portfolios in response to changing market conditions, but rate changes do have an effect on the investment of new funds. Marginal changes in the stock of Governments held are small in relation to the total stock and consequently the relationship between the ratio of Governments held to total assets and the rate differential is weak.

INSURANCE-TYPE FINANCIAL INSTITUTIONS – REGRESSION RESULTS

Equation	Dependent Variable	INDEPENDENT VARIABLES K	(BR-PR)	(BR-MR)	$\left(\frac{GNP-GNPP}{GNP}\right)_{t-1}$	Lagged Dependent Variable	ΔP/P	T	SMI	D2	D3	D4	D5	STATISTICS $\bar{R}^2$	S.E.E.	D-W
(8)	LIGS/LITA	.0248 (3.129)		.0015 (1.231)	-.0838 (-4.645)	.7362 (10.814)	-.0010 (-1.259)		-.0001 (-2.355)	-.0081 (-4.468)	-.0030 (-3.580)	.0034 (2.494)	-.0040 (-2.266)	.99	.00140	2.20
(9)	PFGS/PFTA	.0030 (.997)	.0007 (.753)		-.0151 (-1.588)	.9301 (39.919)	.0004 (1.311)	-.0001 (-.424)		-.0018 (-2.011	-.0005 (-1.387)	.0009 (1.244)		.99	.00059	.88
(10)	FCGS/FCTA	.1009 (4.106)	.0255 (4.893)		.0036 (.080)	.7545 (13.508)	-.0002 (-.099)		-.0002 (-2.548)	-.0023 (-.496)	.0009 (.406)	.0010 (.261)		.99	.00379	1.93
USING HILDRETH-LU TRANSFORMATION																
(11)	PFGS/PFTA	.0037 (.759)	.0014 (2.497)		-.0024 (-.458)	.9323 (26.241)	-.0002 (-1.161)	-.0001 (-.157)		-.0004 (-.832)	-.0002 (-.789)	.0002 (.399)				1.79

The figures given in parentheses under the estimated coefficients are t-values.

LIGS = Life insurance companies' holdings of Government securities, millions of dollars.

LITA = Total assets of life insurance companies, millions of dollars.

ΔP/P = Rate of change in the consumer price index.

T = A trend variable beginning in 1962 I.

PFGS = Trusteed pension funds' holdings of Government securities, millions of dollars.

PFTA = Total assets of trusteed pension funds, millions of dollars.

SMI = Statistics Canada's investors index, begins in 1956, 1961 = 100.

FCGS = Fire and casualty insurance companies' holdings of Government securities, millions of dollars.

FGTA = Total assets of fire and casualty insurance companies, millions of dollars.

K = A constant.

GNP = Current dollar gross national product.

GNPP = Potential GNP in current dollars.

It was suggested earlier that life insurance companies exhibited some tendency towards accommodation of the demand for mortgage loans during periods of strong economic activity and that this was reflected in a reduction in bond holdings. This cyclical factor is represented in equation (8) by the variable $\left(\frac{GNP-GNPP}{GNP}\right)$ and the best results were obtained with a one-period lag on this variable, suggesting that the demand for mortgage loans or the accommodation of these demands, or both, lag the business cycle somewhat. The cyclical variable appears with the expected sign and is statistically significant. Both the rate of change of prices ($\Delta P/P$) and the index of stock market prices appear with the anticipated signs but only the latter is significant (at the .025 level using a one-tailed t-test). The impact of the 1965 revision of the Canadian and British Insurance Companies Act, which essentially broadened the range of alternatives to bonds in the investment portfolio of life insurance companies and introduced segregated assets, is incorporated in the dummy variable (D5), which appears in a significant manner. The implied adjustment coefficient is .26 (i.e., about three years are required for 95 per cent of total adjustment), which is just slightly lower than that obtained for trust and loan companies and consequently higher than expected.

To account for bias introduced by inclusion of the lagged dependent variable, equation (8) was reestimated using the Hildreth-Lu procedure. The results were almost identical and so are not presented here.

Chart IV-3 reveals a continued downward trend in the holdings of Governments by trusteed pension funds. It is apparent that this class of institutions is in the process of a fundamental portfolio adjustment which involves a shift out of bonds and into domestic and foreign stocks. This would appear to reflect a change in overall investment policy resulting from the anticipated heavy benefit demands on these funds in future years, which was alluded to above, rather than a response to short-run differences in rates of return. The continuance of this portfolio realignment throughout the

estimation period made a reliable estimate of the trusteed pension funds' demand for Government securities difficult to obtain. Chart IV- 3 also indicates that mortgage loans constitute a small part of the total assets of trusteed pension funds and hence cyclical factors are not likely to affect their portfolio behaviour in an important manner.

The estimated demand equation for Government securities on the part of trusteed pension funds is equation (9) of Table IV-15. The signs of the estimated coefficients (with the exception of $\Delta P/P$) are consistent with our expectations but most of the explanatory power of the equation rests in the lagged dependent variable. The accuracy of the estimated coefficients also suffers from the existence of positive autocorrelation among the residuals as evidenced by the D-W statistic. Consequently, the equation was reestimated using the Hildreth-Lu procedure with the results recorded as equation (11).

In contrast to the case of life insurance companies the interest rate differential enters in a significant manner in the transformed equation. Also, as expected, the cyclical variable has no discernible impact on the pension funds' portfolio behaviour. Somewhat surprisingly, however, neither the index of stock market prices nor a trend variable included to account for the basic change in the investment policy of these institutions was significant. The adjustment coefficient implied by the coefficient of the lagged dependent variable is very low, suggesting an exceptionally long period for complete adjustment to a new equilibrium position.

The overall explanatory power of the equation is very good, as is the D-W statistic, but as mentioned above, most of the explanatory power rests in the inclusion of the lagged dependent variable. A variety of alternative forms of the equation was attempted but the results did not improve upon those reported here.

In the case of fire and casualty companies there is, as pointed out earlier, a greater concentration of assets in a relatively liquid form, although these companies too have illustrated a tendency towards more efficient cash management over time and consequently a reduction in their liquidity position. There would appear to be a considerable degree of substitution among bonds of various types on the basis of relative yields and also an increasing preference for domestic preferred and common shares. Mortgages, on the other hand, constitute a small part of their total assets and consequently the accommodation of varying loan demands over the cycle is not likely to be a significant factor. Since their assets are considerably more liquid than those of life insurance companies and pension funds, we should expect that the adjustment coefficient would be somewhat higher than in the case of the latter institutions.

The estimated demand equation for fire and casualty companies is equation (10) of Table IV-15. As expected, yield differences play a significant role in the investment decisions of these companies. Although the reported equation uses the rate on provincial bonds, other rates, such as the index on industrial bonds, gave similar results. The cyclical variable and the rate of change in prices are statistically insignificant and the stock market index, although it has the correct sign and is statistically significant, has only a marginal impact on the companies' holdings of Governments, as indicated by the magnitude of the estimated coefficient. The implied adjustment coefficient is approximately .25 which suggests 95 per cent of complete adjustment is accomplished within three years. The overall explanatory power of the equation is good and, although the D-W statistic would appear to be acceptable, the equation was reestimated using the Hildreth-Lu procedure due to possible bias in this statistic. The results of the reestimation were very similar to equation (10) and so are not reported here.

8. The Role of Government Securities in the Financial Asset Portfolio of Non-Financial Corporations

A considerable amount of work has been carried out on the topic of the corporate demand for federal government securities in the U.S. Among the more important analyses are those of Cawthorne, Teeters, Block, Heston and Levy.[15] Although these works differ somewhat with regard to the sample period examined, the type of corporations included, the specification of variables in terms of stocks or flows, etc., they do follow the same basic approach and it is useful at this point to undertake a brief review of their common features.

All of the studies concluded that a major determinant of changes in corporation holdings of federal securities was the variation in accrued federal income tax liabilities. This variable is obviously more important the larger is the permissible delay between the time the tax is accrued and the time when it is paid. Block assumed that corporations "covered" their federal tax liabilities by holding governments and consequently concerned his analysis with their holdings of "free governments", i.e., total holdings minus tax liabilities. Levy criticized this approach as being as artificial as the separation of the demand for money into components based upon the separate motives for holding money (transactions, precautionary and speculative). His own tests, however, substantiated the "covering" hypothesis.

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[15] D. Cawthorne, "Corporate Participation in the Government Securities Market", Monthly Review, Federal Reserve Bank of Kansas City (Dec., 1960), pp. 9-15; E. Block, "Short Cycles in Corporate Demand for Government Securities and Cash", American Economic Review, (Dec., 1963), pp. 1058-77; A. Heston, "An Empirical Study of Cash, Securities, and Other Current Accounts of Large Corporations", Yale Economic Essays, Vol. 2 (Spring, 1962), pp. 117-68; M. Levy, Cycles in Government Securities, Vol. II (New York: National Industrial Conference Board, 1965), pp. 57-95; N. Teeters, "Nonfinancial Corporations' Holdings of U.S. Government Securities", unpublished mimeograph, 1960; the regression results of the Teeters paper are presented in Levy's study, p. 91. For an attempt to include risk, defined as the variability of the rate of return on a given asset, into the portfolio decisions of non-financial corporations see J. Jeffers and J. Kwon, "A Portfolio Approach to Corporate Demands for Government Securities", Journal of Finance, Vol. XXIV (Dec., 1969), pp. 905-919.

Another important variable was the volume of funds available from internal sources (depreciation plus retained earnings) relative to investment expenditures on inventory, plant and equipment. (Block considered internal plus external sources, the latter consisting of capital market floatations and bank borrowing). In general, the results suggested that an excess of investment expenditures over internal sources was financed in part by reductions in corporate holdings of liquid assets, including federal securities. Levy's results lent some support to the intuitively appealing notion that the sale of governments is more important in the case of financing inventory build-ups than it is for additions to plant and equipment.

The empirical results also tended to support the notion that sales of governments were used to provide partial financing of gross trade credit. In none of the analyses, however, did net trade credit (accounts receivable minus accounts payable) prove to be significant in explaining variations in corporate holdings of governments.

Most studies attempted to associate changes in corporate holdings of governments with the Treasury Bill rate but without any success. Levy's analysis differed from the others in that he viewed the sale of governments and bank loans as substitute sources of financing for corporations. He tested this hypothesis by including as an explanatory variable in his regression analysis (where the dependent variable was the change in corporate holdings of Governments) the difference between the bank loan rate and the Treasury bill rate. The estimated coefficient of this variable had a negative sign as expected and proved to be statistically significant.

In summarizing the results of the above-mentioned studies it may be said that accrued tax liabilities is the only variable that proved to be a significant determinant of corporate holdings of federal government securities in all of the studies. Investment expenditures, or the excess of investment expenditures over internal sources of funds, were significant

in some cases as was the volume of gross trade credit. Only in Levy's study did an interest rate variable prove to be an important explanatory variable.

9. Empirical Analysis of the Corporate Demand for Federal Government Securities

The data used in the analysis of non-financial corporate investment in financial assets were obtained from Statistics Canada's publication "Industrial Corporations - Quarterly Financial Statistics, 1962-1969" and subsequent issues of this series.[16] Chart IV-4 provides an illustration of the changing structure of financial assets held by non-financial corporations in the period 1962-1971. Notable is the rapid decline in bond holdings of various types and in particular Government of Canada bonds. This reduction in bond holdings is coincident with significant alterations in the laws governing the payment schedule for federal corporate income taxes. Table IV-16, which provides a summary of these legislative changes, reveals that the schedule of income tax instalment payments by corporations has been gradually amended from a six month delay before the first payment in 1962 to a pay-as-you-go basis by 1971. Consequently, it might be expected that the importance of accrued tax liabilities as a determinant of corporate holdings of Governments would diminish over time and also that the proportion of financial assets held in this form would decrease. The reduction in bond holdings evident in Chart IV-4 may also be attributable in part to the use of more efficient cash management techniques but this alone could not have been responsible for the substantial disinvestment which has taken place with respect to Government bonds.

Since information on corporate tax liabilities and payments is available for all corporations only, it was necessary for purposes of regression analysis to approximate in some way the difference between tax liabilities

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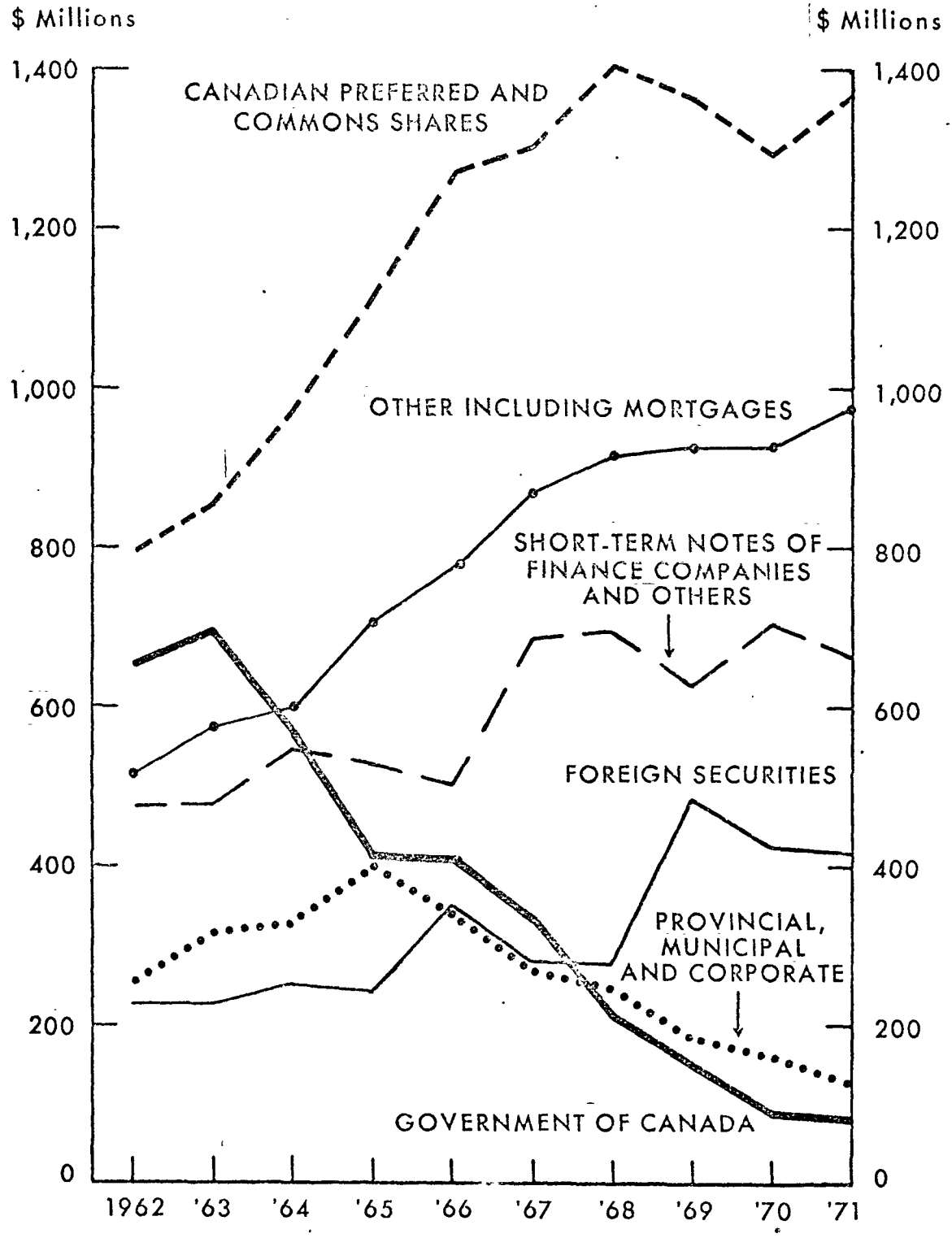
[16] For a detailed description of the extent of coverage of the survey and the methodology employed, the initial issue of the above publication should be consulted.

CHART IV – 4

NON-FINANCIAL CORPORATIONS – FINANCIAL ASSETS

(1962 – 1971)



Source: Statistics Canada, Industrial Corporations.

TABLE 1V - 16

SCHEDULE OF INCOME TAX INSTALMENT PAYMENTS BY CORPORATIONS[1]

Taxation Year Ending	MONTHS OF FIRST TAXATION YEAR												MONTHS OF SECOND TAXATION YEAR						
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	1st	2nd	3rd	4th	5th	6th	7th
Prior to 1954	.	.	.	.	.	.	1/12	1/12	1/12	1/12	1/12	1/12	1/6*	1/6*	1/6*	1/6*	1/6*	1/6*	
Jan. 1, 1954 - Nov. 30, 1963	.	.	.	.	.	.	1/12	1/12	1/12	1/12	1/12	1/12	1/12	1/12	1/12	1/3*	1/3*	1/3*	
Dec. 1, 1963 - Nov. 30, 1964	.	.	.	.	.	.	1/12	1/12	1/12	1/12	1/12	1/12	1/12	1/12	1/12	1/2*	1/2*	1/2*	
Dec. 1, 1964 - Nov. 30, 1965	.	.	.	.	.	1/11	1/11	1/11	1/11	1/11	1/11	1/11	1/11	1/11	1/2*	1/2*			
Dec. 1, 1965 - Nov. 30, 1968	.	.	.	.	1/12	1/12	1/12	1/12	1/12	1/12	1/12	1/12	1/12	1/12	1/2*	1/2*			
Dec. 1, 1968 - Nov. 30, 1969	.	.	.	.	.	1/5	.	1/5	.	1/5	.	1/5	.	1/5	*				
Dec. 1, 1969 - Nov. 30, 1970	.	.	1/10	1/10	1/10	1/10	1/10	1/10	1/10	1/10	1/10	1/10	.	.	*				
After Dec. 1, 1970	1/12	1/12	1/12	1/12	1/12	1/12	1/12	1/12	1/12	1/12	1/12	1/12	.	.	*				

Basic Changes Effective
Jan. 1, 1954
Dec. 1, 1963
Dec. 1, 1967
Dec. 1, 1968

Source: Department of Finance.

* - Settlement Payment

(1) The schedule is appropriate for federal corporate tax liabilities and provincial corporate tax liabilities for those provinces which participate in the tax collection agreement with the federal government. Ontario and Quebec collect their own corporate taxes.

and tax payments appropriate for non-financial corporations. Rather than attempt to scale the aggregate variable down it was decided to express the difference between tax liabilities and payments as a ratio of the liabilities under the assumption that the rate of corporate tax payments is the same for all corporations. Also, since the dependent variable used in the estimated regression equations was the ratio of non-financial corporations' holdings of federal government securities to total current assets, the explanatory variables expressed ir dollar terms were also divided by total current assets. A variety of forms of the demand equation was attempted, and these will be mentioned below, but the equation indicated below was the "best" in terms of explanatory power,consistency of the signs of the estimated coefficients with a priori notions,etc.

$$\frac{NFCGS}{TCA} = \underset{(.542)}{.01779} + \underset{(1.721)}{.00557}\left(\frac{TL - TC}{TL}\right) - \underset{(-.395)}{.03090}\frac{GTC}{TCA} + \underset{(.769)}{.00027}\,TBR - \underset{(-1.104)}{.03721}\frac{DEF}{TCA}$$

$$+ \underset{(5.435)}{.79533}\left(\frac{NFCGS}{TCA}\right)_{t-1} - \underset{(-2.389)}{.00298}\,D5 - \underset{(-2.485)}{.00503}\,D6 + \underset{(.766)}{.00086}\,D2 - \underset{(-.918)}{.00123}\,D3$$

$$- \underset{(-1.939)}{.00228}\,D4$$

SEE = .001851 $\quad \bar{R}^2 = .977$ $\quad$ DW = 2.48

NFCGS = holdings of Government securities by non-financial corporations (book value)

TCA = total current assets

TL = corporate tax liabilities (federal + provincial)

TC = corporate tax collections (federal + provincial)

GTC = gross trade credit (accounts receivable)

TBR = Treasury bill rate

DEF = investment in inventories and plant and equipment minus internal sources of funds (depreciation + addition to retained earnings)

D5 = dummy variable; equals 1 for 1964I to 1966IV and 0 elsewhere

D6 = dummy variable; equals 1 for 1967I to 1971 IV and 0 elsewhere

D2,D3,D4 = seasonal dummies

Various interest rate variables, including the rate on short-term federal bonds and differences between the rate on Governments and the rates on other liquid assets as well as the difference between the rate on Governments and the prime bank lending rate, were attempted but none of these proved to be significant. This was also the case in most of the studies cited above and in fact in some of those analyses the Treasury bill rate entered the regression equation with a negative sign.

The variable $\left(\frac{TL - TC}{TL}\right)$ was defined to include alternatively federal corporate taxes only and the total of federal and provincial corporate taxes. The latter gave the better results, although the sign of the coefficients was always positive. Quarterly corporate tax liabilities are estimated by Statistics Canada.

The variable DEF represents the difference between investment expenditures on inventory and plant and equipment, and internal sources of funds (depreciation plus additions to retained earnings). Other variables attempted in this connection include the difference between investment expenditures and internal plus external sources of funds and also the change in inventories and investment in plant and equipment entered separately under the assumption that financing inventory changes through reductions in Government security holdings is more likely than financing investment in plant and equipment in this manner. None of the alternative variables improved the equation.

Net trade credit (accounts receivable minus accounts payable) was inserted in place of gross trade credit, GTC, but the inclusion of this variable did not improve the equation and in fact often had the wrong sign.

The seasonal dummies were also included in a multiplicative form (i.e., multiplied by $\frac{TL - TC}{TL}$) under the assumption that seasonal changes in the dependent variable emanated from the seasonal pattern in tax payments

but these attempts were unsuccessful.

The dummy variables D5 and D6 are included to capture the impact of the legislative changes which were likely to have a significant effect on the portfolio management of the non-financial corporations. The estimated coefficients proved to be statistically significant and had the expected sign. The dummies were also included in a multiplicative form (i.e., multiplied by $\frac{TL - TC}{TL}$) but without success.

The adjustment coefficient implied by the estimated coefficient of the lagged dependent variable is approximately .20. This is, of course, extremely low if one interprets the coefficient as measuring the corporations response to changing cash-flow conditions. It is more likely, however, that the estimated adjustment coefficient is a measure of the response to variations in long-term equilibrium levels of the other components of total current assets, particularly as they are affected by changes in laws associated with the allowable delay in the payment of corporate income taxes.

SUMMARY AND CONCLUSIONS

The most notable feature of the market for Government of Canada securities is the gradual portfolio shift on the part of the major participants in this market out of Government securities and into alternative financial assets. This development has resulted in a considerable growth in the relative importance of the chartered banks as holders of Government debt and consequently has led to a focusing of debt management policy on the portfolio behaviour of the chartered banks. The fundamental reasons for the general shift out of Government debt would appear to be the appeal of more attractive rates of return on alternative financial assets, which is largely the result of the Bank of Canada's policy of price support with respect to Government of Canada securities, supply conditions associated with an apparent decision by the federal government to allow the provincial and municipal governments greater access to the bond market in order to finance their growing cash requirements, and also the implementation of more efficient cash management techniques by financial institutions and non-financial corporations, which has reduced the need for a relatively large stock of liquid assets. In recent years, the federal government has come to rely increasingly on the sale of C.S.B.'s to meet its financial requirements, a shift in policy which is worthy of a good deal of consideration from the point of view of cost and economic stabilization policy.

The analysis of portfolio behaviour of a profit-maximizing, deposit-type financial intermediary isolated the impact of variations in current and expected relative rates of return to alternative financial assets. The results, along with assumptions regarding the formulation of expectations and the method of adjustment to an equilibrium portfolio position, provided the basic form of the demand equation for Government securities on the part of deposit-type institutions.

The examination of the portfolio behaviour of the chartered banks revealed a gradual restructuring of their portfolio over time in favour of loans, including mortgage loans, and at the expense of various types of securities. Moreover, a comparison of chartered bank holdings over various cycles implied a tendency to accommodate loan demand by a reduction in Government bond holdings, a result which is consistent with the conclusions of studies by Goldfeld, Levy and others in the U.S. The regression analysis provided empirical support for the importance of current and expected relative rates of return as determinants of chartered bank demand for Governments and also substantiated the hypothesis of loan accommodation on the part of the banks. Tests of the stability of the estimated coefficients in the estimated demand equations for chartered banks implied that the Bank Act revision of 1967 had the effect of altering the responsiveness of chartered banks to current and expected rates of return but did not appear to change the banks' response to cyclical fluctuations or the rate of adjustment to an equilibrium portfolio position.

The analysis of the asset composition of trust companies indicated a gradual shift over time out of federal, provincial and municipal bonds and into mortgage loans. The regression analysis utilized the results of the model of financial intermediary behaviour developed in Chapter II and lent empirical support to the significance of current and expected rates of return and the accommodation of variations in mortgage loan demand over the cycle. The asset structure of mortgage loan companies, on the other hand, appears to have remained virtually unchanged in the interval 1956-1971, with mortgage loans accounting for approximately three-quarters of total assets throughout this period. The less flexible portfolio management of mortgage loan companies is reflected in the regression

analysis, which indicated that relative rates of return are less important in the case of mortgage loan companies than they are for trust companies. The loan companies, like the trust companies, exhibited a cyclical pattern in the proportion of their total assets held in the form of Government securities.

In the case of insurance-type institutions, investment patterns are determined to a large extent by legal constraints and the long-term nature of their liabilities. Changing market conditions (i.e. relative rates of return) tend to alter the investment of new funds but do not result in a restructuring of their overall portfolio. Considerable attention was given to the changes in the institutional environment in recent years and the impact of these changes on the market for Government securities. A common feature of all these institutions is the gradual adjustment of their asset structure to a new equilibrium position in which the proportion of total assets held in the form of Government of Canada debt will be considerably reduced. Since these institutions do not manage their portfolios actively on a short-term basis, expected interest rates were not included in the regression analysis but other variables believed to be appropriate were inserted. The results suggested that current interest rate differences are not significant in the case of life insurance companies and pension funds, whose assets are basically long-term, but are important in the case of fire and casualty insurance companies, whose liabilities are of a much shorter duration, resulting in an investment portfolio of considerably shorter maturity. Cyclical factors proved to be important in the case of life insurance companies, which held a substantial stock of mortgage loans, relatively unimportant for pension funds, which invest less in mortgages, and not important at all for fire and casualty companies, which invest very little in mortgage loans. The regression results indicated

a slow adjustment process on the part of all insurance-type institutions to a new equilibrium portfolio structure.

Non-financial corporations have been engaged in a rapid reduction in their holdings of Government of Canada debt, which reduction appears to be primarily related to the gradual decrease in the allowable period of delay in the payment of corporate income taxes. This conclusion is consistent with the results obtained in similar studies carried out in the the U.S. Other variables which seemed potentially important determinants of the non-financial corporate demand for federal debt, such as net trade credit and investment expenditures, did not prove to be statistically significant.

The information provided in this study may be arranged in summary fashion as follows. The empirical analysis based upon the conclusions of Chapter II provided considerable information on the effects of actual interest rates, expected interest rates and cyclical and adjustment factors in the determination of the demand for federal government debt by deposit-type financial institutions. The role of federal debt in the portfolios of insurance-type financial institutions was examined and the important determinants of the volume of marketable national debt held by these institutions were isolated. The reasons for the rapid reduction in marketable public debt held by nonfinancial corporations were also examined. It is hoped that those analysts concerned with the operations of the market for federal government debt will find this information useful.

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