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Provincial And Municipal Debt In Canada, 1946-1966

Ivan Charles Johnson

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PROVINCIAL AND MUNICIPAL DEBT
IN CANADA, 1946-66

by

Ivan Charles Johnson
Department of Economics

Submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

Faculty of Graduate Studies
The University of Western Ontario
London, Canada
June 1970

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ABSTRACT

This study has a two-fold purpose: first, to find the effect of federal monetary policy upon debt issuing by the Canadian Provinces and Municipalities; and second, to find out if the existence of this debt affects credit conditions and hence if changes in the amount of debt issued affects the efficacy of federal monetary policy.

Because provincial and municipal governments are unable to carry out exhaustive "means-ends" analyses for all programs in the time available, it seems likely that certain rules of thumb must be applied in the budgetary process. Regression of local government expenditures on certain monetary indicators gave credence to the view that the expenditures were being expanded along with what the governments thought was socially desirable regardless of federal monetary policy. Local government revenues, on the other hand, did not appear to be varied with some regard for federal monetary policy. All taxes, except the municipalities' direct taxes of persons, were found to
be positively correlated with interest rates, but only the municipalities' indirect taxes were correlated in a significant way.

The local government deficit -- found by subtracting revenues from expenditures -- varied only slightly with interest rates, but the amounts actually borrowed in the market, especially when these amounts were expressed as a proportion of local government expenditures, showed a marked negative correlation with interest rates. From these results it appeared that once a deficit had been decided upon, even if it were not optimal from the point of view of the rate of interest at the time of the decision, the actual timing of the bond issues was varied with monetary conditions.

In the second part of the thesis a model of the Canadian economy is developed by making slight adaptations to Tobin's model as he described it in his "Essay on Principles of Debt Management". This model reveals how local government debt can affect the efficacy of federal monetary policy.

To control the economy the federal authorities influence the supply price of capital (i.e., the rate at
which wealth-owners are prepared to hold a stock of physical capital) by changing the yields of the assets which compete with equity for places in wealth-owners' portfolios. Thus the fact that local government debt competes for a place in wealth-owners' portfolios means that the local debt will affect federal policy. The model reveals that how it affects this policy depends on whether wealth-owners consider local debt to be a substitute for or a complement of federal debt.

Empirical tests of the demand for long-term federal bonds, long-term provincial bonds, long-term municipal bonds and long-term corporate bonds by the Chartered Banks, Life Insurance Companies, the Mortgage Loan Companies and the Trust Companies were carried out. The results suggested that the Chartered Banks, the Mortgage Loan Companies and the Trust Companies considered provincial and corporate bonds as complements of federal debt and municipal bonds as substitutes for federal debt, whilst the Life Insurance Companies considered the opposite to be the case. There are good statistical reasons for omitting the conclusions regarding the municipal debt,
and if this is done the Chartered Banks, Mortgage Loan Companies and Trust Companies behave in a way consistent with Tobin's assumptions about substitutability, while the Life Insurance Companies behave in a way consistent with Keare and Silber's assumptions.

Because of the strong wealth effects of increases in money and short-term federal debt, there can be no doubt as to the direction of the effects of monetary policy, but whether wealth-owners consider local debt as a substitute for long-term federal debt or for equity can change the effects of changes in long-term federal debt and local debt and thus also on some debt management.

If the Chartered Bank-Mortgage Loan-Trust Company attitude should prevail in the markets, increases in long-term federal debt will tend to be unambiguously expansionary while increases in local debt will tend to be contractionary, but if the attitude of the Life Insurance Companies should prevail in the markets, the effects will tend to be ambiguous in both cases -- the final expansionary or contractionary effects depending on whether price effects or wealth effects are stronger.
Owing to the fact that the wealth-owners who hold most of the local debt do not publish their portfolio changes in monthly or quarterly form, the conclusions reached for the four wealth-owners in this study cannot be extended to account for the total changes in the whole economy. The actual effects of portfolio changes can only be reached with any degree of accuracy when a complete model of financial markets has been developed. Until a complete model of the financial markets in Canada exists, the best that can be done is to say which way particular wealth-owners behave.
ACKNOWLEDGEMENTS

In writing this thesis my greatest debt has been to my supervisor, Professor Ronald G. Bodkin, who has worked untiringly under the very difficult situation of having me reside in another country for most of the time that the work was being done. I am, therefore, very pleased to express my sincere thanks to Professor Bodkin for supervising the thesis critically and generously and for making numerous suggestions that led to improvements in it. I also wish to acknowledge the valuable criticisms and comments of the other members of my advisory committee, Professors R. W. Baguley and P. G. Tomlinson; they have given unstintingly of their time whenever I called upon them.

Other members of the Economics Department of the University of Western Ontario have been of valuable assistance during the writing of the thesis, but in particular I would like to express my appreciation to Professor D. E. Bond, now of the University of British Columbia, and
Professor T. J. Courchene for their help, particularly in the formulation of the original proposal.

I also owe a special debt to Professor James Tobin of Yale University who not only gave me permission to use and adapt his model of the economy, but also gave of his valuable time to read and make comments on Chapter 3 of this thesis.

I, of course, assume sole responsibility for any factual or logical errors that remain.

I wish to acknowledge my indebtedness to the Provost of Research of the University of Virginia for financial support in the form of Computing Grant D0706BD and to Professor B. T. McCallum of the Economics Department of the University of Virginia for supplying me with, and instructing me in the use of, computer programs PLATO2A and PLATO2K. All computing in this thesis was done at the Computer Center of the University of Virginia using the PLATO programs. These programs are least square linear regression programs designed for use by economists, originally written in FORTRAN IV at Rice University by
John Conlisk. PLATO2A and PLATO2K are translations into Virginia ALGOL by Professor McCallum.

My gratitude must also be extended to George Post who allowed me access to the data bank of the Bank of Canada. Without his aid this thesis could not even have been attempted.

Realizing that writing a thesis is only the culmination of a doctoral program and an even longer educational process, I wish to express heartfelt appreciation to all my teachers -- both faculty and students -- in Britain, Canada and the United States for their intellectual stimulation and to the Government of the United Kingdom, the Government of Canada, the Government of Ontario and the University of Western Ontario for financial support throughout my student days.

I.C.J.

Charlottesville, Virginia
June, 1970
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CHAPTER I

INTRODUCTION

Canadian governments, federal, provincial and municipal, have become very large borrowers of funds in the post-war period. This study is an attempt to focus attention on the monetary effects of the provincial and municipal debt (hereinafter referred to collectively as "local government debt\(^1\)" or simply "local debt") which in part entails considering the activities of the provincial and municipal governments (the "local governments") when incurring this debt. Apart from work done specifically for the Royal Commission on Banking and Finance\(^2\) and the Royal Commission on Taxation\(^3\), very little analytical work has been done on the local debt in Canada despite the fact that as of December 31st 1966 the gross amount of local government direct

---

1 The use of the term "local government" in the United States to mean the municipal governments alone is not followed here.


3 Royal Commission on Taxation Report (Queen's Printer, 1967).
and guaranteed bonds outstanding was in excess of $19 billion and within $2 billion of total federal government bonds outstanding. Studies which have been made on local government activities in a federation have generally focussed on the United States and on the fiscal effects of local government spending, ignoring the possible monetary effects of local debt, i.e., both the impact of federal monetary policy on the issuing of debt by the local governments and the impact of the sale of local government bonds in the capital market and hence on credit conditions generally.

This study is intended to go some way, at least, towards remedying these defects. Thus my purpose is twofold: first, to find the effect, if any, of monetary policy upon debt issuing by the provinces and municipalities; and

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6 The discussion has centered on the so-called "Perversity Hypothesis" started by the publication of State and Local Finance in the National Economy, by Alvin Hansen and Harvey Perloff (Norton, 1944). See Appendix 1.
second, to find out if the existence of this debt affects credit conditions and hence if changes in the amount of debt issued affects the efficacy of federal monetary policy.

**Local Government Activities in the Post-War Period:**

What might be called "the local government problem" has increased tremendously since 1945 because of the large growth in the activities of the local governments. Total local government expenditure has increased twenty-fold since 1933 and 97.94% of this increase has been since 1945 (i.e., 1933 - $522 million; 1945 - $729 million; 1966 - $10,562 million). The most plausible explanation for this great increase is the fact that local governments are involved in the major social services -- the areas that "public opinion" has decided should be increased. Most of the local governments' expenditure is now in education, transport and communications, and health -- a far cry from pre-war days when local government expenditure in these areas ranked second to their debt charges.

The percentage increase in expenditure by the local governments has been much greater than for the federal government so that total local government expenditure now
exceeds federal government expenditure (see table 1). Total public investment in Canada has become an increasing proportion of total investment over the post-war period, but the proportional increase of public investment by the local governments has been much greater than the proportional increase in federal government investment (see table 2). The increase in local government expenditures over the post-war period is summarized in the reference cycles\(^7\) of figure 1.

In 1945 local government expenditure was less than 7% of gross national expenditure, but in 1966 it had almost reached 19%. Certainly, local government revenue has also increased (see figure 2A) (in 1945 the local government revenue was 8\(\frac{1}{2}\)% of personal income and in 1966 it had reached 27\(\frac{1}{2}\)% -- considerably higher than the previous high of the depression), but the taxing ability of the local governments has proved inadequate to meet expenditures, so that there has been a tendency for provincial and municipal officials to look to the federal government for aid and to rely more and more on borrowing in the capital market in this country or elsewhere. Surprisingly, despite the myriad conferences

\(^7\) See Appendix 2 for explanation of reference cycles.
TOTAL GOVERNMENT EXPENDITURE AS A
PERCENTAGE OF 1947 EXPENDITURE --
(exclusive of intergovernmental transfers).

$'000,000.

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<th>YEAR</th>
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<th>MUNICIPAL EXPEN. % OF 1947</th>
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<tr>
<td>1966</td>
<td>7,938</td>
<td>5,572</td>
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Source: DBS., National Accounts, Income & Expenditure,
dollar figures only.

TABLE 1.
## PRIVATE AND PUBLIC INVESTMENT IN CANADA

$'000,000.

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<tr>
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<th>TOTAL PRIVATE</th>
<th>TOTAL</th>
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<td>924</td>
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<td>3,539</td>
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<td>243</td>
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<td>292</td>
<td>1,026</td>
<td>2,910</td>
<td>3,936</td>
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<td>399</td>
<td>540</td>
<td>347</td>
<td>1,286</td>
<td>3,453</td>
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<td>617</td>
<td>423</td>
<td>1,635</td>
<td>3,856</td>
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<tr>
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<td>560</td>
<td>650</td>
<td>440</td>
<td>1,650</td>
<td>4,326</td>
<td>5,976</td>
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<td>659</td>
<td>475</td>
<td>1,613</td>
<td>4,108</td>
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<td>447</td>
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<td>501</td>
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<td>4,765</td>
<td>10,132</td>
<td>14,897</td>
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</table>

Source: Bank of Canada, Statistical Summary.

Table 2.
Quarters from reference peak

Figure 1.
Quarters from reference peak

Figure 2A

Quarters from reference peak

Figure 2B
and arrangements for the transfer of funds between governments, the local governments have been remarkably unsuccessful in their attempts to get more funds. The amounts received from the federal government have increased, and these amounts have been increasing percentages of federal government revenue, but -- though there have been a few increases -- the over-all picture has been one of receiving decreasing percentages of local government revenue from the federal government. In 1945 approximately 6% of federal revenue was transferred to the provinces to form 35% of provincial revenue, but in 1966 approximately 16% of federal revenue was transferred to the provinces to form 21% of provincial revenue.

Figure 2B shows the reference cycle patterns for local governments' "own receipts" and comparison with figure 2A reveals that there is little difference between "own receipts" and total receipts.

Faced with the choice of running a deficit or raising taxes, the municipalities in particular have tended more and

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8 See for example, The Financing of Canadian Federation: the First Hundred Years, Canadian Tax Foundation 1966.

9 See DBS, National Accounts, Income and Expenditure for dollar figures.
more to running the deficit (see table 3) and this has played a large role in the total government surplus or deficit position. Figure 3 shows the reference cycle patterns for the total surplus or deficit position. The reference cycles show that there has been an increasing use of the deficit throughout the post-war period but there appears to have been a crudely stabilizing influence around the trend.

However, the deficit position of a local government is not the end of the story of local government debt, even when the capital account is included. The local governments do not only have the borrowing requirements of the deficits they run, but also of the cash needed for redemption of maturing bond issues and for investment in provincial and municipal owned companies.

Investigation of the local governments' decision to borrow is, in a sense, the investigation of a residual. The amount that a local government will borrow in any given year is partly determined by: (a) the amount the government decides to spend; (b) the amount the government decides to
<table>
<thead>
<tr>
<th>YEAR</th>
<th>TOTAL SURPLUS OR DEFICIT</th>
<th>FEDERAL</th>
<th>PROVINCIAL</th>
<th>MUNICIPAL</th>
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<td>1966</td>
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<td>124</td>
<td>30</td>
<td>-588</td>
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</table>

Source: Bank of Canada, Statistical Summary.

Table 3.

*The Federal, Provincial and Municipal deficits and surpluses for 1966 do not add up to the Total Surplus or Deficit as in that year the Total figures also included $714,000,000 in contributions to the Canada Pension Plan.
Quarters from reference peak

Figure 3.
raise by taxation\textsuperscript{10}; (c) the amount needed for investment in the utilities owned by the government (often this amount cannot be changed substantively from year to year as, once a project has been started, it usually has to be completed); and (d) the timing and maturity of previous bond issues. Obviously, to analyze the borrowing decision of the local governments will necessitate analyzing each of these other decisions.

The budget deficit can (and should) be considered by studying the spending and taxing decisions. It seems unlikely that the spending decision of the local governments is much affected by federal monetary policy as the governments appear to have decided how much spending is "socially desirable". A very large proportion of both provincial and municipal spending is on education, transportation and communications, health and welfare, and the protection of persons and property, and the local governments concerned are so convinced of the desirability of such projects that they consider the bulk of their expenditure as unavoidable\textsuperscript{11}.

\textsuperscript{10} Remembering, of course, that this amount is not definite as governments only set tax rates. The amounts actually raised will depend also on the level of income, etc.

Indeed, as figure 1 reveals, total local government expenditures have established a growing time trend over the post-war period, and any sensitivity to credit conditions can only be evidenced in minor deviations from this trend. Similarly, as figure 2B reveals, the amounts received from taxation show an increasing trend, but local government officials are very reluctant to change the level of taxes for purely political reasons. This is particularly true of the municipalities, where officials are often elected annually.

Some local governments may be more likely than others to change their tax rates because of monetary conditions, but it is unlikely that the over-all level of tax revenues is responsive to monetary conditions. Whether or not the individual local governments believe in the "future generations" view of capital expenditure (where borrowing is always preferred to the taxing of the present generation) or in the "pay-as-you-go" view (where capital as well as current expenditure is always financed from current revenues), seems...

\[12\] ibid., p. 21.

\[13\] ibid., pp. 31-2.
largely irrelevant. What is important is whether there is a general trend towards borrowing when the cost of credit is low and a general trend towards taxation when the cost of credit is high. Whatever monetary response that can be found for local governments' expenditures and revenues will be reflected in the responsiveness of the deficit or surplus, unless the federal grants to the local governments is very responsive to monetary policy in a stabilizing direction.

Moving from borrowing to cover a deficit to the total borrowing requirements of the local governments will entail including expenditures on local government owned enterprises and the refloating of debt. Even though little monetary responsiveness can be expected here, and even if the total deficit position is not responsive to monetary conditions, it is still possible that the debt issuing by the local governments will show a response. This will, of course, be the result of the timing of bond issues during a year to suit monetary conditions.

The responsiveness of local government financial activities to monetary conditions will be traced in Chapter 2.
The Monetary Effects of Local Government Debt:

The second part of this study will view the local debt from the point of view of seeking its effects on national credit conditions. The Royal Commission on Banking and Finance was of the opinion that the local governments should not be obliged to consider their impact on national credit conditions as the federal authorities could vary credit conditions without co-ordination between the different governments. If this is, in fact, the case, this study will still be worthwhile as it will attempt to show to what extent the federal authorities have to adapt their policies in the face of local government activities. Of course, if it is not true that the federal authorities maintain effective control, this study will reveal the necessity for the authorities to regain that control.

A cursory glance at the market yields of bonds issued by the federal government, the provinces and the municipalities, and corporations will show that the cost of borrowing has increased substantially since the last war and the

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differential between the yields on the different bonds has remained fairly constant. In the last two quarters of 1947 the yield on the federal government's 15 year theoretical bonds was as low as 2.93%, whereas twice during the first two quarters of 1968 the yield on September 1st 1983 4½% coupon rate federal bonds\textsuperscript{15} was in excess of 7%, and the average yield on all direct Government of Canada issues due or callable in 10 years or over, excluding perpetuals, reached 7% on May 22nd 1968 for the first time\textsuperscript{16}. Comparably, the average yield on the ten provincial bonds included in the McLeod, Young, Weir & Co. Ltd. Provincial bond series rose from 2.82% in the first quarter of 1948 to 6.70% in the last quarter of 1967\textsuperscript{17}.

Though in the early post-war years the average provincial yield was below that of federal long-term bonds, the provincial yield surpassed the federal yield in late 1951 and

\textsuperscript{15} The Bank of Canada no longer publishes the yield on the 15 year theoretical bonds because of the naiveté of the interpolation involved. The September 1st 1983 4½% coupon rate federal government bond is currently used as a proxy.

\textsuperscript{16} See Bank of Canada Statistical Summary, appropriate years.

\textsuperscript{17} Bank of Canada Research Dept., Financial Statistics Book, section 6-60.
has remained there subsequently. As the Royal Commission on Banking and Finance noted, the yield differential tended

"...to widen in years of rising interest rates and in years when provincial borrowing was growing while the federal government was paying off debt."\(^{18}\)

The average yield of the ten industrials included in McLeod, Young, Weir & Co. Ltd. corporate bond yield average has remained above the provincial average in the post-war period with the differential narrowing after 1957. In January 1948 the average yield on McLeod, Young, Weir & Co. Ltd.'s corporate bonds series was 3.42%; by February 1960 it had reached 6.22% from where it fell to 5.15% in April 1962, then increased again, reaching rates above 7% in the last two quarters of 1967.\(^{19}\)

It is, of course, much more difficult to draw quick conclusions about municipal yields as the different cities, towns and townships pay very varied rates. The cities with the lowest yields are Ottawa and Metropolitan Toronto (Montreal is presumably still having to pay higher risk

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\(^{18}\) op. cit., p. 61.

\(^{19}\) Bank of Canada, series 268, supplied by McLeod, Young, Weir and Co. Ltd.
premier because of its more recent defaults in 1940 and 1944), but other large cities pay up to 20¢ more and lesser known municipalities even more\textsuperscript{20}. However the average yield on the ten municipal bonds in the McLeod, Young, Weir & Co. Ltd. municipal series, which covers only the major cities, has remained slightly more than the provincial average following a very similar pattern to the average yield on the ten industrials. In January 1948 the average yield on the ten municipals was 3.13%. It then rose to 6.60% in February 1960, fell to 5.38% in May 1962, then rose to 7% in the last quarter of 1967\textsuperscript{21}.

The close proximity of the market yields on federal government, provincial, municipal and corporate bonds through time suggests that the demand for and supply of these bonds are in some way related. In chapters 3 and 4 of this study an attempt is made to build and test empirically a model showing how these demands and supplies are related and how this relationship can influence credit

\textsuperscript{20} Royal Commission on Banking and Finance, \textit{op. cit.}, ff. p. 61.

\textsuperscript{21} Bank of Canada Research Department, \textit{Financial Statistics Book}, section 6-60.
conditions. The model is developed on the basis of the work of James Tobin\textsuperscript{22} and Keare and Silber's discussion of it\textsuperscript{23}.

Theoretically, whether the efficacy of monetary policy is affected by local government debt depends on how this debt changes the federal government's influence over the terms on which investors will hold the existing stock of real capital and absorb new capital. The federal authorities try to influence the supply price of capital (i.e., the rate at which wealth-owners are prepared to hold a stock of physical capital) by changing the yields of the assets which compete with equity, i.e., ownership of physical capital, for places in wealth-owners' portfolios\textsuperscript{24}.

Local government debt will also compete for a place in wealth-owners' portfolios, but if, for example, the two

\begin{itemize}
\end{itemize}
kinds of government debt may be considered as good substitutes, (which is not unreasonable as they both share the risks of interest rate changes and uncertainty regarding the purchasing power of the dollar), any change in the yield of one will lead to a wholesale substitution of the higher yielding debt in wealth-owners' portfolios. This will affect the monetary authority's power to influence the critical differential between the yield on equity and the yield on federal debt.

If monetary policy is now initiated to lower the yield on federal debt, there will be a substitution of local debt for federal debt in wealth-owners' portfolios. This will have a tendency to decrease the yield on local debt and increase the yield on federal debt. The substitution will continue until an equilibrium differential between yields on federal and local debt is restored. As the influence of monetary policy over the level of economic activity depends on the differential between the yield on equity and the final yield on competing government debt, the existence of the local government debt means that a given change in the differential can only be achieved by a more forceful monetary policy.
If under these conditions of substitutability of federal and local debt securities the local governments decide to increase their borrowings, they will increase the yield on local debt relative to federal debt, again causing portfolio substitution. This will cause the yield on federal debt to increase so that the crucial differential between the yield on equity and the yields on competing debt will be reduced. If federal authorities are not to lose control of the economy, they may have to engage in countervailing monetary policy, as the only limit to local government borrowing will be when they -- or the investment dealers -- consider that further increases in debt issuing will have a detrimental effect on their credit rating.

If, on the other hand, local government debt and federal government debt are found to be complements (i.e., local government debt is a substitute for equity in wealth-owners' portfolios), the results will be slightly different, but the existence of the local debt will still pose a problem to the policy makers. If under conditions of complementarity monetary policy is initiated to lower the yield on federal debt, the local debt will have a dampening effect on the ensuing change in the supply price of capital. A
decrease in the yield on federal debt may cause the supply price of capital to fall, but this fall will be partly offset by the fact that the yield on local debt (i.e., the substitute for capital in wealth-owners' portfolios) may also have risen.

If the local governments increase their borrowing under these conditions, the yield on their debt will rise, tending to cause wealth-owners to substitute local debt for equity in their portfolios. However, the effect of the local debt may be offset somewhat by the wealth effect of an increase in holdings of debt and also by the fall in yields of federal debt (the complement of local debt).

The empirical work of chapter 4 will attempt to show whether wealth-owners consider the various types of debt as substitutes or complements, or whether their demands for the debt are independent. As two kinds of assets would be revealed as good substitutes the nearer to perfection is the positive correlation between their future rates of return, efforts to show this would be frustrated by the need to consider expectations, but it should be somewhat easier to

show whether substitution is taking place. The method used here will follow that of William Silber which he developed for studying the financial markets in the United States. If substitution is taking place, then the increase in local government debt over the last twenty years should mean that any change in credit conditions requires a more vigorous monetary and debt management policy than would have been necessary without it. Measuring a "more vigorous monetary and debt management policy" would, of course, prove very difficult, but the need for such action can be inferred if it can be shown that substitution is taking place in wealth-owners' portfolios between local debt and either federal debt or capital equity.

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CHAPTER 2

THE RESPONSIVENESS OF LOCAL GOVERNMENTS TO FEDERAL MONETARY POLICY

To investigate the responsiveness of local government activities to the federal government's monetary policy, it is necessary first to determine how local government decisions are made regarding their expenditures and revenues, by whom they are made, and when they are made. To accomplish this the provincial and municipal budgetary procedures will have to be treated separately as they are quite distinct decision-making entities.

The budgetary procedures of the provinces have been fairly well documented\(^1\) and they vary little from province to province or from year to year. The procedure begins some two or three months before the opening of the provincial legislature when the various departments and agencies compile their estimates of their expected expenditures for the coming year. These estimates are then submitted to the

provincial treasurer (in British Columbia this officer is called the finance minister) who reviews them and assembles them for presentation to the treasury board -- which is a fiscal committee of the cabinet consisting usually of at least three members of ministerial rank under the chairmanship of the treasurer himself. Though departmental officers may well be called before the treasury board for revisions and explanations, the estimates made by the departments usually remain intact.\(^2\) The expenditure estimates are divided up into separate "votes" for presentation to the legislature. Not all appropriations are voted on; some are "statutory votes" which are automatically passed. These statutory votes may cover over 50% of the expenditure estimates.\(^4\) The expenditure estimates are then brought before the Committee of Supply, which is a committee of the whole legislature (the lower house in Quebec), for a detailed discussion of the estimates and eventually the vote. Each item of a vote may be discussed before the entire vote is offered as a resolution, with the committee having the right to reduce or even strike out any of them.


\(^3\)E.g., interest on the debt and sinking fund charges.

\(^4\)A.E.Buck, *op. cit.*, p 276.
Before the Budget Speech is delivered (usually in February or March) the treasurer makes the motion that the legislature resolve itself into the Committee of Ways and Means. This committee must authorize the withdrawal of money from the consolidated revenue fund to pay for the expenditures authorized by the Committee of Supply (usually just a formality, though it is intended to be a check on expenditures), and provide the ways and means of financing the expenditures. As the expenditures have already been approved by the Committee of Supply, and authorized by the Committee of Ways and Means, the revenues must now be adjusted to the expenditures -- a process which often requires that the sources of revenue be increased. As soon as ways and means of financing the expenditures have been devised, the annual Supply Bill, which includes the decisions of the Committee of Supply and the Committee of Ways and Means, is drawn up and presented to the legislature for approval. The Bill is treated the same way as any other bill, becoming law when it has been approved by the legislature and given Royal Assent by the Lieutenant Governor.

The budgetary procedures in the municipalities are much more rudimentary and diverse, particularly in the
smaller municipalities, but nevertheless they do follow the pattern of the provincial governments' procedures in that the final budget is arrived at by the interaction of two opposing forces. The budget is prepared by the treasurer (a salaried official appointed by the municipal council) or a budgetary committee consisting of the treasurer and one or two members of the council. The treasurer, or the committee, receives the departmental estimates of expenditure in the same way as the provincial treasurer and is responsible for requiring an adequate explanation for the expenditures and has the power to check as far as possible the tendency for the budget to grow. The departmental estimates are then added to the fixed charges borne by the municipality and the total is compared with the available revenues. These figures are then presented to the council for discussion, where the comparison of expenditures with revenues, may call for further cutting back of the estimate and/or an increase in the tax rates as well as a decision to borrow. When agreement is reached, the budget is passed by the council.

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5 ibid., p. 312.
The fiscal year of the municipalities is often the calendar year; otherwise it usually coincides approximately with that of the province. If the fiscal year does coincide with that of the province, the timing of the municipal budget may be expected to coincide with that of the province. Often, however, when the calendar year is used the timing of the budget still coincides with that of the province as the decisions are delayed until the annually elected officers of the municipality have taken office. This means that the relevant budgetary decisions of both provinces and municipalities are almost all made in the latter part of the first quarter of the calendar year. The relevance of this point will be clear when we need to find a monetary indicator for a particular decision "year".

For our purposes the provincial and municipal procedures may be considered equivalent. In the provinces the departments will try to increase their expenditures, and the growth of the budget will be checked by the treasurer and the Committee of Supply. In the municipalities the departments will try to increase their expenditures, and the growth of the budget will be checked by the treasurer or the budget committee and the Council.

This process of decision making as a compromise between two opposing groups with opposing aims is very significant as it coincides exactly with Aaron Wildavsky's description
of the United States federal budgetary process\textsuperscript{6} -- about which much more is known. Wildavsky observes\textsuperscript{7} that the agencies, believing their projects to be worthwhile, seek to increase their activities and thus ask for an increase in their appropriation, the Bureau of the Budget tries to keep the rates of increase within the limits desired by the President, and the House Appropriations Committee -- the guardian of the Treasury -- tries to cut back the budget.

In the case of the provinces we can replace "the agencies" with "the departments" and "the Bureau of the Budget and the House Appropriations Committee" with "the treasurer and the Committee of Supply"; in the case of the municipalities we can again replace "the agencies" with "the departments" and "the Bureau of the Budget and the House Appropriations Committee" with "the treasurer or Budget committee and the Council" and the sense of Wildavsky's observations will remain.

The budgetary process in any government is very complex, but it is obvious that every fiscal year an exhaustive


\textsuperscript{7} Aaron Wildavsky, \textit{op. cit.}, pp. 18-62.
"means-ends" analysis cannot be carried out for all the programs in the time available\(^8\). This will be true for the Canadian provinces and municipalities no less than it is for the United States Federal Government. This means that the various participants in the budgetary process use certain "aids to calculation" or "rules of thumb" to arrive at their decisions. Budgets are seldom, if ever, reviewed in their entirety so that all the possible alternatives may be compared, but instead each succeeding year's budget is based on that of the previous year with the actual budgetary process consisting of a consideration of comparatively minor increases and decreases.

Wildavsky has produced ample evidence\(^9\) that the decision makers in the United States federal budgetary process think in terms of percentages -- the agencies requesting a percentage increase in their "base" (the level of expenditure they currently spend and expect to receive money for in the future) or simply maintaining their "fair share" (the proportion of

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\(^9\) Aaron Wildavsky, *op. cit.*
the total budget that the agency thinks it "should" receive), and the House Appropriations Committee making percentage cuts in the requests. These considerations led him to believe that the process relationships might be approximately linear — and his beliefs were later borne out by a statistical investigation\(^\text{10}\). Intuitively there seems to be no reason to believe that Canadian Provinces and Municipalities do not operate in a similar manner\(^\text{11}\).

The statistical work of Davis, Dempster and Wildavsky\(^\text{12}\) attempts to quantify the qualitative studies of Wildavsky. "Behavioral" models were devised using hypothetical strategies of the various participants in the United States Federal budgetary process. Three different strategies were considered for the agencies requesting funds and three strate-


\(^{11}\) It has however been pointed out by John P. Crecine that the budgetary process in some American municipalities has been somewhat more complicated in that over-all budgetary constraint is sought rather than constraint of the expenditures of individual departments. See John P. Crecine, A Computer Simulation Model of Municipal Resource Allocation, PhD thesis, 1966, Carnegie Institute of Technology.

\(^{12}\) Otto A. Davis, M.A.H. Dempster and Aaron Wildavsky, op. cit.
gies for the Congress making allocations of the funds\textsuperscript{13}.

The basic variables involved are:

$y_t$, the appropriation passed by Congress for any given agency for year $t$;

and $x_t$, the appropriation requested by the Bureau of the Budget for any given agency in the year $t$.

The three equations for possible Congressional responses are as follows:

\begin{align*}
Y_t &= a_0 x_t + \eta_t \quad \ldots \text{C.1.} \\
Y_t &= a_1 x_t + \alpha_2 y_{t-1} + \epsilon_t \quad \ldots \text{C.2.} \\
Y_t &= a_3 x_t + \alpha_4 \lambda_t + \nu_t \quad \ldots \text{C.3.}
\end{align*}

In equation C.1, Congress is assumed to grant a fixed percentage of the agency's request, which fluctuates from year to year only because of unforeseen circumstances. Thus $\alpha_0$ is the fixed mean percentage and $\eta_t$ is the random disturbance. In equation C.2, Congress "on the average" grants a fixed percentage of the request before it (represented by $\alpha_1$), but sometimes this amount would mean that the agency would spend an amount other than that desired by Congress. To overcome this situation Congress tends to appropriate a sum

\textsuperscript{13} \textit{Ibid.}, pp. 67-71.
which is not the usual percentage, \( \alpha_1 \), of the request, \( x_t \), for the current year, but in the following year there is a tendency for Congress to try to make an allowance for the deviation from the current year's appropriation. Thus,

\[
Y_t = \alpha_1 x_t + v_t \quad \ldots (i)
\]

where \( v_t \) is a value of a stochastic component which is generated in accordance with the first order Markov scheme,

\[
v_t = \alpha_2 v_{t-1} + \varepsilon_t \quad \ldots (ii)
\]

Substitution of equation (ii) into equation (i) gives equation C.2.

Equation C.3 shows the behavior of Congress when it believes that it knows the strategy of the Agency (represented by A.1, A.2 and A.3 below) and tries to counter their "gaming" behavior. In equation C.3, \( \alpha_3 \) is a fixed percentage of the request \( x_t \). \( \lambda_t \) is a dummy variable representing, in year \( t \), one of the following: \( \xi_t \), \( \beta_2 (Y_{t-1} - x_{t-1}) + \phi_t \) or \( \psi_t \), depending on which decision rule (shown below as equations A.1, A.2 and A.3) is considered by Congress to be followed by the Agency. It is expected that \( 0 < |\alpha_4| < 1 \) as Congress will probably only take partial account of the disturbance \( \lambda_t \). \( v_t \) is a stochastic disturbance.
Each Agency is considered to follow one of the following three strategies:

$$x_t = \beta_0 y_{t-1} + \xi_t$$  \hspace{1cm} \ldots \text{A.1.}$$

$$x_t = \beta_1 y_{t-1} + \beta_2 (y_{t-1} - x_{t-1}) + \phi_t$$  \hspace{1cm} \ldots \text{A.2.}$$

$$x_t = \beta_3 x_{t-1} + \psi_t$$  \hspace{1cm} \ldots \text{A.3.}$$

In equation A.1 the Agency asks for a fixed mean percentage $\beta_0$ of the previous year's appropriation granted by Congress; $\xi_t$ represents a random disturbance from this percentage. In equation A.2 the Agency wishes to take into account the difference between its previous appropriation and request, $(y_{t-1} - x_{t-1})$. $\beta_2$ is expected to be negative, so that the agency will "pad" its current request if there was a large cut in its previous request, and will reduce its estimate after an increase in appropriation. $\phi_t$ is a stochastic disturbance.

In equation A.3 the Agency is determined to expand its program and so asks for a fixed percentage, $\beta_3 > 1$, of its previous request. $\psi_t$ is a stochastic disturbance.

The statistical results showed that during the period studied, 1947-1963, Congress and the Agencies appeared to use the different strategies as listed in table 2 - 1:
The estimated correlation coefficients were found to be high\textsuperscript{14}. These results are in agreement with Wildavsky's hypothesis that the budget of the U. S. Federal Government is carried out according to certain stable linear decision rules. In fact by far the most of the decisions follow the rules C.1 and A.1:-

\[ y_t = \alpha_0 x_t + \eta_t \]
\[ x_t = \beta_0 y_{t-1} + \xi_t \]

Substitution of the second equation into the first, gives

\[ y_t = \alpha_0 \beta_0 y_{t-1} + \alpha_0 \xi_t + \eta_t \]

Indeed, as Oliver Williamson has pointed out\textsuperscript{15}, Davis, Dempster and Wildavsky have shown that the budgetary decisions are all of the type indicated by the following equation:

\textsuperscript{14} ibid., pp. 82-86.

\[ X_{it} = BX_{it-1} + \varepsilon_{it} \] \( \ldots (A) \)

where \( X_{it} \) = budget request (appropriation) for expenditure class \( i \) in period \( t \);

\( X_{it-1} \) = budget request (appropriation) for expenditure class \( i \) in period \( t - 1 \);

\( \varepsilon_{it} \) = a random variable with \( E(\varepsilon_{it}) = 0 \);

\( B \) = a constant which, when multiplied by the budget in period \( t - 1 \), yields the expected value of the budget in the subsequent period \( t \).

A desire to repeat the Davis-Dempster-Wildavsky experiment for Canadian Provinces and Municipalities was thwarted completely by the refusal of all the provincial governments to supply figures on the requests made by various departments.\(^{16}\) However, if it can be expected that the Canadian Provinces and Municipalities follow a set of decision rules of the type (A) above, it should be possible to test whether the succeeding appropriations follow a simple trend -- as a rule of thumb of the Davis-Dempster-Wildavsky type would

\(^{16}\) All Provincial Governments were asked for this information and all replied. However, only the Province of Quebec was willing to supply the information, but unfortunately that was for only three years.
suggest -- or whether they vary with monetary policy. In other words, it should be possible to test whether the joint activities of the various departments and governments follow a simple rule of thumb or whether their decisions are responsive to monetary policy.

Even if we accept Oliver Williamson's equation for the rule of thumb\textsuperscript{17}, we have the further problem of deciding how "monetary policy" can be included in the equations. No "ideal indicator" for monetary policy has yet been devised that can be used empirically\textsuperscript{18}, so obviously something much less than the ideal will have to be used. The available figures for local government expenditures and receipts are of two kinds: provincial and municipal figures are published separately on an annual basis, and provincial plus municipal figures are published monthly, so it is necessary to devise a proxy for monetary policy that can be used both annually and monthly.

\textsuperscript{17} Equation (A) above.

Two indicators which are far from the "ideal" but are at least readily available are (i) the long-term rate of interest (representing the cost of borrowing for the local governments); and (ii) changes in the money supply (representing the changes in the amount of loanable funds available in the economy). As decisions are made once a year, the annual change in the monetary supply and the long-term rate of interest at the time of the decisions may be used for the annual data, and the monthly rate of interest may be used for the monthly data. When using data on changes in the money supply it will also be necessary to make allowance for changes in real gross national product as an increase in the money supply will not have the same effect on credit conditions if the size of the real gross national product to be supported also increases.

Combining these monetary indicators with the rule of thumb equations suggested by Williamson, it would appear that we could test the deviations from the rule of thumb against the monetary indicators. Equations which suggest themselves for this purpose (but unfortunately may not be used because of the econometric problems involved -- see below and footnote 19) are the following:
\[ y_t = \beta_0 y_{t-1} + \beta_1 r_t + u_t \quad \ldots (1) \]
\[ y_t = \beta_2 y_{t-1} + \beta_3 \Delta \left( \frac{MS}{GNP} \right)_t + v_t \quad \ldots (2) \]

where \( y_t \) represents expenditure in period \( t \), \( y_{t-1} \) represents expenditure in period \( t - 1 \), \( r_t \) represents the rate of interest at the time the decision is made for expenditure in period \( t \), \( \Delta \left( \frac{MS}{GNP} \right)_t \) represents the change in the money supply divided by real gross national product in period \( t \), and \( u_t \) and \( v_t \) are disturbance terms.

Equation (1) would test whether the variation of \( y_t \) from \( y_{t-1} \) varied with the interest rate at the time that the decision was being made (i.e., the cost of borrowing funds in the latter half of the first quarter of the calendar year), and equation (2) would test whether the variation of \( y_t \) from \( y_{t-1} \) varied with the change in the money supply once allowance for changes in the real level of gross national product has been made. However, with the small sample that the annual data (the only data available which distinguishes between provincial and municipal expenditures) provide, this would be a very unsatisfactory procedure, especially if there should be autocorrelation. Attempts to use equations (1) and (2) to test the sensitivity of total
local government expenditures to changes in monetary policy, yielded the following results:

\[ y_t = 126.7 + 1.123y_{t-1} - 39.04r_t \]
\[ (0.467) (42.193) (0.489) \]
\[ R^2 = 0.99875 \quad d.w. = 1.34037 \quad (< d_L) \]

\[ y_t = -10.59 + 1.114y_{t-1} - 0.03336 \Delta \begin{bmatrix} \text{MS} \\ \text{GNP} \end{bmatrix}_t \]
\[ (0.130) (67.208) (0.211) \]
\[ R^2 = 0.99857 \quad d.w. = 1.25885 \quad (< d_L) \]

This result is probably the worst of all possible worlds as it is a small sample regression on lagged variables with the presence of autocorrelation. Use of ordinary least squares regression in this case would give consistent results, but little consolation can be had from this fact because of the smallness of the sample size. In addition, the studies of Orcutt and Cochrane\(^{19}\) reveal that not only are the results likely to be biased, but biased in an unknown direction. It would appear, therefore, that little can be expected from equations (1) and (2), even if we try to remove the problem of autocorrelation by the two step procedure of assuming the autoregressive scheme to be a first order one and regressing on variables transformed by

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the estimate of the coefficient of the regression of the residuals on the residuals lagged\textsuperscript{20}. If we do, however, follow this two step procedure, the results are as follows:

\[
y_t = 181.1 + 1.139y_{t-1} - 67.22r_t
\]
\[
(0.54) \quad (33.81) \quad (-0.73)
\]
\[
R^2=0.99702 \quad d.w.=1.53901
\]

\[
y_t = 1.698 + 1.116y_{t-1} - 0.064 \Delta \left[ \frac{MS}{GNP} \right]_t
\]
\[
(0.011) \quad (39.14) \quad (0.50)
\]
\[
R^2=0.99610 \quad d.w.=1.59124
\]

These two equations show a very low level of significance for the monetary indicator, but we can draw little in the way of conclusions about responsiveness to monetary policy from them because of the bias which is known to exist.

If we are to proceed it is therefore necessary to avoid using this kind of equation, and this in fact can be done by looking at the problem in a slightly different way. The hypothesis is that a rule of thumb is being used so that successive budgets conform to equation (A), i.e.,

\[
X_{it} = BX_{it-1} + \epsilon_{it}.
\]

\textsuperscript{20} See J. Johnston, \textit{op. cit.}, pp. 193-4.
If monetary policy has any effect, therefore, it will be evidenced in deviations from the "true" relationship. If a straight line trend were to be drawn through points which could be represented by the "true" relationship, there would obviously be autocorrelation, but this is not so bad as in the previous case of lagged variables being included and also something would be known about the form of the autoregressive structure of the disturbance.

Let the "true" relationship be

\[ x_t = ax_{t-1} \]

and the straight line trend be

\[ x_t = bt \]

At time \( t \) there will be a difference between the two relationships, \( u_t \). At time \( t \), therefore, if we add \( u_t \) to the \( x_t \) of the "true" relationship we will get the corresponding point on the straight line trend \( bt \). Thus,

\[ u_t + x_t = bt \]

and, therefore,

\[ u_{t-1} + x_{t-1} = b(t - 1) \]

but,

\[ x_t = ax_{t-1} \]

so by substitution and subtraction we get:
\[ u_t + ax_{t-1} = bt \]
\[ au_{t-1} + ax_{t-1} = ab (t-1) \]
\[ u_t - au_{t-1} = bt - ab (t-1) \]
or,
\[ u_t = au_{t-1} + (bt - ab (t-1)) \]

Thus, although the term in the bracket will afford some bias, it is possible to estimate "a" in the autoregressive structure of the disturbance and use this for transforming the variables for the two step procedure already mentioned\(^{21}\).

Despite the fact that both methods of estimation give biased results and require an autoregressive transformation, the latter method -- using the time trend -- is preferable to the first as the latter is a more general approach. Also the removal of the lagged dependent variable restores the power of the Durbin-Watson statistic to detect the presence of autocorrelation, thus minimizing the possibility of using an inappropriate estimate of the coefficient of the regression of the residuals on the residuals lagged.

When local governments decide on their expenditures, they have two possible reasons for taking monetary policy into account -- they may be committed to a counter-cyclical fiscal policy, or they may be desirous of keeping borrowing charges for financing a deficit at a minimum. Assuming that federal monetary

policy is in the correct direction for the current situation in the economy, then for local governments not to be fiscally perverse, their expenditure should be negatively correlated with changes in interest rates and positively correlated with changes in the money supply. If the local governments wish to minimize borrowing costs, the results should be the same.

Coupling this a priori reasoning with the low significance given to the monetary indicators in the expenditure equations in Appendix 3, it seems that the local governments pay little attention to monetary policy when deciding on their expenditures. Despite the fact that most of the variations in expenditure are "explained" by the equations, only the constant terms and the trend factor are at all significant. In most of the cases even the sign of the coefficient of the monetary indicator is wrong. In fact, for the annual figures the sign of the rate of interest is always wrong and never significant. In the monthly figures it is never significant and one of the occasions when the sign is correct is for interest payments on the debt -- which cannot be varied from year to year as they are the results of contracts made long in the past. It appears, therefore, that a rule of thumb of the Wildavsky-type is being followed regardless of federal monetary policy.

This result is not particularly surprising; it is, no doubt, the result of the local governments having decided
that their expenditures are for the most part unavoidable --- the result of what is socially desirable. It is not, however, evidence that the local governments are unresponsive to federal monetary policy, as it is still quite possible for the local governments to vary their taxation policy with monetary policy and thus move away from borrowing when the cost of credit is high and move in favor of borrowing when the cost of credit is low. There will, of course, be a secular increase in revenues to match the increase in expenditures, but around this trend there may well be a sensitivity to monetary conditions.

Regression equations treating the local government taxation in the same way as the expenditures were treated are included in Appendix 3.

For the local government revenues not to be fiscally perverse and also to have some regard for minimizing borrowing costs, the revenues should be positively correlated with interest rates. From the equations it appears that all the taxes, except the municipalities' direct taxes of persons, 22 See A. W. Johnson and J. M. Andrews, op. cit., pp. 18-19.
are in fact positively correlated with interest rates, but only the municipalities' indirect taxes are correlated in a significant way.

These taxation categories are not, however, the only revenues received by the local governments. As we are mainly interested in the residual decision to borrow when the total revenues do not cover the total expenditures, we must concern ourselves with the total revenues. This entails including the return to local government investments and grants from other governments. These sources of revenue cannot be manipulated by the local governments, and as the regression equations in Appendix 3 reveal, the investment income shows very little sensitivity to interest changes. In the case of federal transfers the coefficients are significant and positive, a fact that is very helpful from the point of view of the local governments, enabling them to receive more funds from the federal government when interest rates are high. This does, however, reveal a certain amount of fiscal perversity on the part of the federal government, but this is not our concern here.

Total revenues of the local governments which may be used to finance expenditures show a very marked upward trend
and a less marked positive correlation with interest rates (see Appendix 3).

The local government deficit -- the residual found by subtracting revenues from expenditures -- seems to vary only slightly with interest rates:

$$D = 157.58S_1 + 89.05S_2 - 74.54S_3 + 30.39S_4$$

$$(85.85) (86.53) (88.47) (87.81)$$

$$1.84 \quad 1.03 \quad -0.84 \quad 0.35$$

$$-1.48t \quad -12.13r \quad R^2 = 0.63269$$

$$(0.96) (24.79)$$

$$-1.54 \quad -0.49 \quad d.w. = 2.2339$$

where $D$ = total local government deficit, monthly.

Though 63.269% of the variation in deficits is "explained" by the equation, the variables included are not very significant. Even the trend variable has a low level of significance, which has to be the result of the variation in the provincial deficits as the municipal deficits have an unmistakable upward trend23. The coefficient of the

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23 See table 3 of the Introduction.
rate of interest has a particularly low level of significance, though the sign is "right" from the point of view of borrowing in that deficits tend to increase when the rate of interest is low.

If the funds needed for capital expenditures by the local governments are added to the deficits, the result is the total borrowing requirement. These funds may be borrowed in either of two ways -- loans may be had directly from the banking institutions and the remainder may be raised by issuing bonds and selling them in the open market. Whether money is borrowed directly or raised by the sale of bonds will depend on the differential between the yield on bonds and the loan rates of the financial institutions, but unfortunately this cannot be tested as the direct loans are made at unknown interest rates.

However, the net new issues of provincial plus municipal bonds can be tested:

\[
BNET = 210.10S_1 + 233.20S_2 + 179.69S_3 + 230.70S_4
\]

(82.53) (82.36) (84.30) (84.41)

2.55 2.83 2.13 2.73
+ 0.42t - 29.20r \quad R^2 = 0.19492

(0.22) \quad (17.20) \quad \text{d.w.} = 1.7931

where BNET = net new issues of local government bonds, monthly. The equation shows that for the absolute level of bonds issued the seasonal variation is significant, but the significance of the trend coefficient and the rate of interest coefficient are not very high. Neither is a large part of the variation explained by the equation. The sign of the coefficient of the rate of interest is, in any event, much higher than it was in the case of the provincial and municipal deficits.

If the proportion of local government expenditure financed by borrowing is tested, much more significant results are obtained:

\[
\frac{\text{Net Bonds}}{\text{Expenditure}} = 0.50S_1 + 0.53S_2 + 0.44S_3 + 0.53S_4 - 0.065r
\]

\[
(0.095) \quad (0.096) \quad (0.100) \quad (0.099) \quad (0.020)
\]

\[
5.26 \quad 5.46 \quad 4.41 \quad 5.30 \quad -3.31
\]

\[
R^2 = 0.43286 \quad \text{d.w.} = 2.4232.
\]

Here the seasonal variation is significant, and the interest rate is at a very high level of significance -- much higher
than the significance of the interest rate in explaining the total deficit position.

In summary, the findings of this chapter are that local governments' fiscal activities are influenced by federal monetary policy. The expenditures expand with what the local governments consider to be "socially necessary", but the revenues raised without borrowing show some sensitivity to the cost of credit. This is especially true in the case of municipal indirect taxes. The total deficits do not show a particularly marked relationship with the cost of credit, but the amounts actually borrowed in the market do show such a relationship. This result gives credence to the view that once a deficit has been decided upon (even if it is not optimal from the point of view of the rate of interest at the time of the decision), the actual timing of the bond issues does vary with monetary conditions.
CHAPTER 3

A THEORETICAL MODEL OF THE ECONOMY

This chapter is in no way concerned with the fiscal effects of local government revenue collection and expenditure, but instead is concerned with the monetary effects of the debt incurred when the local governments borrow -- an occurrence which we have already found to be on the increase in the post-war period. This monetary effect of the debt will far outlast the fiscal effects of incurring a deficit. At the time when a deficit is incurred, the expansionary effect will be the purely fiscal one of the increase in the income stream started by the government expenditure and continued in the ensuing multiplier effects, but when we con-

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N.B., however, that, as we are talking about local debt, each of the local governments concerned will be working in a "non-Musgravian" world and the multiplied effect of their spending may well have much of its impact beyond the bounds of their jurisdiction, but this will be irrelevant for this study as we are concerned with the effects of local government activities on the national economy as a whole.
sider the monetary aspects of the local debt, we shall be concerned with the entire life span of the debt because, throughout the life of the debt, the paper claims representing that debt will be in wealth-owners' portfolios and may at any time be bought and sold by different wealth-owners.

To find the monetary effects of the debt it is, therefore, necessary to trace the movements of local debt through wealth-owners' portfolios -- and in particular to observe the effects that the presence of the local debt in wealth-owners' portfolios has on federal monetary policy and debt management.

It is, therefore, necessary to develop a model of the economy which may be used to show how the presence of the local debt can affect credit conditions and the attempts by the federal authorities to change those credit conditions.

The model used in this study will be developed in this chapter by adding the local government debt to the model built by James Tobin\(^2\). The relevance of this particular

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model for our purposes lies in the fact that it lays bare
the processes by which monetary policy and debt management
can affect credit conditions by focussing attention on the
contents of wealth-owners' portfolios.

Tobin states that the course of economic activity de-
pends on the difference between two rates of return on the
ownership of capital: the anticipated marginal productivity
of capital -- determined by technology, factor supplies and
expectations about the economy; and the supply price of
capital, which is the rate at which wealth-owners would be
willing to hold the existing stock of capital, valued at
current prices. If investors demand a higher rate of re-
turn than the capital currently yields, investment will
decline, whereas if investors are content with a rate of
return lower than the capital currently yields, investment
will increase. Economic stabilization is therefore possi-
ble because monetary and debt management, by changing the
supplies and yields of assets and debts that compete with
real capital for a place in wealth-owners' portfolios, can
change the supply price of capital. If the authorities wish
to follow an expansionary policy, they will attempt to lower
the supply price of capital below its marginal productivity
by lowering the yields on national debt instruments, bank
loans, mortgages, etc., but if they wish to follow a con-
tractionary policy they will increase these yields in an
attempt to bid the supply price of capital above its mar-
ginal productivity. ³

These processes of monetary policy and debt management
are best seen from the formal model developed in the appen-
dix to the article. ⁴ The model, with the slight adaptation
needed to convert it to Canadian institutions, is as follows:

1. Definitions of variables and parameters:

\[ M_1 = \text{Amount of demand debt outside the Bank of Canada}; \]

\[ M_2 = \text{Amount of federal government short debt outside} \]
\[ \quad \text{the Bank of Canada}; \]

\[ M_3 = \text{Amount of federal government long debt outside} \]
\[ \quad \text{the Bank of Canada}; \]

\[ C = \text{Value of privately owned capital stock at current} \]
\[ \quad \text{prices}; \]

\[ L = \text{Net indebtedness of private borrowers to banks;} \]
\[ \quad \text{defined as a negative number}; \]

\[ D = \text{Bank deposits} \]

\[ k = \text{Required ratio of bank reserves to deposits}; \]


⁴ ibid., pp. 214-18, -- used by permission.
E = Shareowners' equity in banks;

$M_{1b} = $ Amount of debt of category 1 (i=1, 2, 3) held by banks;

$M_{ip} = $ Amount of debt of category i (i=1, 2, 3) held by non-bank public;

$M_{1b} = $ Banks' net free reserves;

W = Net private wealth;

$r_1 = $ Bank of Canada discount rate;

$r_2 = $ Rate on short-term federal government securities;

$r_3 = $ Rate on long-term federal government securities;

$r_4 = $ Rate on private loans;

$r_5 = $ Supply price of capital\(^5\).

2. Accounting identities and definitions:

(A1) $M_1 + M_2 + M_3 + C = W$

(A2) $M_{1p} + M_{2p} + M_{3p} + D + L + C + E = W$

(A3) $M_{1b} + M_{ip} = M_i \quad (i = 1, 2, 3)$

(A4) $M_{1b} + M_{2b} + M_{3b} - L - D - E = 0 \text{ (from (A1), (A2)}$

\text{and (A3)\(^2\)).}$

(A5) $M_{1b} = kD + M_{1b} \quad  \\

\(^5\) Tobin's choice of the term "supply price of capital" is rather unfortunate as it is -- as he correctly states -- a rate of return on capital. Symmetry with other assets would therefore dictate that it be considered as a yield rather than a price (which varies with the inverse of the yield). Tobin's term will, however, be retained.
3. Behavioral relationships:

3.1. Banks

(B1) \( M_{1b}^1 = m_{1b} (r_1, r_2, r_3, r_4)(1-k)D \)

(Banks' net free reserves vary directly with the discount rate, and inversely with the interest rate on the three types of earning assets in banks' portfolios. The most important determinants are \( r_1 \) and \( r_2 \), banks having an incentive to borrow reserves when the differential between \( r_2 \) and \( r_1 \) is favorable.)

(B2) \( M_{2b}^1 = m_{2b} (r_1, r_2, r_3, r_4)(1-k)D \)

(B3) \( M_{3b}^1 = m_{3b} (r_1, r_2, r_3, r_4)(1-k)D \)

(B4) \( L = \lambda_b (r_1, r_2, r_3, r_4)(1-k)D + E \)

(Banks' demand for an asset is assumed positively related to its own rate, negatively to the other rates).

3.2 Non-Bank Public:

(P1) \( M_{1p} = m_{1p} W \)

/Public currency holdings are taken to be a constant proportion of wealth).

(P2) \( M_{2p} = m_{2p} (r_2, r_3, r_4, r_5)W \)

(P3) \( M_{3p} = m_{3p} (r_2, r_3, r_4, r_5)W \)
(P4) \[ L = \lambda_p (r_2, r_3, r_4, r_5) W \]

(As \( L \) is a liability of the non-bank public -- i.e., they are loans they owe to the banks -- \( L \) is a negative number and becomes smaller algebraically, larger absolutely, when \( r_4 \), the loan rate, declines and when other rates rise. These reactions are due both to the direct lending behavior of the public and to its borrowing behavior. When the loan rate declines and other rates rise, the lending sector of the public will prefer other assets to loans. When the loan rate declines and other rates rise, particularly \( r_5 \), the borrowing sector of the public will wish to increase its debt. On both counts there will be more demand for loans.

(P5) \[ D = d_p (r_2, r_3, r_4, r_5) W \]

(Demand for deposits is negatively related to all rates).

(P6) \[ C = c_p (r_2, r_3, r_4, r_5) W \]

(Demand for capital increases as \( r_5 \) increases and as the other rates decrease because the higher is the supply price of capital, \( r_5 \), above the other
rates, the more will wealth-owners prefer to hold equity (now having a relatively higher yield).

4. **Balance Equations**:

(1) \[ M_1 = k_d p (r_t) W + m_{1b} (r_s) (1-k) d_p (r_t) W + m_{1p} W \]
\[ (s = 1,2,3,4; \ t = 2,3,4,5) \]

(2) \[ M_2 = m_{2b} (r_s) (1-k) d_p (r_t) W + m_{2p} (r_t) W \]
\[ (s = 1,2,3,4; \ t = 2,3,4,5) \]

(3) \[ M_3 = m_{3b} (r_s) (1-k) d_p (r_t) W + m_{3p} (r_t) W \]
\[ (s = 1,2,3,4; \ t = 2,3,4,5) \]

\[ \lambda_p (r_s) (1-k) d_p (r_t) W + E + \lambda_p (r_t) W = 0 \]
\[ (s = 1,2,3,4; \ t = 2,3,4,5) \]

(5) \[ C = c p (r_t) W \]
\[ (t = 2,3,4,5) \]

The monetary effects of various actions by the authorities can be traced by using this model. For example, the monetary effect of an increase in \( M_1 \), \((i = 1,2,3)\) is found by differentiating the system partially with respect to \( M_1 \) and solving for \( \frac{\partial r_5}{\partial M_1} \). The open market purchase by the Bank of Canada of short debt (i.e., the substitution of demand

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6 The second plus sign in this equation replaces the negative sign used by Tobin in this equation. This correction has been acknowledged by Tobin (private correspondence).

7 This model is used by permission of the author.
debt, \( M_1 \), for short debt, \( M_2 \)) has a monetary effect of:

\[
\frac{\partial r_5}{\partial M_1} - \frac{\partial r_5}{\partial M_2}
\]

on the economy, the open market purchase by the Bank of long-term federal debt an effect of:

\[
\frac{\partial r_5}{\partial M_1} - \frac{\partial r_5}{\partial M_3}
\]

and the substitution of short-term debt for long-term debt an effect of:

\[
\frac{\partial r_5}{\partial M_2} - \frac{\partial r_5}{\partial M_3}
\]

From this model Tobin drew the very significant conclusion that \( \frac{\partial r_5}{\partial M_3} \) was always negative, i.e., that an increase in the issue of federal long-term debt will always be expansionary\(^9\). Issue was taken with this conclusion by Keare and Silber\(^10\), who believed that \( \frac{\partial r_5}{\partial M_3} \) could be positive, negative or zero (i.e., long-term debt finance could be con-

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8 ibid., p. 217.


tractionary, expansionary or neither) depending upon the magnitude of \( \frac{\partial x_4}{\partial M_3} \), or in other words depending on the degree of substitutability of private debt for federal long-term debt in wealth-holders' portfolios. The reasons for this difference of opinion are very significant for the discussion of the effects of local debt on monetary policy as the "private" debt having the yield of \( r_4 \) includes the local debt.\(^{11}\) The difference arises because of which assets are assumed to be substitutes in wealth-holders' portfolios. Tobin contends\(^{12}\) that because all interest-bearing federal government debt is a better substitute for money than for equity capital, an increase in total federal debt, regardless of the maturity of the new issue, will have expansionary monetary effects on the economy because there will be an increase in the demand for capital. As Keare and Silber point out\(^{13}\), this reasoning implicitly assumes that private debts are better substitutes for equities than they are for federal government debt.

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\(^{12}\) ibid., pp. 158-67.

\(^{13}\) Keare & Silber, op. cit., p. 511.
Following Tobin's reasoning, let us assume there is an increase in the supply of long-term federal debt by the authorities. Because

$$M_{3b} = m_{3b}(r_1, r_2, r_3, r_4) (1-k)D$$

and

$$M_{3p} = m_{3p}(r_2, r_3, r_4, r_5) W,$$

and the demands are such that both the banks' and the public's demands for $M_3$ are positively related to $r_3$ and negatively related to all other rates, this increase will ensure an increase in $r_3$, i.e.,

$$\frac{\partial r_3}{\partial M_3} > 0.$$

Because $M_2$ is a good substitute in wealth-holders' portfolios for $M_3$, the demand for $M_2$ will decrease as $r_3$ increases. Thus $r_2$ will also rise, i.e.,

$$\frac{\partial r_2}{\partial M_3} > 0.$$

However, equation (P6) tells us that

$$C = c_p(r_2, r_3, r_4, r_5) W,$$

where the demand for capital varies positively with $r_5$ and negatively with the other rates. Thus if an increase in $M_3$ is to be always expansionary, i.e.,

$$\frac{\partial r_5}{\partial M_3} < 0.$$
then, for balance purposes, it is necessary that
\[ \frac{\partial r_4}{\partial M_3} < 0. \]
This can only be the case if in fact private debt and equities are good substitutes and private debt and government debt are not. In such a circumstance an increase in \( M_3 \) will increase \( r_3 \), then increase \( r_2 \) -- the rate on its nearest substitute, then decrease \( r_4 \), causing an increase in demand for capital and a decrease in \( r_5 \) -- which is an expansion.

Geometrically, this may be seen from figure 3.1, which shows excess demand functions for short-term federal government bonds (\( M_2 \)), long-term federal government bonds (\( M_3 \)), private debts and equities. The diagrams are not drawn in the same horizontal plane so as to allow for the fact that there is normally a differential between the prices (and hence the yield rates) of the various assets on the market. Thus the prices of the assets are aligned horizontally at the outset and they remain aligned after any change that does not change the differentials between the prices. The differential between the price of the short-term government bonds, \( \frac{1}{r_2} \), and the price on long-term federal government bonds, \( \frac{1}{r_3} \), is shown as \( \delta_3 \). Similarly the price differential between private debt and short-term federal government bonds
Figure 3.1
is \( \delta_4 \). Any or all of these differentials may, theoretically, be positive, negative or zero\(^{14}\).

The figure (3-1) starts out from a position of equilibrium, with each diagram drawn so that the prices of the various assets are aligned horizontally. The system is now disturbed by an increase in the supply of \( M_3 \) -- lowering the excess demand function for \( M_3 \) from \( d_3 \) to \( d_3' \). This will have two effects on wealth-owners -- a wealth effect and a price effect. The wealth effect will cause an increase in the demand for all assets -- forcing their prices up and their yields down. It is not, however, likely that wealth-owners will wish to hold all of the increase in wealth in \( M_3 \) or that they will wish to distribute it equally among all of their assets; there will, therefore, be increases in the demand for \( M_2 \), private debts and equities, but most probably by different amounts. Normal diversification of risks would indicate that wealth-owners would be most likely to increase their holdings of those assets which they did not consider to be substitutes in their portfolios for the assets whose

\(^{14}\) The actual differentials experienced in Canada in the period under discussion are all positive when the assets are arranged in the order of figure 3-1 (see Introduction).
supply has been increased. The differentials $\delta_3$, $\delta_4$, $\delta_5$ are all likely to change as wealth-owners reconcile their portfolios to the new asset supplies, but these wealth effects have all been omitted from figure 3-1 for the sake of simplicity in demonstrating the price effects.

The initial increase in the supply of $M_3$ will, as the diagram shows, lower the price of $M_3$ (and increase its yield, $r_3$) and this price change will, aside from the wealth effect, cause a decrease in the demand for $M_2$ (short-term federal Government debt) which is $M_3$'s best substitute in wealth-owners' portfolios. Omitting the wealth effects and assuming that the change in the price of $M_3$ has done nothing to influence the desires of wealth-owners for the differential $\delta_3$ between $\frac{1}{r_2}$ and $\frac{1}{r_3}$ -- and assuming, along with Tobin, that the two kinds of debt are perfect substitutes -- new prices will be established which are lower than the original prices but still aligned horizontally in the diagram.

The question naturally arises: how far will these prices fall? This will depend on the amount of $M_3$ supplied to the market and the responsiveness of the demand for each of the two assets to the rate of return on the other. In periods when the discount rate is set at the discretion of
the Bank of Canada, the rate of return on short-term federal
government bonds is also strongly affected by changes in the
discount rate (this effect will, of course, be absent in
those periods when the discount rate was tied to the rate on
Treasury Bills), but if we consider \( M_2 \) and \( M_3 \) in isolation,
the initial rise in \( r_3 \) relative to \( r_2 \) has upset the "normal"
differential between the two rates of return so the demand
for \( M_2 \) will shift to the left and the demand for \( M_3 \) will
shift to the right. A new price -- or allowing for the
differential, new prices -- will be established when \( d_2 \) has
shifted to \( d_2' \) and the excess demand for \( M_3 \) has shifted from
\( d_3' \) to \( d_3'' \).

Private debts and equities are not assumed to be good
substitutes for federal government debt, but they are good
substitutes for each other. The higher yields on \( M_2 \) and \( M_3 \)
will, however, cause changes in the demand for private debts
and equities. Wealth-owners will shift out of money into
interest-bearing debt, and the banks -- now holding a lar-
ger amount of defensive asset than previously -- will be
in a position to expand loans and reduce the rate on private
debts. The private debt market will witness a decrease in
the supply of private debt securities as borrowers move in
favor of borrowing directly from the banks, and \( r_4 \) will decline absolutely. As Tobin states:

"The improvement in yields of interest-bearing debt will induce the banks to diminish net free reserves and the public to hold more debt relative to deposits and currency. Banks, with an over-all increase in their holdings of defensive assets, may expand loans and reduce the loan rate even though the yields on these assets are higher. In any case it takes a decrease in the rate of return on equity to induce the public to increase their holdings of liquid assets, deposits plus government debt, by even more than the increase in their wealth."\(^{15}\)

Tobin then assumes that the demand for equities varies directly with wealth-owners' wealth and inversely with \( r_2 \), \( r_3 \), and \( r_4 \) -- with \( r_4 \) being especially important because much capital holding is financed by borrowing.

When the supply of \( M_3 \) was increased, \( r_2 \) and \( r_3 \) increased, \( r_4 \) was decreased and there was an increase in wealth. Thus, if the demand for equity is to increase (causing a fall in \( r_5 \) -- the supply price of capital), the wealth effect and the price effect of the change in \( r_4 \) must predominate over the price effect of the changes in \( r_2 \) and \( r_3 \). Tobin is of the opinion that this in fact will be the

case as holders of capital are much influenced by the rate on private debt. Thus in Tobin's model the price effect of an increase in $M_3$ will be an increase in the demand for capital as is shown in figure 3-1. If we also include the wealth effect, which is positive, the net effect of an increase in the supply of $M_3$ will be a definite increase in the demand for capital, and $r_5$, the supply price of capital, will fall evidencing an unambiguously expansionary effect on the economy.

As Tobin points out, this result is of obvious interest as it seems to be the opposite of what is expected from traditional monetary theory, viz., this is a case of an expansion being accompanied by an increase in $r_3$ -- the traditional indicator of a contraction.

Open market operations and debt management may similarly be traced through the model. For example, the effects of an open market purchase by the Bank of Canada of short-term federal government debt may be found by investigating the difference between the two effects on the demand for capital -- and hence on $r_5$ -- exerted by the decrease in

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16 J. Tobin, ibid., p. 151.
short-term federal government debt and the concomitant increase in the money supply.

Keare and Silber's argument with Tobin's result\(^\text{17}\) stems from the place that private debts have in the model. Tobin implicitly assumed that private debt and equity are good substitutes in wealth-owners' portfolios, but Keare and Silber explicitly assume that private debts are good substitutes for federal government debt and not for equities\(^\text{18}\).

This is a very significant change. If \(M_3\) is increased under these conditions, not only will \(r_2\) and \(r_3\) rise, but \(r_4\) will also rise. Now, seeing that the demand for capital varies inversely with \(r_2\), \(r_3\) and \(r_4\), but directly with \(r_5\), the demand for capital may decrease as this price effect may outweigh the positive effect of the increase in wealth. Thus an increase in \(M_3\) may have a contractionary effect on the economy.

Keare and Silber's result can be seen by a consideration of figure 3 - 2 which, like figure 3 - 1, does not show the wealth effects. The supply of \(M_3\) increases, so

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\(^{18}\) Keare D.H. and Silber W.L., \(\text{ibid.}\), p. 511.
the excess demand function for $M_3$ shifts down from $d_3$ to $d_3'$ as before and $r_3$ increases. This causes a decrease in the demand for $M_2$ and for private debts. Thus the excess demand function for $M_2$ moves down from $d_2$ and the excess demand for private debts moves down from $d_4$. As the initial increase in $M_3$ forced $r_3$ to a level above $r_2$ and $r_4$ (the yields on its closest substitutes), the continuing differential between $r_3$ on the one hand and $r_2$ on the other will cause the demand for $M_3$, $d_3'$, to increase. The final result among the three substitutes, short-term federal debt, long-term federal debt and private debt will be that the new yields are established where $d_3''$, $d_2'$ and $d_4'$ cut the price axes. Thus $r_2$, $r_3$ and $r_4$ are all higher than they were before, but ignoring the wealth effects and remembering Tobin's assumption of perfect substitutability, they will still be aligned horizontally in figure 3 - 2.

Tobin's assumption\(^{19}\) tells us that the demand for capital varies inversely with $r_2$, $r_3$ and $r_4$, so we would expect a decrease in the demand for capital, $d_5$, and a rise in $r_5$ as is shown in the diagram. However, the increase in $M_3$ was

\(^{19}\) This is the assumption that accompanies equation (P6) above.
an increase in wealth, so there are opposing forces being exerted on the demand for capital. The net result under Keare and Silber's assumptions of substitutability is that the demand for capital, \( d_5 \), will decrease, increase or remain unchanged -- or \( r_5 \) will increase, decrease or remain the same -- according to whether the price effect outweighs the wealth effect, is outweighed by the wealth effect or is just counter-balanced by the wealth effect.

Under Tobin's assumptions, an increase in \( M_3 \) has an unambiguously expansionary effect on the economy, i.e., there is an increase in the demand for capital and the supply price of capital falls. Also \( r_2 \) and \( r_3 \) increase, but \( r_4 \) declines along with \( r_5 \). Thus the differential between the price of short-term federal government debt and long-term federal government debt will -- quite aside from the wealth effect -- remain unchanged at \( \delta_3 \). The differentials between \( r_4 \) and \( r_2 \) and between \( r_5 \) and \( r_2 \) will, of course, no longer be \( \delta_4 \) and \( \delta_5 \), but the differential between \( r_4 \) and \( r_5 \) will remain at \( \delta_5 - \delta_4 \). On the other hand, under Keare and Silber's assumptions, an increase in \( M_3 \) will have an ambiguous effect on the economy, but \( r_2 \), \( r_3 \) and \( r_4 \) will all increase causing the differentials \( \delta_3 \) and \( \delta_4 \) to remain un-
changed while the differential \( r_5 - r_2 \) will change unless the shift in the demand for capital is downward and causes \( r_5 \) to rise by exactly the same amount as \( r_2 \) -- which is unlikely as capital is not considered to be a good substitute for other assets.

Whether or not we get the result stated by Tobin or the result stated by Keare and Silber depends in part on the substitutability of assets in wealth-owners' portfolios. For Tobin to be correct it is necessary (aside from wealth effects) for money, short-term federal debt and long-term federal debt to be good substitutes one for another, but for all private debt to be a good substitute for capital. For Keare and Silber to be correct it is sufficient (aside from wealth effects) for money, short-term federal debt, long-term federal debt and private debt all to be good substitutes for each other as well as having some substitutability with capital in wealth-owners' portfolios. So a crucial point is the substitutability of private debt -- whether it is a better substitute for capital or for federal government debt.

The significance of the problem for this study is, as has already been pointed out, that the so-called "Private debt" in the model also includes the local government
debt. Thus to investigate the behavior of this "private debt", it is necessary to investigate it in three sections — municipal debt, provincial debt and the remainder (which is referred to hereinafter as "non-government debt" or "non-government loans").

Bringing this division into the model requires only minor changes. The only new definitions needed are:

\[ M_6 = \text{Amount of municipal debt outstanding}^{21}; \]
\[ M_7 = \text{Amount of provincial debt outstanding}^{22}; \]
\[ r_4 = \text{Rate on non-government loans, rather than the rate on all "private loans";} \]
\[ r_6 = \text{Rate on municipal debt;} \]
\[ r_7 = \text{Rate on provincial debt.} \]

Private debts no longer "all wash out"\(^{23}\), if we are able to include \( M_6 \) and \( M_7 \) explicitly. In this case only the non-government debt will not appear in the definition of wealth, (A1). We now have:-

\[ \text{21 This is also the amount of municipal debt outside the Bank of Canada as municipal debt is not bought by the bank.} \]
\[ \text{22 The Bank of Canada has not bought provincial debt since 1947.} \]
\[ \text{23 Tobin J. "Essay on Principles of Debt Management", op. cit., p. 149.} \]
(A1') \( M_1 + M_2 + M_3 + M_6 + M_7 + C = W \)

(A2') \( M_{1p} + M_{2p} + M_{3p} + M_{6p} + M_{7p} + D + L + C + E = W \)

(A3) \( M_{ib} + M_{ip} = M_i \) as before, but now \((i=1,2,3,6,7)\).

(A4) \( M_{1b} = kD + M_{1b} \)

All the behavioral equations have to be changed except (P1), and (B5), (B6), (P7) and (P8) have to be added:

(B1') \( M'_{1b} = m_{1b}(r_1, r_2, r_3, r_4, r_6, r_7)(1-k)D \)

(B2') \( M_{2b} = m_{2b}(r_1, r_2, r_3, r_4, r_6, r_7)(1-k)D \)

(B3') \( M_{3b} = m_{3b}(r_1, r_2, r_3, r_4, r_6, r_7)(1-k)D \)

(B4') \( L = \xi_b(r_1, r_2, r_3, r_4, r_6, r_7)(1-k) D + E \)

(B5) \( M_{6b} = m_{6b}(r_1, r_2, r_3, r_4, r_6, r_7)(1-k)D \)

(B6) \( M_{7b} = m_{7b}(r_1, r_2, r_3, r_4, r_6, r_7)(1-k)D \)

(P1) \( M_{1p} = m_{1p} W \)

(P2') \( M_{2p} = m_{2p}(r_2, r_3, r_4, r_5, r_6, r_7) W \)

(P3') \( M_{3p} = m_{3p}(r_2, r_3, r_4, r_5, r_6, r_7) W \)

(P4') \( L = \xi_p(r_2, r_3, r_4, r_5, r_6, r_7) W \)

(P5') \( D = d_p(r_2, r_3, r_4, r_5, r_6, r_7) W \)

(P6') \( C = c_p(r_2, r_3, r_4, r_5, r_6, r_7) W \)

(P7) \( M_{6p} = m_{6p}(r_2, r_3, r_4, r_5, r_6, r_7) W \)

(P8) \( M_{7p} = m_{7p}(r_2, r_3, r_4, r_5, r_6, r_7) W \)
With these identities and behavioral equations the following seven balance equations may be formed:

\[ (1') M_1 = k_d p (r_t) W + m_{1b} (r_s) (1-k) d_p (r_t) W + m_{1p} W, \]
\[ (s = 1,2,3,4,6,7; \ t = 2,3,4,5,6,7) \]

\[ (2') M_2 = m_{2b} (r_s) (1-k) d_p (r_t) W + m_{2p} (r_t) W, \]
\[ (s=1,2,3,4,6,7; \ t = 2,3,4,5,6,7) \]

\[ (3') M_3 = m_{3b} (r_s) (1-k) d_p (r_t) W + m_{3p} (r_t) W, \]
\[ (s=1,2,3,4,6,7; \ t=2,3,4,5,6,7) \]

\[ (4') M_6 = m_{6b} (r_s) (1-k) d_p (r_t) W + m_{6p} (r_t) W, \]
\[ (s=1,2,3,4,6,7; \ t=2,3,4,5,6,7) \]

\[ (5') M_7 = m_{7b} (r_s) (1-k) d_p (r_t) W + m_{7p} (r_t) W, \]
\[ (s=1,2,3,4,6,7; \ t=2,3,4,5,6,7) \]

\[ (6') \ e_b (r_s) (1-k) d_p (r_t) W + e_p (r_t) W = 0, \]
\[ (s=1,2,3,4,6,7; \ t=2,3,4,5,6,7) \]

\[ (7') C = c_p (r_t) W, \ (t=2,3,4,5,6,7). \]

As before we have a system of equations -- this time seven instead of five -- which are not independent. However, eliminating any one of the equations, we have six equations to determine the six unknown, market determined interest rates, \( r_2, r_3, r_4, r_5, r_6 \) and \( r_7 \). The system itself is little different from the one we already had, but
with the "private debt" divided up into its three components, municipal, provincial and non-government debt, it is possible to see more clearly the role played by the local government debt.

There are now more identifiable reactions to monetary policy and debt management than the two proposed by Tobin and Keare and Silber. Tobin's "unambiguous" solution will still exist if in fact \( r_4, r_6 \) and \( r_7 \) all move together in the same direction as the supply price of capital, \( r_5 \), or, in other words, if wealth holders consider non-government debt, municipal debt, and provincial debt all equally good substitutes for equities. Keare and Silber's solution, similarly, will exist if \( r_2, r_3, r_4, r_6 \) and \( r_7 \) all move together, i.e., all the federal government, local government and non-government securities are considered good substitutes for each other but not for capital. It is now also possible to see that \( r_4, r_6, \) and \( r_7 \) need not move together --- a fact that was hidden by the previous formulation of the model, for example, \( r_6 \) and \( r_7 \) may move with \( r_2 \) and \( r_3 \) while \( r_4 \) moves with \( r_5 \), i.e., local government debt may be considered a good substitute for federal government debt at the same time that non-government debt is considered a good
Reaction of $r_4$, $r_6$, $r_7$ to, say, increase in $r_3$.

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<td>26</td>
<td>↑</td>
<td>I</td>
</tr>
<tr>
<td>27</td>
<td>I</td>
<td>I</td>
</tr>
</tbody>
</table>

Arrow indicates possible direction of change. I represents an independent reaction and can, therefore, mean "no change" when $r_3$ increases.

Table 3.1
substitute for ownership of physical capital. In fact, ruling out the possibility of complete independence on the part of any of the securities, there are now eight possible outcomes of municipal, provincial and non-government debt reacting to, say, a change in $r_3$. If we allow any or all of the three securities to behave independently, there are twenty-seven possibilities -- see table 3-1.

Before embarking on the task of attempting to determine empirically which outcome is evidenced in the Canadian financial markets, it would be advisable to ask why any security might be considered a good substitute for another by a wealth-holder. This takes us directly to the fundamental problem faced by any prospective wealth-holder in ordering a portfolio -- the decision between profitability and safety.

Usually securities would be considered as substitutes if they share the same risks. The art of diversifying a portfolio lies in being able to choose securities (or, indeed, any other assets) which have independent risks and still have an adequate yield. Unfortunately for the wealth-holder, he has a trade-off problem -- if he lowers the risk
element of his portfolio, he has usually lowered his yield; and if he succeeds in increasing his yield, he has usually succeeded in increasing the risk too.

The specific risks attached to the assets under discussion here were enumerated by Tobin\(^{24}\) -- and Silber has added one more risk to the list since then\(^{25}\). Basically they are as follows:

(1) The uncertainty regarding the future purchasing power of the dollar.

(2) The uncertainty regarding future interest rates, as capital gains and losses depend on interest rate changes. The longer the maturity of a security the more important this risk will be.

(3) The uncertainty attached to some securities because they are tied to specific assets or managements. The risk of default is included here.

(4) The uncertainty due to technological obsolescence. This uncertainty is, of course, mainly attached to equities.

\(^{24}\) *ibid.*, pp. 162-167.

(5) The uncertainty regarding the existence of a secondary market in the future, or its degree of organization. (This risk was called "marketability risk" by Silber, but I see no reason to abandon the older term of "shift-ability").

A priori we might consider each of the assets to have the risks marked in table 3 - 2:

<table>
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<tr>
<th>Risk Security</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<td>Demand debt</td>
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<tr>
<td>Fed. short</td>
<td>X</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Fed. long</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prov. debt</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Mun. debt</td>
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<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
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<tr>
<td>Non-govt.</td>
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<td>?</td>
<td>X</td>
<td>?</td>
<td>X</td>
</tr>
<tr>
<td>Equities</td>
<td></td>
<td>?</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Table 3 - 2

Those assets sharing risks are likely to be considered as substitutes and those having independent risks are likely to be considered as complements, so it might seem that some of the cases in table 3 - 1 could be ruled out. However, table 3 - 1 only refers to provincial debt, municipal debt and non-government debt and how they might react to a change in the rate of interest on long-term federal bonds, and as
can be seen from table 3-2, these securities appear to share three out of five of the types of risk. Despite the fact that the securities in table 3-2 appear to be ordered so that each is likely to be a good substitute for its immediate neighbor in the table, very little can be said a priori about the substitutability of the crucial "private debt". Provincial and municipal debt share risks one and two with federal debt and non-government debt shares risk one and possibly risk two with federal debt, but at the same time provincial and municipal debt and non-government debt share risks three and five and possibly risk two with equities. In addition non-government debt and equities may share risk four. As the crucial factor for the model is whether "private debt" is a better substitute for long-term federal debt or for equities, it would seem that any conclusions that can be made can only be reached from empirical evidence, the task to which chapter 4 is addressed.

Monetary policy and debt management policy are performed by changing the supply conditions of federal government debt -- demand debt (money), short-term federal debt and long-term federal debt -- but as was pointed out above, the aim of this policy is to influence the differential
between the supply price of capital, \( r_5 \), and the rate of return on securities that compete with equities for a place in wealth-owners' portfolios. It is here that the critical place of local government debt can be seen. If, say, monetary policy is initiated which lowers the yield on long-term federal government debt, \( r_3 \), then the impact of this action on the differential between the yield on capital and the yield on competing debt can be affected by wealth-owners' substitution in their portfolios of local government debt for either federal debt or equity. Any attempt to change the yield on federal long-term debt, \( r_3 \), will be affected by portfolio changes among the close substitutes for \( M_3 \) and any attempt to change the supply price of capital, \( r_5 \), will be affected by portfolio changes among substitutes for equities.

Of the twenty-seven possible outcomes of the reaction of "private debt" to changes in \( r_3 \), the local debt could be said to have no effect only in cases 25, 26 and 27 of table 3-1. Municipal debt would have no effect in cases 13, 14, 15, 16, 21, 22, 25, 26, and 27; and provincial debt would have no effect in cases 17, 18, 19, 20, 23, 24, 25, 26, and 27.
CHAPTER 4

EMPIRICAL TESTS OF WEALTH-OWNERS' BEHAVIOR

Our next task is to search for empirical evidence that the financial sector of the Canadian economy behaves in a way consistent with the model postulated in the previous chapter. The whole concept of municipal and provincial debt affecting the efficacy of monetary policy hinges on the substitutability of the debt of different levels of government in wealth-holders' portfolios. The empirical study must, therefore, investigate this substitutability.

According to the "Slutsky conditions" or demand theory, two goods $i$ and $j$ may be considered substitutes if

$$\left[ \frac{\partial Q_i}{\partial P_j} \right] > 0,$$

that is, a compensated increase in the price of good $j$ ($P_j$) causes an increase in the demand for good $i$ ($Q_i$). And similarly, two goods $i$ and $j$ may be considered complements if

$$\left[ \frac{\partial Q_i}{\partial P_j} \right] < 0,$$

$$U = \text{const.}$$
that is, a compensated increase in the price of good \( j \) \((P_j)\)
causes a decrease in the demand for good \( i \) \((Q_i)\). Unfortunately, it is almost impossible to test empirically the full
Slutsky equations for any set of demand equations. As
J. S. Cramer has remarked:

"...the more sophisticated propositions of pure
theory, like the Slutsky condition, which appeal
less readily to common sense and introspection,
have rarely been fruitful in empirical work."\(^2\)

and A. P. Barten, who has made probably the best attempt yet
at using the Slutsky condition in empirical work, was still
led to conclude that

"(t)he day is not yet close,..., when we will have
really detailed descriptions of consumer behavior
in the form of demand equations which comply with
economic theory, that is, which satisfy the con-
ditions put forward by Slutsky more than 50 years
ago."\(^3\)

The testing of substitutability and complementarity in this
study will obviously, therefore, have to be satisfied with

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1 Henderson, J.M. & Quandt, R.E., *Microeconomic Theory*

2 Cramer, J.S., *The Ownership of Major Consumer Durables,*
(Cambridge, 1962) -- quoted by A.P.Barten, "Evidence on
the Slutsky conditions for demand equations", *Review of

something much less than the Slutsky equation. Thus, two goods \( i \) and \( j \) will be considered gross substitutes merely if

\[
\frac{\partial Q_i}{\partial P_j} > 0,
\]

and gross complements if

\[
\frac{\partial Q_i}{\partial P_j} < 0.
\]

This principle may easily be applied to securities\(^4\):

e.g., municipal bonds and provincial bonds may be considered to be substitutes in wealth-holders' portfolios if:

\[
\frac{\partial Q_m}{\partial P_p} > 0,
\]

where \( Q_m \) represents the wealth-holders' demand for municipal bonds and \( P_p \) represents the price of provincial bonds. However, as the yield on a security varies inversely with its price\(^5\), municipal and provincial bonds may be considered as

\[\text{References:}\]


\(^5\) If \( P \) is the price of a bond which matures in \( N \) years, \( C \) is the annual coupon payment, \( A \) is the principal paid at maturity and \( i \) is its yield, then:

\[
P = \frac{C}{1 + i} + \frac{C}{(1 + i)^2} + \ldots + \frac{C}{(1 + i)^N} + \frac{A}{(1 + i)^N}
\]

and therefore,

\[
\frac{\partial P}{\partial i} = -\frac{C}{(1 + i)^2} - \frac{2C}{(1 + i)^3} - \ldots - \frac{NC}{(1 + i)^{N+1}} - \frac{NA}{(1 + i)^{N+1}} < 0
\]

so \( P \) varies inversely with \( i \).
substitutes in wealth-holders' portfolios if:-

\[ \frac{\partial Q_m}{\partial i_p} < 0, \]

where \( i_p \) represents the yield on provincial bonds.

In empirical work regression coefficients are equivalent to partial derivatives. For example, if we have a dependent variable \( Y \) regressed on certain explanatory variables, \( X_1, X_2, \ldots \) etc., then the coefficient \( b_1 \) of the explanatory \( X_1 \) variable tells us that a unit change in \( X_1 \) will, ceteris paribus, cause a change of \( b_1 \) times that unit in \( Y_1 \). Thus returning to our example of municipal and provincial bonds -- if we postulate a demand equation for municipal bonds by a particular wealth holder which includes the yield on provincial bonds:-

\[ \Delta Q_m = b_0 + \ldots + b_r \Delta i_p + \ldots, \]

where \( \Delta Q_m \) is some wealth-holders' change in holdings of municipal bonds, \( b_r \) the \( r \)th regression coefficient and \( \Delta i_p \) the change in the yield on provincial bonds, then \( b_r \) may be interpreted as

\[ \frac{\partial Q_m}{\partial i_p}. \]

Thus to test whether a particular wealth-holder considers municipal and provincial bonds to be substitutes, we only need to investigate \( b_r \). If \( b_r \) is negative and significant,
then the wealth-holder reveals that he considers the two
bonds as substitutes. If, on the other hand, the coefficient
is positive and significant, the wealth-holder reveals that
he considers the bonds as complements, while a very low
ratio of the coefficient to its standard error is open to
the interpretation that the wealth-holder's demands for the
two bonds are independent.

Our task will be to investigate the substitutability of
federal government bonds, provincial government bonds, munici-
pal government bonds and corporate bonds in wealth-
holders' portfolios. The wealth-holders chosen will, of
course, be limited by the data available, but the wealth-
holders for which data exist on their holdings of the vari-
ous bonds hold a significant proportion of the total. The
main suppliers of funds to the government bond market are:
Life Insurance Companies, Pension Funds, Chartered Banks,
Retail buyers, and the provincial and municipal govern-
ments themselves, followed by the Quebec Savings Banks, the
Caisses Populaires, non-life insurance companies and the administered funds of Trust Companies.

The hypothesis that wealth-holders actually substitute federal, provincial and municipal bonds in their portfolios as the yields on these bonds change will be tested by estimating demand equations for federal long-term bonds, long-term provincial bonds, long-term municipal bonds and long-term corporate bonds for Chartered Banks, Life Insurance Companies, Trust Companies and Mortgage Loan Companies -- the four financial intermediaries holding the four kinds of bonds for which portfolio data are available. The demand equations will include the yields of the various bonds as differentials (i.e., the differences between the yields on the dependent variable and the yields on the alternative bonds) as changes in demand will vary not with the absolute level of the rate of interest but with the deviations of the yields from some accepted "normal" structure of rates. Use of differentials will also allow us more easily to include more than one bond rate in one equation as this will eliminate the collinearity that would exist between the absolute rates.

---

Just as a consumer is constrained by his budget constraint, so will a wealth-holder. As the wealth-holders that we are considering are all financial intermediaries, the equivalent constraint will be total liabilities, or in view of the fact that the calculations are made by assuming the changes in the holdings of a bond to be the "demand" for that bond, the relevant constraint in the equations will be the change in the total liabilities of a particular financial institution. At least two other constraints will have to be included in the equations. First we must abstract from the supply conditions because some of the changes in the yields of a bond are undoubtedly the result of changes in the supply of that bond. Also, especially in the case of a financial intermediary that has a legal limitation -- or a self imposed limitation -- on the amount, or proportion, of a particular kind of bond that it holds, the amount of the bond that the institution already holds must be included.

The general form of the demand equations will thus be:

$$\Delta A^j = b_0 + b_1(i_b-i_a) + \ldots + b_{n-2}L^j + b_{n-1}A^j_{t} + b_nA^j_{t} - 1.$$ 

where,
\( \Delta A^j \) = the change in the holdings of security A by intermediary J;

\( i_a, i_b, \ldots \) = rates of interest (yields) on securities A, B, \ldots;

\( \Delta L^j \) = change in total liabilities of intermediary J;

\( \tilde{A} \) = the supply of security A;

\( A^j_{t-1} \) = the lagged holdings of security A by intermediary J.

If estimation of such an equation yields a value for \( b_1 \) which is negative and significant, then intermediary J is revealed as treating securities A and B as substitutes in its portfolio, because \( b_1 \) may be interpreted as, in this case, \( \frac{\partial q_a}{\partial i_b} \), which is the rate of change in demand for security A by intermediary J as the yield in security B changes.

As these equations are using interest rate differentials instead of the absolute level of the interest rates, there is one other restriction that must be placed on them. The coefficients of the differentials will also give an implicit coefficient for the own interest rate of each bond. These implicit coefficients must be positive (so that the demand for each bond varies inversely with its price); otherwise the equations will be violating the axiom of rationality
that demand equations slope downwards to the right. Thus, if an equation includes

\[ \ldots + b_1 (i_b - i_a) + b_2 (i_c - i_a) + b_3 (i_d - i_a) + \ldots, \]

then, remembering that the $i_a$'s appear with a negative sign, $b_1 + b_2 + b_3$ must be negative, so that the coefficient of $i_a$ is positive.

In doing the empirical work it was also necessary to decide what level of significance would be accepted as evidence that a coefficient was negative or positive. Following Silber\textsuperscript{7}, a significance level signified by a $t$-ratio of one was used, though some of the equations yielded much more significant results. In many cases, however, $t$-ratios as low as one (and in the case of corporate debt equations, even lower) were taken as evidence that the signs on the coefficients were correctly stated. Without this admittedly low criterion, demands for many of the bonds would be recorded as being independent of interest rates on other bonds.

\textsuperscript{7}Silber, W. L., \textit{op. cit.}
**Empirical Results:**

**Key:**

Superscript $j$ = the variable refers to chartered banks;

Superscript $l$ = the variable refers to life insurance companies\(^8\);

Superscript $m$ = the variable refers to mortgage loan companies;

Superscript $t$ = the variable refers to trust companies;

$r_3$ = the interest rate on long-term federal government bonds;

$r_7$ = interest rate on long-term provincial government bonds;

$r_6$ = interest rate on long-term municipal government bonds;

$r_4$ = interest rate on long-term corporate bonds;

$r_1$ = Bank of Canada rediscount rate;

$\Delta L$ = change in liabilities of wealth-owner;

$\Delta A$ = change in holdings (demand) of long-term federal government bonds by wealth-owner;

$\Delta B$ = change in holdings (demand) of long-term provincial government bonds by wealth-owner;

---

\(^8\) The life insurance companies are the 12 companies whose net premium income in Canada in 1964 was 73.7% of the total for all federal companies recorded by the Bank of Canada Statistical Summary. These series end in June 1965 as the Bank of Canada switched to consideration on 16 companies on that date.
\[ \Delta C = \text{change in holdings (demand) of long-term municipal government bonds by wealth-owner}; \]
\[ \Delta D = \text{change in holdings (demand) of long-term corporate bonds by wealth-owner}; \]
\[ A_t - 1 = \text{holdings of long-term federal government bonds by the wealth-owner lagged one period}; \]
\[ B_t - 1 = \text{holdings of long-term provincial government bonds by the wealth-owner lagged one period}; \]
Demand equations for long-term federal government bonds:

$$\Delta A^j = 480.13 S_1 + 418.31 S_2 + 408.87 S_3 + 422.30 S_4$$

\[ (117.40) \quad (116.30) \quad (115.30) \quad (116.39) \]
\[ 4.09 \quad 3.60 \quad 3.55 \quad 3.63 \]

$$+ 130.72 (r_7 - r_3) - 230.62 (r_6 - r_3) + 70.89 (r_4 - r_3)$$

\[ (101.19) \quad (86.10) \quad (66.47) \]
\[ 1.29 \quad -2.68 \quad 1.07 \]

$$+ 0.066 \Delta L^j + 0.048 \bar{A} - 0.17 \hat{A}^j$$

\[ (0.020) \quad (0.017) \quad (0.044) \]
\[ 3.32 \quad 2.81 \quad -3.85 \]

$$R^2 = 0.34513 \quad \text{d.w.} = 1.7300 \quad \hat{\rho} = 0.4828$$

$$\Delta A^1 = -25.86 - 17.63 (r_7 - r_3) + 44.87 (r_6 - r_3)$$

\[ (27.89) \quad (19.79) \quad (14.82) \]
\[ -0.93 \quad -0.89 \quad 3.03 \]

$$- 31.28 (r_4 - r_3) + 0.0088 \bar{A}^1 - 1 + 0.21 \Delta L^1$$

\[ (14.42) \quad (0.044) \quad (0.12) \]
\[ -2.17 \quad 0.20 \quad 1.77 \]

$$- 0.0095 \bar{A}.$$

\[ (0.0046) \]
\[ -2.09 \]

$$R^2 = 0.18690 \quad \text{d.w.} = 1.7489$$

$$\Delta A^m = 78.90 S_1 + 75.57 S_2 + 76.67 S_3 + 72.15 S_4$$

\[ (22.60) \quad (21.86) \quad (23.15) \quad (22.52) \]
\[ 3.49 \quad 3.46 \quad 3.31 \quad 3.20 \]

$$+ 65.38 (r_7 - r_3) - 112.30 (r_6 - r_3) + 38.01 (r_4 - r_3)$$

\[ (36.85) \quad (36.70) \quad (19.05) \]
\[ 1.77 \quad -3.06 \quad 2.00 \]
\[-0.53A_t^m - 1 + 0.045\Delta L_t^m + 0.0034A_t\]

\[
\begin{array}{ccc}
(0.13) & (0.035) & (0.014) \\
-4.05 & 1.29 & 0.25 \\
\end{array}
\]

\[R^2 = 0.61693 \quad \text{d.w.} = 1.8348\]

\[\Delta A_t^t = -41.79 + 128.96(r_7 - r_3) - 147.15(r_6 - r_3)\]

\[
\begin{array}{ccc}
(88.78) & (95.32) & (94.80) \\
-0.47 & 1.35 & -1.55 \\
\end{array}
\]

\[+ 31.60(r_4 - r_3) + 25.92r_3 - 0.24A_t^t - 1\]

\[
\begin{array}{ccc}
(53.85) & (21.28) & (0.14) \\
0.59 & 1.22 & -1.70 \\
\end{array}
\]

\[+ 0.1\Delta L_t + 0.0091A_t\]

\[
\begin{array}{ccc}
(0.042) & (0.011) & \\
2.37 & 0.79 & \\
\end{array}
\]

\[R^2 = 0.43913 \quad \text{d.w.} = 2.3493\]

**Demand equations for long-term provincial government bonds:**

\[\Delta B_t^j = 22.88S_{11} + 19.87S_2 + 16.05S_3 + 17.78S_4\]

\[
\begin{array}{ccc}
(23.01) & (23.49) & (22.64) \\
0.99 & 0.85 & 0.71 \\
\end{array}
\]

\[+ 10.22(r_3 - r_7) - 16.19(r_4 - r_7) + 2.81(r_7 - r_1)\]

\[
\begin{array}{ccc}
(10.18) & (14.85) & (2.09) \\
1.00 & -1.09 & 1.34 \\
\end{array}
\]

\[-0.058B_{t-1}^j - 0.0012\Delta L_t^j + 0.036\bar{B}\]

\[
\begin{array}{ccc}
(0.054) & (0.0060) & (0.031) \\
-1.08 & -0.20 & 1.15 \\
\end{array}
\]

\[R^2 = 0.12722 \quad \text{d.w.} = 2.1019\]
(a) $\Delta B^1 = 18.06 S_1 + 13.01 S_2 + 15.09 S_3 + 17.03 S_4$

<table>
<thead>
<tr>
<th>$r_i$</th>
<th>$r_j$</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.60</td>
<td>8.38</td>
<td>(8.36)</td>
</tr>
<tr>
<td>2.10</td>
<td>1.55</td>
<td>1.81</td>
</tr>
</tbody>
</table>

$- 1.05 (r_3 - r_7) - 10.07 (r_6 - r_7) - 3.03 (r_4 - r_7)$

<table>
<thead>
<tr>
<th>$r_i$</th>
<th>$r_j$</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.92</td>
<td>9.38</td>
<td>(7.04)</td>
</tr>
<tr>
<td>-0.21</td>
<td>-1.07</td>
<td>-0.43</td>
</tr>
</tbody>
</table>

$- 0.025 B^1_t - 1 + 0.010 \Delta L^1 + 0.084 \bar{B}$

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Coefficient</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.011</td>
<td>0.062</td>
<td>0.013</td>
</tr>
<tr>
<td>2.29</td>
<td>0.17</td>
<td>6.53</td>
</tr>
</tbody>
</table>

$R^2 = 0.47991$  
d.w. = 1.6578

(b) $\Delta B^1 = 18.63 S_1 + 13.52 S_2 + 15.58 S_3 + 17.55 S_4$

<table>
<thead>
<tr>
<th>$r_i$</th>
<th>$r_j$</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.12</td>
<td>7.97</td>
<td>(7.98)</td>
</tr>
<tr>
<td>2.30</td>
<td>1.70</td>
<td>1.95</td>
</tr>
</tbody>
</table>

$- 9.91 (r_6 - r_7) - 3.38 (r_4 - r_7) - 0.025 B^1_t - 1$

<table>
<thead>
<tr>
<th>$r_i$</th>
<th>$r_j$</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.29</td>
<td>6.80</td>
<td>(0.011)</td>
</tr>
<tr>
<td>-1.07</td>
<td>-0.50</td>
<td>-2.31</td>
</tr>
</tbody>
</table>

$+ 0.0079 \Delta L^1 + 0.085 \bar{B}$

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.060</td>
<td>0.013</td>
</tr>
<tr>
<td>0.13</td>
<td>6.68</td>
</tr>
</tbody>
</table>

$R^2 = 0.47956$  
d.w. = 1.6538

(c) $\Delta B^1 = 12.25 - 3.28 (r_3 - r_7) - 6.36 (r_6 - r_7)$

<table>
<thead>
<tr>
<th>$r_i$</th>
<th>$r_j$</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.62</td>
<td>4.99</td>
<td>(9.66)</td>
</tr>
<tr>
<td>1.42</td>
<td>-0.66</td>
<td>-0.66</td>
</tr>
</tbody>
</table>

$- 8.67 (r_4 - r_7) - 0.026 B^1_t - 1 + 0.051 \Delta L^1$

<table>
<thead>
<tr>
<th>$r_i$</th>
<th>$r_j$</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.85</td>
<td>0.011</td>
<td>(0.059)</td>
</tr>
<tr>
<td>-1.27</td>
<td>-2.31</td>
<td>0.86</td>
</tr>
</tbody>
</table>

$+ 0.077 \bar{B}$

<table>
<thead>
<tr>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.91</td>
</tr>
</tbody>
</table>

$R^2 = 0.41192$  
d.w. = 1.5866
$$\Delta B^m = 6.11 + 3.47(r_4 - r_7) - 6.56(r_6 - r_7) - 0.15B_t^m - 1$$

\[
\begin{array}{ccc}
(3.55) & (3.56) & (6.39) \\
1.72 & 0.97 & -1.03 \\
(0.010) & (0.0043) & -2.14 \\
1.61 & 0.29 & \\
\end{array}
\]

\[R^2 = 0.16606 \quad d.w. = 2.3943\]

$$\Delta B^t = 34.99S_1 + 49.80S_2 + 51.98S_3 + 61.21S_4$$

\[
\begin{array}{ccc}
(18.50) & (18.16) & (19.08) \\
1.89 & 2.74 & 2.72 \\
(18.26) & & 3.35 \\
\end{array}
\]

\[-76.97(r_6 - r_7) + 57.56(r_4 - r_7) - 0.32B_t^t - 1\]

\[
\begin{array}{ccc}
(30.42) & (17.59) & (0.084) \\
-2.53 & 3.27 & -3.77 \\
\end{array}
\]

\[+ 0.12\Delta L^t + 0.029B\]

\[
\begin{array}{ccc}
(0.034) & (0.020) & \\
3.50 & 1.44 & \\
\end{array}
\]

\[R^2 = 0.58703 \quad d.w. = 2.8032\]

**Demand equations for Corporate Bonds:**

$$\Delta B_j^m = 23.62S_1 + 23.62S_2 + 24.23S_3 + 22.68S_4$$

\[
\begin{array}{ccc}
(17.83) & (17.71) & (17.96) \\
1.32 & 1.33 & 1.35 \\
(18.17) & & 1.25 \\
\end{array}
\]

\[-6.29(r_7 - r_4) - 6.87(r_6 - r_4) + 1.76r_4\]

\[
\begin{array}{ccc}
(12.09) & (7.93) & (2.73) \\
-0.52 & -0.87 & 0.65 \\
\end{array}
\]
\[ + 0.0050 \Delta L^i + 0.0079 \bar{D} - 0.068 \bar{D}_t - 1. \]

\[
\begin{array}{ccc}
0.0032 & (0.022) & (0.034) \\
1.55 & 0.36 & -1.99
\end{array}
\]

\[ R^2 = 0.13118 \quad \text{d.w.} = 2.3642 \]

\[ \Delta D^1 = 34.62 S_1 + 20.83 S_2 + 23.71 S_3 + 24.66 S_4 \]

\[
\begin{array}{cccc}
17.21 & 16.75 & 17.07 & 17.03 \\
2.01 & 1.24 & 1.39 & 1.45
\end{array}
\]

\[ + 10.23 (r_7 - r_4) - 32.42 (r_6 - r_4) - 0.026 \bar{D}_t - 1 \]

\[
\begin{array}{ccc}
13.61 & (11.33) & (0.011) \\
0.75 & -2.86 & -2.34
\end{array}
\]

\[ + 0.20 \bar{D} + 0.24 \Delta L^1. \]

\[
\begin{array}{cc}
0.034 & (0.097) \\
5.94 & 2.50
\end{array}
\]

\[ R^2 = 0.62833 \quad \text{d.w.} = 1.9713 \]

\[ \Delta D^m = 4.92 S_1 + 5.19 S_2 + 4.68 S_3 + 5.48 S_4 + 2.81 (r_3 - r_4) \]

\[
\begin{array}{cccc}
5.01 & (4.76) & (0.93) & (1.15) & (4.95) \\
0.98 & 1.09 & 0.93 & 1.15 & 0.57
\end{array}
\]

\[ + 3.38 (r_7 - r_4) - 7.67 (r_6 - r_4) - 0.14 \bar{D}_t - 1 \]

\[
\begin{array}{cc}
7.99 & (10.13) & (4.95) \\
0.42 & -0.74 & -1.12
\end{array}
\]

\[ + 0.024 \Delta L^m - 0.0061 \bar{D}. \]

\[
\begin{array}{cc}
0.012 & (0.0080) \\
2.00 & -0.76
\end{array}
\]

\[ R^2 = 0.39577 \quad \text{d.w.} = 2.5728. \]
\[ \Delta D^t = 52.20S_1 + 34.29S_2 + 39.60S_3 + 26.62S_4 \]
\[ (29.29) (24.24) (24.67) (24.18) \]
\[ 1.78 \quad 1.41 \quad 1.61 \quad 1.10 \]
\[ + 22.92(r_3 - r_4) - 49.56(r_6 - r_4) - 0.088D^t - 1 \]
\[ (23.50) \quad (53.46) \quad (0.084) \]
\[ 0.98 \quad -0.93 \quad -1.05 \]
\[ - 0.057 \Delta L^t + 0.053D \]
\[ (0.069) \quad (0.042) \]
\[ -0.83 \quad 1.26 \]
\[ R^2 = 0.47399 \quad d.w. = 2.5834. \]

**Demand equations for long-term municipal government bonds:**

It was found impossible to obtain demand equations for municipal bonds which were consistent with the rationality axiom. Any attempt to estimate an equation yielded a negative coefficient for municipal bonds' own interest rate. Such an equation cannot be accepted as the demand curve would be sloping upwards to the right with the price. This result is comparable with that of Silber's experience in the United States where the interest rate coefficients in the State and Local bond equations were never significant and the own rate of interest always entered with a negative sign.9

9 See Silber, W.L., op. cit., p. 66.
Silber did, however, manage to get a positive sign for the municipal own rate of interest in the case of commercial banks when using only the differential between the municipal rate and the discount rate. This was not the case with the Canadian data, as the sign was always negative.

**Special peculiarities of some of the equations:**

In general, the equations were established on the double criterion of a positive coefficient for the own rate of the bond being estimated and a significance level shown by a t-ratio of at least one for the coefficients of the differentials. However, it will be seen that sometimes the significance level criterion was violated. This was in order to keep the important positive sign of the own rate of interest. For example, in the equation of the Life Insurance Companies' demand for long-term federal bonds, the differential between the federal rate and the provincial rate is included despite its low significance. Without this differential it was impossible to keep the positive sign for the own rate of interest.

The significance level of the interest rate differentials in all the demand equations for long-term corporate
bonds is very low. The equations do, however, yield a positive sign for the corporate rate and, as will be discussed below, are all consistent between different wealth-owners.

In some cases it was only possible to get a positive coefficient for the own rate if the absolute rate itself was included, and in one case (the demand for long-term provincial bonds by chartered banks) the differential with the discount rate had to be used.

In the case of the Life Insurance Companies' demand for provincial bonds, three different equations are shown. In all cases the coefficient of the provincial bond rate is positive and the sign of the interest rate differentials is always negative, but the significance levels are different. If seasonal variations are included in the equations, only the municipal-provincial differential is significant, but if no seasonal variations are included, only the corporate-provincial differential is significant and the federal-provincial and municipal-provincial differentials are equally significant. As is discussed below, none of these equations is consistent with those of the other wealth-owners.
Results:

We now have twelve equations -- three for each of the four wealth-owners under consideration -- which have to be interpreted in terms of the proposed models.

The equations give the following results:

<table>
<thead>
<tr>
<th>Bond</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>J(1)</td>
<td>*</td>
<td>C</td>
<td>S</td>
<td>C</td>
</tr>
<tr>
<td>J(2)</td>
<td>C</td>
<td>*</td>
<td>?</td>
<td>S</td>
</tr>
<tr>
<td>J(3)</td>
<td>?</td>
<td>S</td>
<td>S</td>
<td>*</td>
</tr>
<tr>
<td>L(1)</td>
<td>*</td>
<td>S</td>
<td>C</td>
<td>S</td>
</tr>
<tr>
<td>L(2)</td>
<td>S</td>
<td>*</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>L(3)</td>
<td>?</td>
<td>C</td>
<td>S</td>
<td>*</td>
</tr>
<tr>
<td>M(1)</td>
<td>*</td>
<td>C</td>
<td>S</td>
<td>C</td>
</tr>
<tr>
<td>M(2)</td>
<td>?</td>
<td>*</td>
<td>S</td>
<td>C</td>
</tr>
<tr>
<td>M(3)</td>
<td>C</td>
<td>C</td>
<td>S</td>
<td>*</td>
</tr>
<tr>
<td>T(1)</td>
<td>*</td>
<td>C</td>
<td>S</td>
<td>C</td>
</tr>
<tr>
<td>T(2)</td>
<td>?</td>
<td>*</td>
<td>S</td>
<td>C</td>
</tr>
<tr>
<td>T(3)</td>
<td>C</td>
<td>?</td>
<td>S</td>
<td>*</td>
</tr>
</tbody>
</table>

Key:

- J = Chartered Banks;
- L = Life Insurance Companies;
- M = Mortgage Loan Companies;
- T = Trust Companies;
- A = Long-term federal bonds;
- B = Long-term provincial bonds;
- C = long-term municipal bonds;
- D = Long-term corporate bonds.

Table 4-1.
Table 4 - 1 should be read horizontally. The asterisk represents the bond whose demand equation is being estimated. A "C" in the table means that the demand equation reveals that the wealth-owner considers the bond listed at the head of that column a complement for the bond being estimated. An "S" in the table means that the bond is considered a substitute, whilst a question mark means that the estimated equation does not indicate either a complement or a substitute.

The question now arises: what arrangement of complements and substitutes would reveal a behavior consistent with any of the outcomes? If Tobin's assumptions are correct\(^\text{10}\), then the wealth-owner should reveal the following pattern:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>*</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>2</td>
<td>C</td>
<td>*</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>S</td>
<td>S</td>
<td>*</td>
</tr>
</tbody>
</table>

The first equation means that provincial, municipal and corporate bonds are all considered complements for federal

\(^{10}\) It should be noted that there is actually only one model, but different assumptions regarding substitutability are made. I am grateful to Professor Tobin for emphasizing this point (personal correspondence).
bonds. Thus the second equation reveals the same complementarity between federal bonds and provincial bonds, but substitutability of municipal and corporate bonds for provincial bonds. The third equation reveals the complementarity between corporate and federal bonds as was revealed in the first equation, and substitutability of provincial and municipal bonds for corporate bonds. The five C's in the table will necessarily have to be there for consistency between the different equations of the same wealth-owner, but it is questionable whether the four cases of substitution are really necessary. There are many other assets in the system apart from the bonds mentioned, so it is possible, within the very complex ideas of substitutes and complements that wealth-owners have, for the two complements of a third asset not to be substitutes for each other.\textsuperscript{11} Thus the necessary entries in the table that justify Tobin's assumptions are that the first column and the first row consist (apart from the asterisk) of complements.

If, on the other hand, Keare and Silber's assumptions are correct the pattern should be as follows:

\textsuperscript{11} Consider, for example, sugar and cream as complements of coffee. It is not necessary that sugar and cream be considered substitutes in all other uses.
Here federal, provincial, municipal and corporate bonds are all considered good substitutes for each other.

All the other possible behavioral patterns of wealth-owners will reveal a similar table. For example, the case where provincial and corporate debt are considered complements of federal debt but municipal debt is a substitute for federal debt, the table is as follows:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>*</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>2</td>
<td>S</td>
<td>*</td>
<td>S</td>
</tr>
<tr>
<td>3</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
</tbody>
</table>

The proviso exists in all cases that the entries in the first row and the first column are required for a consistent solution, but the other entries are more flexible.

It is, of course, possible that different wealth-owners consider the same assets in a different way. The fact that Chartered Banks might consider two bonds as substitutes does not preclude, say, the Life Insurance Companies from con-
Considering them as complements. This means that the "aggregate" outcome will be more complex than any of the "pure" models would predict, but it is highly likely that this is the case.

Allowing for a certain amount of flexibility for the entries that are not in the first row or the first column, the results found in this chapter suggest that the Chartered Banks, the Mortgage Loan Companies and the Trust Companies consider provincial and corporate bonds as complements for federal debt and municipal bonds as substitutes for federal debt, while the Life Insurance Companies consider the opposite to be the case. This will mean that if the Chartered Bank-Mortgage Loan-Trust Company attitude can prevail in the market over the Life Insurance Company attitude, then the yields on corporate bonds and provincial bonds will move with the supply price of capital (as Tobin's "private debt" does) and municipal bond yields will move with the yield on federal debt (as Keare and Silber's "private debt" does). If the Life Insurance Company attitude prevails over the Chartered Bank-Mortgage Loan-Trust Company attitude in the market, the opposite will be the case. However, it seems likely that the conclusions regarding the municipal debt should not be
included in the findings for serious consideration, as the statistical problems involved in the municipal data are at present insurmountable. This stems from the fact that only the bonds of ten of the largest municipalities are included when the municipal bond yield is calculated, but the total amounts of all municipal bonds are included in the portfolio figures.

Leaving out the municipal data, the results for Chartered Banks, Mortgage Loan Companies and Trust Companies are consistent with Tobin's assumptions, but the results for the Life Insurance Companies are consistent with the assumptions of Keare and Silber.

With different wealth-owners behaving in different ways, it becomes significant to ask which wealth-owners hold the largest proportion of the local debt. These statistics are as follows:

<table>
<thead>
<tr>
<th>Holdings of Provincial bonds as of Dec. 31 (millions of dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Chartered Banks</td>
</tr>
<tr>
<td>Life Insurance Cos.</td>
</tr>
<tr>
<td>Trust &amp; Mortgage Cos.</td>
</tr>
<tr>
<td>Total resident</td>
</tr>
</tbody>
</table>
Holdings of Municipal bonds as of Dec. 31 (millions of dollars)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chartered banks</td>
<td>168</td>
<td>195</td>
<td>204</td>
<td>208</td>
<td>231</td>
<td>250</td>
<td>287</td>
<td>307</td>
<td>331</td>
</tr>
<tr>
<td>Life Insurance Cos.</td>
<td>427</td>
<td>456</td>
<td>507</td>
<td>547</td>
<td>601</td>
<td>626</td>
<td>676</td>
<td>727</td>
<td>722</td>
</tr>
<tr>
<td>Trust &amp; Mortge.Cos.</td>
<td>47</td>
<td>56</td>
<td>54</td>
<td>70</td>
<td>90</td>
<td>102</td>
<td>122</td>
<td>149</td>
<td>136</td>
</tr>
<tr>
<td>Total resident</td>
<td>2052</td>
<td>2283</td>
<td>2458</td>
<td>2716</td>
<td>3022</td>
<td>3208</td>
<td>3595</td>
<td>3915</td>
<td>4123</td>
</tr>
</tbody>
</table>

Source: Bank of Canada, Statistical Summary, relevant years.

Table 4 - 2.

Two facts become immediately apparent: (1) the proportion of local debt held by these four institutions is not very high, and (2) the Life Insurance Companies have grown rapidly in their influence over the last ten years. This means that to draw firm conclusions regarding the influence of local debt on monetary policy a model of the entire financial markets of Canada is necessary, but unfortunately the portfolio changes for the other holders of the debt are only available on an annual basis, which does not allow analysis of portfolio changes as interest rate differentials change.

From the available statistics presented here, it can only be said that the influence of the Life Insurance Companies on the markets for local debt has increased -- which
is a move towards the Keare and Silber conclusion. However, the Trust Companies and the Mortgage Loan Companies have expanded at a similar rate, so it cannot as yet be stated whether the Tobin assumptions or the Keare and Silber assumptions predominate in the financial market as a whole. Only the complete model of the financial markets would allow of this conclusion.
CHAPTER 5
CONCLUSIONS

This study has attempted to do two things: (1) to find the effect of federal monetary policy on debt issuing by the provinces and municipalities; and (2) to find out if the existence of this debt affects credit conditions and hence if changes in the amount of debt issued by local governments affect the efficacy of federal monetary policy.

It was found that the total expenditure of the local governments appeared to be little affected by monetary policy. The amounts of expenditure were what the local governments considered to be socially desirable and hence the main determinants of the expenditure were political rather than economic. Total local government revenues have had to expand along with these expenditures, but the proportion of the revenue raised by taxes has varied somewhat with monetary indicators. To a large extent, taxes are hard to change (at least in the upward direction) for purely political reasons, but despite this constraint local governments have been able to move in favor of taxation when credit is expensive and to move in
favor of borrowing when credit becomes cheaper. The municipalities -- despite their increasing deficits -- have shown some skill in adapting their indirect taxes so that in times of high interest rates they have moved away from borrowing. Once the local government deficits have been decided upon, the financial officials of the local governments (or their investment dealers) have been adept at timing the actual bond issues so as to take advantage of interest rate fluctuations throughout the period when the deficits had to be financed.

The financial model developed revealed that the direction of the effect of debt issuing by the local governments depended to a large extent on whether wealth-owners considered the local government bonds they held as better substitutes for federal bonds and money or for capital equity, but in either case there would be an effect as wealth-owners made substitutions in their portfolios. The behavior of Chartered Banks, Life Insurance Companies, Mortgage Loan Companies and Trust Companies were investigated, and, as far as the data allowed, it was found that Life Insurance Companies considered at least provincial debt as a substitute for federal debt, while the other three wealth-owners treated it as a
complement. For municipal debt, firm conclusions could not be reached because of the statistical problem of using the only interest rate available (i.e., the average yield of ten of the largest municipalities' bond issues) together with the amounts of all the municipal debt issued.

Because of the strong wealth effects of increases in money and short-term federal debt, there can be no doubt as to the direction of the effects of monetary policy, but whether wealth-owners consider local debt as a substitute for long-term federal debt or for equity can change the effects of changes in long-term federal debt and local debt and thus also on some debt management. If the Chartered Bank-Mortgage Loan-Trust Company attitude should prevail in the markets, increases in long-term federal debt will tend to be unambiguously expansionary while increases in local debt will tend to be contractionary, but if the attitude of the Life Insurance Companies should prevail in the markets, the effects will tend to be ambiguous in both cases -- the final expansionary or contractionary effects depending on whether price effects or wealth effects are stronger.

Owing to the fact that the wealth-owners who hold most of the local debt do not publish their portfolio changes in
monthly or quarterly form, the conclusions reached for the four wealth-owners in this study cannot be extended to account for the total changes in the economy. The actual effects of portfolio changes can only be reached with any degree of accuracy when a complete model of financial markets has been developed. Without a fully developed model of the financial markets, the best we can do is to try to decide which attitude seems to have prevailed from past experiences of interest rate changes in a very general way.

As was stated in the Introduction to this study, the Royal Commission on Banking and Finance found that the yield differential between provincial and federal bonds (and as municipal bond yields followed closely the pattern of provincial bond yields, the differential between municipal and federal bond rates) tended

"...to widen in years of rising interest rates and in years when provincial borrowing was growing while the federal government was paying off debt."\(^1\)

This finding is consistent with the results that would be obtained if the attitude that local government debt was a

\(^1\) The Royal Commission on Banking and Finance, Report (Queen's Printer, Ottawa, 1964), p. 61.
substitute for equity were to prevail in the markets. If the Keare and Silber assumptions of substitutability (which appear to be the attitude of the Life Insurance Companies) had prevailed in the markets, it would be expected that these yields would move together regardless of whether interest rates were high or low, or whether the local governments were expanding their debt or not, but if Tobin's assumptions prevail (which seem to be evidenced by the behavior of the Chartered Banks, the Mortgage Loan Companies and the Trust Companies), one would expect the Royal Commission's finding to exist. However, this can hardly be taken as firm evidence that Tobin's assumptions are in fact the predominant attitude in the Canadian system. Until a complete model of the financial markets in Canada exists, the best we can do is to say which way individual wealth-owners behave.
APPENDIX 1.

THE PERVERSITY HYPOTHESIS

The so-called "Perversity Hypothesis" was popularized by Alvin Hansen and Harvey Perloff\(^1\), and as Robert W. Rafuse, Jr., has pointed out\(^2\), their position is amply demonstrated by the following paragraph:

"The taxing, borrowing, and spending activities of the state and local governments collectively have typically run counter to an economically sound fiscal policy. These governmental units have usually followed the swings of the business cycle, from crest to trough, spending and building in prosperity periods and contracting their activities during depression. In the boom of the late twenties, they added to the disposable income of the community, and bid up prices and building costs in large-scale construction activities. In the depressed thirties, the fiscal policies of these governments exerted a deflationary rather than an expansionary effect on the economy: expenditures, and especially construction outlays, were severely

---

\(^1\) State and Local Finance in the National Economy by Alvin Hansen and Harvey Perloff (Norton, 1944).

reduced, borrowing was restricted, and taxes weighing on consumption were substantially increased."

Since the publication of Hansen and Perloff's hypothesis (1944), a whole literature has developed on the subject. Journal articles published in the last decade have generally criticized the hypothesis, while larger volumes usually mentioning the subject in passing seem generally to have given the hypothesis a favorable mention. A notable exception to

3 Hansen and Perloff, op. cit., p 49.


this has been the work of Professor Paul E. Smith, who, by using a dynamic model of the U. S. economy, has shown that state and local government expenditures add greatly to the instability of the system.

Hansen and Perloff came to the conclusion that state and municipal governments in the United States should actively pursue countercyclical policies. Those who agree with the hypothesis generally agree with the policy conclusion and those who disagree with the hypothesis obviously see no need for the policy conclusion. Despite the fact that Saskatchewan, Nova Scotia and New Brunswick are committed to countercyclical budgeting, the Royal Commission on Taxation, in their rejection of the perversity hypothesis for the Canadian case, came to the conclusion that such policies were not necessary.

Theoretically the perversity hypothesis stems from logical reasoning — all as applicable to Canada as it is to the United States:


9 The following seven reasons are those given by Rafuse, op. cit., pp. 65-66.
(1) Statutory restrictions on local government budgets impair the ability of the local governments to pursue countercyclical policies;

(2) Local government revenues are generally less income-elastic than their expenditures, which is detrimental to automatic stability;

(3) The "openness" of the local governments' jurisdiction means that they will have little interest in stabilizing activity;

(4) Local governments do not have the federal government's ability to obtain credit;

(5) Intergovernmental competition often prevents local governments from changing tax rates\(^9\);

(6) Earmarking revenues for particular expenditures reduces budget flexibility;

(7) The sheer number of governmental units precludes a concerted effort at stability.

---

\(^9\) Evidence of this was found in Canada by A. W. Johnson and J. M. Andrews, *op. cit.*, pp. 20-27.
APPENDIX 2
REFERENCE CYCLE PATTERNS

The procedure used to derive "reference cycle patterns" is summarized in the following quotation from the National Bureau of Economic Research's "Business Cycle Indicators" edited by Geoffrey H. Moore (N.B.E.R., 1961), page 194:

"First the monthly seasonally adjusted series is divided into so-called reference cycle segments—the intervals between successive reference troughs. Next we compute the average standing of the series during each segment, and express the monthly figures as percentages of this base. These percentages are called "reference cycle relatives". This step reduces the original data for every series to a common unit, so that series expressed in diverse units may be compared. The third step is to compute a nine-point pattern for each reference cycle segment by breaking the segment into nine stages and computing the average of the relatives for each stage. Stage I covers the three months centered on the initial trough, stage V the three months centered on the peak, and stage IX the three months centered on the terminal trough. Stages II, III and IV cover successive thirds of the length of the expansion, and stages VI, VII and VIII successive thirds of the contraction.

Finally, the nine-point patterns for a series may be averaged over as many cycles as the series covers, or any subset."
Obviously this procedure involves the problem of deciding on acceptable "reference dates". These are the dates of the peaks and troughs of the post-war business cycles in Canada. Unfortunately, these peaks and troughs do not refer to any known time series -- such as gross national product -- but to the "general level of economic activity", about which there will, of course, be much difference of opinion. The dates used in this study will at least have the advantage of having been used in Canada before. They are those used by Robert M. Will in his study for the Royal Commission on Banking and Finance. These dates are given below:

<table>
<thead>
<tr>
<th>Initial Trough</th>
<th>Peak</th>
<th>Terminal Trough</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sept. '49</td>
<td>May '53</td>
<td>June '54</td>
</tr>
<tr>
<td>June '54</td>
<td>Apr. '57</td>
<td>Apr. '58</td>
</tr>
<tr>
<td>Apr. '58</td>
<td>Jan. '60</td>
<td>Mar. '61</td>
</tr>
</tbody>
</table>

APPENDIX 3

EQUATIONS OF LOCAL GOVERNMENT RESPONSES TO FEDERAL MONETARY POLICY

\[ E = \text{Provincial plus municipal total expenditure, monthly.} \]

\[ E_p = \text{Provincial total expenditure, annually.} \]

\[ E_m = \text{Municipal total expenditure, annually.} \]

\[ G = \text{Provincial plus municipal expenditure on goods and services, monthly.} \]

\[ G_p = \text{Provincial expenditure on goods and services, annually.} \]

\[ G_m = \text{Municipal expenditure on goods and services, annually.} \]

\[ T = \text{Provincial plus municipal transfer payments, monthly.} \]

\[ T_p = \text{Provincial transfer payments, annually.} \]

\[ T_m = \text{Municipal transfer payments, annually.} \]

\[ S = \text{Provincial subsidies, monthly.} \]

\[ S_p = \text{Provincial subsidies, annually.} \]

\[ I = \text{Provincial plus municipal interest on the debt, monthly.} \]

\[ I_p = \text{Provincial interest on the debt, annually.} \]

\[ I_m = \text{Municipal interest on the debt, annually.} \]

\[ r = \text{Rate of interest on long-term federal government bonds.} \]
\[ r_m = \text{Rate of interest on long-term federal government bonds at the time of the "budget decision", i.e., the last half of the first quarter of the year.} \]

\[ \Delta \left( \frac{MS}{GNP} \right) = \text{Annual change in the money supply divided by the real gross national product.} \]

\[ S_1 = \text{Seasonal dummy variable for January - March.} \]

\[ S_2 = \text{Seasonal dummy variable for April - June.} \]

\[ S_3 = \text{Seasonal dummy variable for July - September.} \]

\[ S_4 = \text{Seasonal dummy variable for October - December.} \]

\[ t = \text{Trend factor} \]

\[ E = 89.84S_1 + 137.26S_2 + 293.07S_3 + 205.03S_4 \]

\[ (188.83) \quad (188.02) \quad (193.13) \quad (190.88) \]

\[ 0.48 \quad 0.73 \quad 1.53 \quad 1.07 \]

\[ + 33.59t - 30.10r \]

\[ (2.65) \quad (49.74) \]

\[ 12.68 \quad -0.61 \]

\[ R^2 = 0.84336 \quad \text{d.w.} = 2.3556 \quad \hat{\rho} = 0.7134 \]

\[ G = -151.16S_1 - 123.76S_2 + 47.64S_3 - 37.63S_4 \]

\[ (164.20) \quad (163.90) \quad (167.44) \quad (165.60) \]

\[ -0.92 \quad -0.76 \quad 0.28 \quad -0.23 \]

\[ + 20.06t + 11.57r \]

\[ (2.27) \quad (51.33) \]

\[ 8.85 \quad 0.23 \]

\[ R^2 = 0.79832 \quad \text{d.w.} = 2.1517 \quad \hat{\rho} = 0.6653 \]
\[ T = -44.80S_1 - 87.76S_2 - 76.77S_3 - 83.31S_4 \]
\[ \begin{array}{cccc}
(70.18) & (70.05) & (70.66) & (70.38) \\
-0.64 & -1.25 & -1.09 & -1.21 \\
\end{array} \]
\[ + 9.54t - 18.86r \]
\[ \begin{array}{cc}
(1.19) & (14.09) \\
8.03 & -1.34 \\
\end{array} \]
\[ R^2 = 0.69736 \quad \text{d.w.} = 2.5822 \quad \hat{\rho} = 0.8819 \]

\[ S = 11.48S_1 - 13.17S_2 - 6.28S_3 - 10.85S_4 \]
\[ \begin{array}{cccc}
(6.17) & (6.17) & (6.36) & (6.31) \\
-1.86 & -2.13 & -0.99 & -1.72 \\
\end{array} \]
\[ + 0.22t + 1.75r \]
\[ \begin{array}{cc}
(0.07) & (1.87) \\
2.98 & 0.94 \\
\end{array} \]
\[ R^2 = 0.56950 \quad \text{d.w.} = 1.7205 \]

\[ I = -22.09S_1 + 1.78S_2 - 26.72S_3 + 1.75S_4 \]
\[ \begin{array}{cccc}
(17.42) & (17.38) & (17.63) & (17.51) \\
-1.27 & 0.10 & -1.52 & 0.10 \\
\end{array} \]
\[ + 2.15t - 1.91r \]
\[ \begin{array}{cc}
(0.28) & (4.44) \\
7.68 & -0.43 \\
\end{array} \]
\[ R^2 = 0.91566 \quad \text{d.w.} = 3.2865 \quad \hat{\rho} = 0.8286 \]

\[ G_m = -286.69 + 292.58t + 45.78r_m \]
\[ \begin{array}{ccc}
(58.29) & (20.47) & (50.10) \\
-4.92 & 14.29 & 0.91 \\
\end{array} \]
\[ R^2 = 0.93871 \quad \text{d.w.} = 0.7591 \quad \hat{\rho} = 0.8351 \]
\[ G_m = 270.98 + 245.14t - 0.046 \Delta \frac{MS}{GNP} \]
\[
\begin{array}{lll}
(111.45) & (11.07) & (0.24) \\
2.43 & 22.15 & -0.19
\end{array}
\]
\[ R^2 = 0.9762 \quad d.w. = 0.3499 \]

\[ G_p = -220.47 + 108.93t + 118.84\tau_m \]
\[
\begin{array}{lll}
(133.30) & (17.11) & (90.02) \\
-1.65 & 6.37 & 1.32
\end{array}
\]
\[ R^2 = 0.87085 \quad d.w. = 0.4865 \quad \rho = 0.5664 \]

\[ G_p = 98.09 + 148.83t - 0.019 \Delta \frac{MS}{GNP} \]
\[
\begin{array}{lll}
(92.91) & (15.94) & (0.15) \\
1.06 & 9.34 & -0.12
\end{array}
\]
\[ R^2 = 0.88886 \quad d.w. = 0.6080 \quad \rho = 0.4247 \]

\[ T_m = -5.81 + 5.30t + 3.41\tau_m \]
\[
\begin{array}{lll}
(6.93) & (0.80) & (4.42) \\
-0.84 & 6.60 & 0.77
\end{array}
\]
\[ R^2 = 0.87528 \quad d.w. = 1.8815 \quad \rho = 0.5288 \]

\[ T_m = 15.60 + 6.23t + 0.0080 \Delta \frac{MS}{GNP} \]
\[
\begin{array}{lll}
(5.05) & (0.50) & (0.011) \\
3.09 & 12.42 & 0.72
\end{array}
\]
\[ R^2 = 0.92780 \quad d.w. = 0.7536 \]

\[ T_p = -254.81 + 179.55t + 26.20\tau_m \]
\[
\begin{array}{lll}
(69.23) & (23.70) & (59.82) \\
-3.68 & 7.58 & 0.44
\end{array}
\]
\[ R^2 = 0.81207 \quad d.w. = 0.6659 \quad \rho = 0.8295 \]
\[ T = -248.29 + 146.81t - 0.044 \Delta \frac{MS}{GNP} \]
\[
\begin{array}{ccc}
(114.30) & (11.35) & (0.25) \\
-2.17 & 12.94 & -0.17 \\
\end{array}
\]
\[ R^2 = 0.93329 \quad d.w. = 0.3126 \]

\[ S_p = -39.62 + 3.03t + 10.80r_m \]
\[
\begin{array}{ccc}
(20.39) & (1.54) & (9.75) \\
-1.94 & 1.97 & 1.11 \\
\end{array}
\]
\[ R^2 = 0.64440 \quad d.w. = 0.8796 \quad \hat{\rho} = 0.3279 \]

\[ S_p = -21.49 + 5.27t + 0.00028 \Delta \frac{MS}{GNP} \]
\[
\begin{array}{ccc}
(9.30) & (0.92) & (0.020) \\
-2.31 & 5.71 & 0.013 \\
\end{array}
\]
\[ R^2 = 0.73104 \quad d.w. = 0.9780 \]

\[ I_m = -114.76 + 113.62t + 6.89r_m \]
\[
\begin{array}{ccc}
(26.15) & (22.83) & (4.88) \\
-4.39 & 4.98 & 1.41 \\
\end{array}
\]
\[ R^2 = 0.63504 \quad d.w. = 1.0778 \quad \hat{\rho} = 0.9856 \]

\[ I_m = -21.16 + 32.19t - 0.0046 \Delta \frac{MS}{GNP} \]
\[
\begin{array}{ccc}
(10.81) & (6.08) & (0.0075) \\
-1.96 & 5.30 & -0.61 \\
\end{array}
\]
\[ R^2 = 0.72409 \quad d.w. = 1.2468 \quad \hat{\rho} = 0.9021 \]

\[ I_p = -22.42 + 19.49t + 3.86r_m \]
\[
\begin{array}{ccc}
(9.09) & (2.82) & (7.95) \\
-2.47 & 6.92 & 0.49 \\
\end{array}
\]
\[ R^2 = 0.79091 \quad d.w. = 0.9779 \quad \hat{\rho} = 0.8078 \]
\[ I_p = -24.33 + 28.60t + 0.0058 \Delta \frac{MS}{GNP} \]

\[
\begin{array}{ccc}
(6.82) & (2.68) & (0.0068) \\
-3.57 & 10.66 & 0.86
\end{array}
\]

\[ R^2 = 0.91179 \quad \text{d.w.} = 0.6570 \quad \hat{\rho} = 0.8104 \]

\[ DTP_m = \text{Municipal direct taxes of persons, annual,} \]
\[ DTP_p = \text{Provincial direct taxes of persons, annual,} \]
\[ DTC_p = \text{Provincial direct taxes of corporations, annual,} \]
\[ IT_m = \text{Indirect taxes by municipalities, annual,} \]
\[ IT_p = \text{Indirect taxes by provinces, annual,} \]
\[ r_m = \text{Rate of interest on long-term government bonds} \]
\[ \text{at the time of the budget decision,} \]
\[ t = \text{Trend factor.} \]

\[ DTP_m = -0.05 + 2.14t - 1.62r_m \]

\[
\begin{array}{ccc}
(1.72) & (0.31) & (1.36) \\
-0.03 & 6.96 & -1.19
\end{array}
\]

\[ R^2 = 0.79604 \quad \text{d.w.} = 1.8385 \quad \hat{\rho} = 0.6701 \]

\[ DTP_p = -217.00 + 95.75t + 8.12r_m \]

\[
\begin{array}{ccc}
(88.53) & (19.12) & (74.26) \\
-2.45 & 5.01 & 0.11
\end{array}
\]

\[ R^2 = 0.69222 \quad \text{d.w.} = 0.6514 \quad \hat{\rho} = 0.7216 \]
\[ DTC_p = -44.19 + 35.20t + 11.26r_m \]

\[
\begin{array}{ccc}
(35.33) & (11.26) & (30.84) \\
-1.25 & 3.13 & 0.37 \\
\end{array}
\]

\[ R^2 = 0.44349 \quad \text{d.w.} = 1.5371 \quad \hat{\rho} = 0.8139 \]

\[ IT_m = -205.37 + 241.16t + 27.00r_m \]

\[
\begin{array}{ccc}
(19.69) & (14.42) & (7.71) \\
-10.43 & 16.72 & 4.80 \\
\end{array}
\]

\[ R^2 = 0.95295 \quad \text{d.w.} = 2.2439 \quad \hat{\rho} = 0.9641 \]

\[ IT_p = -157.73 + 146.24t + 0.61r_m \]

\[
\begin{array}{ccc}
(77.73) & (18.75) & (66.85) \\
-2.03 & 7.80 & 0.0091 \\
\end{array}
\]

\[ R^2 = 0.83449 \quad \text{d.w.} = 0.6205 \quad \hat{\rho} = 0.7493 \]

\[ INVY_m = \text{Investment income of municipalities, annual,} \]

\[ INVY_p = \text{Investment income of provinces, annual,} \]

\[ FEDT_m = \text{Federal transfers to municipalities, annual,} \]

\[ FEDT_p = \text{Federal transfers to provinces, annual,} \]

\[ t = \text{Trend factor,} \]

\[ r_m = \text{Long-term interest rate at the end of the first} \]

\[ \text{quarter.} \]

\[ INVY_m = -3.03 + 19.18t - 0.22r_m \]

\[
\begin{array}{ccc}
(5.19) & (1.59) & (4.54) \\
-0.58 & 12.50 & -0.048 \\
\end{array}
\]

\[ R^2 = 0.92098 \quad \text{d.w.} = 1.2941 \quad \hat{\rho} = 0.8047 \]
INVY_p = - 17.66 + 37.29t + 7.10r_m

(23.81) (4.36) (18.94)
-0.74 8.56 0.38

R^2 = 0.88158  d.w. = 0.3801  \hat{\rho} = 0.6773

FEDT_m = - 30.58 + 4.26t + 7.92r_m

(12.19) (1.20) (7.01)
-2.51 3.56 1.13

R^2 = 0.76211  d.w. = 0.8685  \hat{\rho} = 0.4605

FEDT_p = - 175.21 + 78.00t + 68.73r_m

(54.56) (8.70) (41.03)
-3.21 8.96 1.68

R^2 = 0.91525  d.w. = 1.4425  \hat{\rho} = 0.6374

R = Total revenues of municipal and provincial governments,
monthly,

S_i = Seasonal variations,
t = Trend factor,
r = Long-term rate of interest.

R = - 30.99S_1 - 57.34S_2 - 76.43S_3 - 60.65S_4

(114.94) (114.74) (116.19) (115.82)
-0.27 -0.50 -0.66 -0.52

+ 31.97t + 22.89r
(2.06) (22.87)
15.49 1.00

R^2 = 0.84266  d.w. = 1.6139  \hat{\rho} = 0.8577
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