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THE IMPACT OF TAXATION ON CAPITAL FLOWS AND THE BALANCE OF PAYMENTS IN CANADA

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THIS study estimates, by analysis of an aggregate model of the Canadian economy, some possible effects on capital flows and the balance of payments of two alternative tax-reform packages. The general approach follows conventional lines, although application on the scale attempted in this paper is somewhat unusual, and the two tax-reform packages actually evaluated are both novel and interesting in themselves. The first represents the proposals set out in the *Report of the Royal Commission on Taxation* (The Carter Commission) in 1967,[1] and the second is based on the proposals for tax reform contained in a White Paper issued by the Canadian government in October 1969.[2]

We employ a consistent macroeconomic model of Canada embodying conditions of flow equilibrium customary in analysis of monetary and fiscal policy in an open economy. Within the framework of the model, we represent proposed tax reforms as changes in tax parameters or shifts in behavioral relationships. Given such a representation, we may then ask how such changes alter the equilibrium of the system and how, on balance, trade and flows of capital are affected.[3]

Thus we may think of the model as described by the system

$$H(x, z) = 0$$

$$F(x, z; \tau) = 0,$$

[1] *Report of the Royal Commission on Taxation* (six volumes). Ottawa, Queen's Printer, 1967 (hereafter, Carter Report).

[2] Honorable E. J. Benson, *Proposals for Tax Reform*. Ottawa, Queen's Printer, 1969.

[3] J. F. Helliwell, "Simulating the Macroeconomic Effect of the Carter Proposals." *Canadian Journal of Economics,* Supp. I (February, 1968), pp. 233–254, describes a prior attempt to carry out a similar assessment.

where H is a vector-valued function of the flows z and the equilibrating variables x, representing the equilibrium conditions of the model, and F is a vector-valued function of the same variables (depending on the vector τ of tax parameters), representing the behavioral relations describing the determination of the endogenous flows.[4]

We consider a change in the tax system to be represented formally by movement to a new vector τ, and are therefore concerned with the differential system

$$\begin{bmatrix} H_x & H_z \\ F_x & F_z \end{bmatrix}\begin{bmatrix} dx \\ dz \end{bmatrix} = \begin{bmatrix} 0 \\ F_\tau d\tau \end{bmatrix}.$$

We wish to estimate the constant column, or vector of *initial shocks* (shifts in the behavioral relations), $F_\tau d\tau$, resulting from a proposed change in tax structure, and then to determine the subsequent changes, dx in equilibrating variables and dz in flows, necessary to restore equilibrium. We shall call the solution to the subset of equations arising from the condition $dF = 0$, subject to the restriction $dx = 0$, the *impact effect* of the tax change. This solution represents the changes necessary to ensure that all behavioral and accounting relationships are respected, but before any market adjustment through price or yield changes (or compensating government policies) occurs. The *final effect* is the unrestricted solution to the complete differential system. A *compensated* policy change involves imposition of some constraints $dz_i = 0$.

In order to determine these solutions, we require numerical estimates for the shocks, $F_\tau d\tau$, and the partial derivatives, F_x and F_z, of the behavioral relationships. (The coefficients H_x and H_z are nonstochastic values given directly by the form of the flow-equilibrium conditions employed.)

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[4] Since the model incorporates sectoral sources and uses-of-funds constraints, these behavioral relations either must be determined so that all flows are automatically consistent with such constraints, in which case behavioral relations for each endogenous flow appear explicitly while the constraints are omitted, or else behavioral relations for some flows must be omitted, leaving these flows to be determined residually by the requirements of accounting balance in each sector, then appearing explicitly in the model. We have followed the latter procedure.

EQUILIBRIUM CONDITIONS

WE DEAL in this model with markets for five paper assets — domestic bonds, equity of domestic extractive industries, equity of domestic nonextractive industries, foreign securities, and money — along with markets for foreign exchange and for goods. The core of our model is a set of equilibrium conditions for these markets. Specifically, we impose a condition of equilibrium in the balance of payments, on the bond market, the two equity markets, the goods market, and the money market.

In addition, we recognize five accounting identities. These are statements of the sources and uses of corporate funds, statements describing the disposition of corporate incomes for the two sectors (extractive and nonextractive industries), and an identity describing the uses of personal saving.

These two sets of conditions yield eleven relationships. As always, one is redundant in this general-equilibrium system, and we drop the balance-of-payments equation. Moreover, we assume that monetary policy accommodates itself to money-market demands so as to maintain equilibrium in asset markets and in the balance of payments. Monetary policy, therefore, is determined endogenously in this model, and we may omit explicit representation of the money market.[5]

Thus we arrive at a system of nine equations, the first four being the clearing conditions for asset markets and goods markets, and the others being, essentially, sources-and-uses-of-funds statements for corporations and households, together with two conditions embodying our assumption that underlying real-capital structures (and therefore net before-tax operating incomes of producers) are unaltered. Let us now specify these equations more precisely.

The model is focused particularly on the balance of payments and flows of capital. Therefore, among its most important components are the items that enter the balance-of-payments statement itself.

For present purposes we shall consider only the summary variables shown in Table 1. The first equilibrium condition can then be

[5] The inclusion of the money market equation would merely serve to indicate the change in the money supply required to sustain the equilibrium solution.

TABLE 1

Glossary and Notation

(in order of appearance in the rows of the coefficient matrix; all variables are to be interpreted as differentials)

BE	Bond issues by the extractive industry, both resident and nonresident
BN	Bond issues by the nonextractive industry, both resident and nonresident
NE	New issues of equity, extractive industry
NN	New issues of equity, nonextractive industry
RE	Corporate retentions, extractive industry
RN	Corporate retentions, nonextractive industry
$DPAE$	Dividends paid abroad, extractive industry
$DPAN$	Dividends paid abroad, nonextractive industry
FDE	Foreigners' direct investment in Canada, extractive industry
FDN	Foreigners' direct investment in Canada, nonextractive industry
CDE	Direct investment abroad by the Canadian extractive industry
CDN	Direct investment abroad by the Canadian nonextractive industry
$CCAE$	Capital consumption allowances, extractive industry
$CCAN$	Capital consumption allowances, nonextractive industry
IPA	Interest paid abroad
IFA	Interest from abroad
$DFAE$	Dividends received from abroad, extractive industry
$DFAN$	Dividends received from abroad, nonextractive industry
CSE	Canadian demand for securities, extractive industry
CSN	Canadian demand for securities, nonextractive industry
FSE	Foreign demand for securities, extractive industry
FSN	Foreign demand for securities, nonextractive industry
FB	Foreign demand for Canadian bonds in Canadian markets
CS	Canadian demand for foreign securities
TE	Taxes levied on nonresident firms, extractive industry
TER	Taxes levied on resident firms, extractive industry (in all computations, present data limitations force aggregation of TE with TER)
TN	Taxes levied on nonresident firms, nonextractive industry
TNR	Taxes levied on resident firms, nonextractive industry (in all computations, present data limitations force aggregation of TN with TNR)
TO	Other taxes
PS	Personal saving
X	Net Exports
IE	Investment, extractive industry
IN	Investment, nonextractive industry
G	Government expenditure

TABLE 1 (*concluded*)

q_e	Price of equity in the extractive industry relative to price of bonds
q_n	Price of equity in the nonextractive industry relative to price of bonds
R	Rate of interest
CB	Canadian demand for bonds
DDE	Dividends paid to domestic shareholders, extractive industry
DDN	Dividends paid to domestic shareholders, nonextractive industry
ϕ	Change in official holdings of gold and foreign exchange

derived as follows. From the balance-of-payments statement we have one relationship that determines the rate of change in official holdings of gold and foreign-exchange reserves, namely,

$$X + DFAE + DFAN + IFA - DPAE - DPAN - IPA + FDE$$
$$+ FDN - CDE - CDN + FB + FSE + FSN - CF - \phi = 0. \quad (0)$$

We shall interpret equilibrium in the balance of payments as requiring, simply, that ϕ, the change in official holdings, be zero.

Turning to the bond market, there are two categories of supplier: the government issuing debt to finance whatever portion of its deficit is not matched by an increase in the money supply, and resident or nonresident corporations in the extractive or nonextractive industries, issuing debt to meet part of their capital requirements. From the condition that the flow demand, resident and nonresident, be balanced by the debt issue of those suppliers, we obtain an equation [6]

$$FB + CB - BE - BER - BN - BNR$$
$$- [G - TE - TER - TN - TNR - TO - \dot{M}^s + \phi] = 0. \quad (1)$$

For present purposes, in order to obtain estimates of the different degrees of pressure on the prices for equities of firms in the extractive and nonextractive industries, we suppose that the markets for these securities are sufficiently segmented so that their yields need not nec-

[6] Our model assumes that full sterilization of inflows occurs directly through the money supply; although alternative procedures are conceivable. we do not wish to consider the consequences of less-than-full sterilization. or of full sterilization accomplished by other means.

essarily be forced into balance. Then we obtain two market-clearing conditions,

$$FSE + CSE - NE - NER = 0 \tag{2}$$

and

$$FSN + CSN - NN - NNR = 0, \tag{3}$$

for the markets for the shares of corporations in each of these two sectors.

The fundamental national-income identity, or generalized saving-investment identity, appears in this context as a single equation:

$$IE - RE - CCAE - DPAE + IER + DFAE - RER - CCAER + IN$$
$$- RN - CCAN - DPAN + INR + DFAN - RNR - CCANR + G$$
$$- TE - TER - TN - TNR - TO + X + IFA - IPA - PS = 0. \tag{4}$$

This equation has a natural interpretation in terms of the contributions of firms in extractive and nonextractive industries, the government, and households, to sources and uses of saving.

A similar condition of accounting balance must hold in the financing of investment by each firm or class of firms. If for each of the four classes of firm (extractive, nonextractive; resident, nonresident) a condition of this type is imposed, one obtains four equations to be added to the model. In fact, however, we have found it necessary to aggregate the resident and foreign-owned firms in each of the two industry classes. Thus we obtain the following two equations:

$$BE + NE + RE + CCAE + FDE - CDE - IE = 0, \tag{5}$$

and

$$BN + NN + RN + CCAN + FDN - CDN - IN = 0. \tag{6}$$

Since, as noted earlier, we are examining a flow equilibrium, we assume that no changes in cash balances or in the net position on short-term assets or liabilities may occur.

Since the rate of addition to domestically held financial assets is necessarily equal to personal saving, one has also

$$PS - CSE - CSN - CF - CB - \dot{M} = 0. \tag{7}$$

We take—as a first approximation—the assumption that gross operating incomes and operating expenses remain roughly unchanged following the hypothetical implementation of the proposed reforms. In a neoclassical world, this amounts to assuming the period of analysis to be sufficiently short so that one can ignore the effects of changes in capital stocks upon marginal rates of return to capital. However, in a more eclectic (and more realistic) world, one also needs to assume that no short-run shifting of the changes in the corporate-income tax occurs. While the precise extent, if any, of such shifting in the United States remains an unresolved empirical issue, in a more open economy possible forward shifting of domestic corporate-income taxes is much more limited, because of the actual or potential competition from foreign goods as the Carter Commission indicates.[7] Backward shifting—as is implied by certain models of wage determination—remains a possibility, however.

In our analysis, we assume that there is no backward shifting onto wage changes; however, we do allow for some backward shifting of certain taxes onto the value of oil-bearing land. This has the effect of shifting the burden of any increase in taxes on the oil industry, in part, onto provincial revenues.

The model is designed to analyze the financial flow equilibrium expected to prevail before any substantial adjustment of real capital stocks has occurred. This design implies that net before-tax operating incomes of corporations are unaffected by the reforms, provided that aggregate demand is unchanged. If net operating income is unchanged, then the following two conditions describe the disposition of changes in the components of operating income in each of the producing sectors:

$$RE + DPAE + CCAE - DFAE + TE + TER + DDE = 0, \quad (8)$$

and

$$RN + DPAN + CCAN - DFAN + TN + TNR + DDN = 0. \quad (9)$$

Finally, as discussed earlier, equilibrium requires that the rate of increase in the money supply be willingly accepted, so that one has the condition

[7] Carter Report, Vol. II, pp. 144–146.

$$\dot{M} - \dot{M}^s = 0. \qquad (10)$$

These eleven equations 0–10, all interpreted in terms of differentials, constitute the set of equilibrium conditions of our model.[8] Any predictions about the effects of the proposed tax reforms must, to be consistent, satisfy all the conditions. If the initial impacts of the proposed reforms are such that these conditions are not all satisfied, then interest rates, equity yields, and the level of aggregate income would be forced to adjust.

This subsequent adjustment creates one important difficulty that must be solved: any income adjustment that might be stimulated by the reforms would confound simple aggregate-demand effects with the tax-structure effects that we are trying to isolate. Therefore we specify that the process of adjustment, whatever it is, leaves the level of demand unchanged. Moreover, we specify that the adjustment be such that the new rates of interest and equity yields, whatever they are, are sustainable without further change. Finally, we examine only adjustments that are consistent with equilibrium in the balance of payments. The upshot of these restrictions is that we insist that all the above equilibrium conditions be sustained, with government fiscal policy and money supply so determined as to permit aggregate demand to be maintained unchanged while preserving balance-of-payments equilibrium.

With this understood, we may proceed to complete and simplify the system. We first add behavioral relations describing the independent determination of all flow variables entering the system. We set $\dot{M} = 0$, and drop equation (10).[9]

Summing equations 1–9 yields the balance-of-payments constraint, equation (0); we therefore drop that equation from our explicit system. Moreover, the way in which budget constraints enter the determination of the flows in equations 5–9 requires that one component of each

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[8] The usual qualifications—that we must suppose a linearized system to yield an adequate approximation to the adjustment of the model following a substantial shock, and that the model began initially in (or sufficiently close to) flow equilibrium—of course apply.

[9] This analytical simplification could be dispensed with, in studying a growing economy, by supposing both income and money supply to grow at constant relative rates; for present purposes there is little to be gained by this analytical sophistication.

be determined residually. Hence we drop the behavioral relations for BE, BN, CB, DDE, and DDN.

The system thus reduces to nine explicit conditions. Three are equilibrium conditions referring to asset markets, and there are three asset-yield variables to serve as equilibrating variables. Government expenditure is determined so as to maintain aggregate demand constant; loosely, G may be viewed as determined by equation (4). Accounting identities and budget constraints (along with our assumption that real stocks are not altered under the new tax system) are inherent in equations 5–9; these, therefore, may be thought of as determining BE, BN, CB, DDE, and DDN as residuals. The remaining equations are behavioral relations, the specification of which is described in the next section.

SPECIFICATION OF BEHAVIORAL RELATIONS

THIS section outlines the equations explaining the dependent variables in our model, dealing first with the various components of the balance of payments, and then with the equations for saving, investment, and other financial flows in the economy.

In each equation, allowance is made for the shock or perturbation introduced by the tax reforms, together with feedback effects from any adjustments in interest rates, relative prices of equities in the extractive and nonextractive sectors, government expenditure, and other endogenous income or expenditure variables. The impact effects, which reflect the direct effect of proposed tax reforms on the dependent variable in each equation, naturally differ between the two tax-reform proposals and, therefore, are discussed separately below. Here we consider the form of the various behavioral relations.

A. PORTFOLIO-CAPITAL FLOWS

The situations we examine obviously involve changes in the relative attractiveness of Canadian equities to Canadians and in the rel-

ative attractiveness of some of these securities to nonresidents. It is necessary, therefore, to separate trade in Canadian equities from trade in Canadian bonds.

In addition, since the indirect effects of the reforms may affect interest rates in Canada, the relative attractiveness of Canadian bonds vis-à-vis foreign securities is likely to change. Therefore it is necessary also to distinguish net trade in foreign securities (mainly foreign equities) from net trade in Canadian bonds and stocks.

We assume that the direction and magnitude of international flows of portfolio capital are determined solely on the basis of the relative after-tax yields to nonresident and resident investors. The effects of the tax reforms are therefore felt simply through the changes in relative yields for the three types of security brought about by the changes in the tax structure, assuming that interest rates and before-tax equity yields are given.

The indirect effects of the tax reforms are likely to be very important for these flows, however. Domestic interest rates and equity prices will, in fact, change, thereby affecting further the relative yields on these securities. The over-all sensitivity of total net flows of long-term portfolio capital has been estimated within the context of three complete quarterly econometric models of the Canadian economy, and one complete annual model.[10] While the three quarterly equations yield comparable (and substantial) sensitivities to interest-rate differentials, the interest-rate sensitivity suggested by the annual model is much lower.

We have therefore carried out two sets of runs — one using an over-all yield sensitivity based on the equation of the Rhomberg quarterly model,[11] and one using the lower coefficient of the TRACE annual

[10] R. R. Rhomberg, "A Model of the Canadian Economy under Fixed and Fluctuating Exchange Rates." *Journal of Political Economy* (February, 1964), pp. 1–31; L. H. Officer, *An Econometric Model of Canada Under the Fluctuating Exchange Rate.* Cambridge, Mass., Harvard University Press, 1968; J. F. Helliwell, L. H. Officer, H. D. Shapiro, and I. A. Stewart, *The Structure of RDX1*, Bank of Canada, Staff Research Study No. 3, 1969; N. K. Choudry, Y. Kotowitz, J. A. Sawyer, and J. W. L. Winder, *TRACE, 1969: An Annual Econometric Model of the Canadian Economy.* Toronto, University of Toronto Press, 1971.

[11] As the yield sensitivity in the Rhomberg model refers only to portfolio flows from the United States to Canada, it was adjusted to be representative of all portfolio capital flows to Canada.

model.[12] Because of problems with the existing equation of the annual model, and because the three quarterly models yield roughly consistent results, we choose to emphasize the results obtained through the use of the yield sensitivity based on the Rhomberg model. Better estimates may perhaps be obtained from a complete analysis of the recently published flow-of-funds accounts.[13]

Unfortunately, none of these models examines these capital flows classified into the three types that concern us. A search of the available empirical literature in Canada and the United States did not turn up separate estimates of the yield sensitivities of these three types of capital flow. Indeed, the main thrust of the conclusions in the literature seems to be that capital flows generally are determined by factors other than relative after-tax yields.

As a result, we decided to construct estimates of the yield sensitivity for each of the subcomponents of the total inflow of portfolio capital from the above over-all yield sensitivities on the basis of the following assumptions:

1. The relative yield sensitivity (yield response/existing holdings) of American purchases of Canadian stocks is one-half of the relative yield sensitivity of American purchases of Canadian bonds. The sensitivity of our results to this strategic assumption will be examined later.
2. The relative yield sensitivity of purchases of Canadian stocks by other nonresidents and of Canadian purchases of foreign securities is the same as that of American purchases of Canadian stock.
3. The relative yield sensitivity of purchases of Canadian bonds by other nonresidents is the same as that of American purchases of Canadian bonds.

These three assumptions permit us to construct estimates of the average yield response of each of the three types of inflow of portfolio

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[12] The coefficient used is the sum of the coefficients for the long-term and short-term interest-rate differentials.

[13] A preliminary report on the financial flow accounts in Canada is now available (Dominion Bureau of Statistics, *Financial Flow Accounts 1962–67*. Ottawa, Queen's Printer, 1969).

capital. The details of the calculation procedures are described in a previous paper.[14]

In order to examine the effects of changes in the tax structure and of changes in the yield of equities relative to bonds, the following two additional assumptions are necessary:

4. The response of each type of capital flow depends solely on the differentials between its after-tax yield to the relevant investor and the after-tax yield on alternative financial investments.
5. The aggregate response of Canadian investors to changes in the tax structure may be approximated by the behavior of a "typical" investor holding "typical" Canadian and foreign securities.

The resulting yield and relative price sensitivities of foreign purchases of bonds (FB), foreign purchases of stocks (FS), and Canadian purchases of foreign securities (CF) based on these assumptions and the alternative over-all yield sensitivities are presented in Table 2. Using the Rhomberg equation, for example, we obtain a yield sensitivity of $+10.15$ for foreign purchases of stocks, which implies a relative equity-price sensitivity of these purchases of $-.550$.[15] This response is then divided into the extractive and nonextractive industries in proportion to the share of resident-controlled capital in each of these sectors.

In addition to the substitution effects represented by the coefficients for interest rates and relative prices, allowance must be made for the effects of any change in the total volume of personal savings induced by the reforms. We base our estimate of the proportion of the change in personal saving that is channeled into the demand for foreign equities upon the relative importance of Canadian purchases of foreign securities to total personal saving.

[14] A. R. Dobell and T. A. Wilson, "Overall Effects of the Proposed Tax Reforms: Savings, Investment, and the Balance of Payments." Institute for the Quantitative Analysis of Social and Economic Policy, Working Paper #6806.

[15] Using as a base an average corporate bond yield of 5.2 per cent, a percentage point change in bond yields corresponds to an 18.45 per cent change in bond prices. Relative price sensitivities are therefore obtained by dividing the yield sensitivities by 0.1845 (and reversing the sign).

TABLE 2

Structural Coefficients: Interest-Rate and Relative-Price Sensitivities of Capital Flows

| Capital Flows | Relative-Price Equities | | Interest Rate |
	(Extractive) q_e	(Nonextractive) q_n	r
A. Rhomberg			
CSE C(26)	.118	0	−0.72
CSN C(27)	0	1.06	−6.52
FSE C(28)	.065	0	−1.21
FSN C(29)	0	.485	−8.94
FB C(30)	0	0	−61.30
CF C(31)	−.047	−.345	7.24
B. TRACE			
CSE C(26)	.042	0	−0.26
CSN C(27)	0	.379	−2.34
FSE C(28)	.023	0	−0.43
FSN C(29)	0	.174	−3.21
FB C(30)	0	0	−22.00
CF C(31)	−.017	−.124	2.59

NOTE: Interest-rate sensitivities are expressed in billions of dollars per unit of yield. Relative-price sensitivities are expressed in billions of dollars. This means, for example, that one percentage point rise (a rise of .01 unit) in yields would increase the foreign demand for the equities of the nonextractive sector by .089 billion dollars; such a rise in yields would be equivalent, in effect, to a relative price increase of .185 in q_n (or 18½ per cent). Multiplying .186 by the relative-price coefficient .485 yields the same response of .089 billion dollars. For this particular capital flow, we have assumed that the effect of a change in equity yields is the same, whether or not it is accompanied by a change in interest rates.

B. DIRECT INVESTMENT

The available empirical evidence suggests that foreign direct investment in Canada is not very sensitive to changes in yields on marketable securities. Rhomberg, for example, found some response of direct investment to changes in the interest-rate differential, but this response is much lower than that of portfolio flows.

We therefore allow for only modest feedback effects of changes in interest rates upon these flows. We estimate that a one per cent increase in the interest-rate differential would increase total foreign direct investment by $80 million, a figure obtained by scaling Rhomberg's estimate [16] by the ratio of total foreign direct investment in Canada to United States direct investment in Canada. As a first approximation, we shall assume that the effect of relative changes in equity prices is commensurate with the interest-rate effect, after adjusting for the relative importance of equity issues to total funds raised in Canada.

We also make allowance for a modest yield effect on Canadian direct investment abroad, based on scaling Rhomberg's coefficient for American direct investment in Canada by the relative importance of the two capital flows. For simplicity we assume that all Canadian direct investment is channeled through the nonextractive sector.

C. DIVIDEND OUTFLOWS

An increase in corporate taxes levied upon foreign-owned firms can be accommodated by either a reduction in dividend outflows or by an increase in foreign direct investment,[17] with equivalent balance-of-payments effects. Since some minor tax advantages accrue to foreign firms when they reduce dividend outflows rather than increase foreign direct investment, we shall adopt the convention that this effect of the tax reforms bears wholly upon dividend outflows. These effects may be treated wholly as shock effects, and, therefore, are discussed in the following section.

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[16] Rhomberg, *op. cit.*, p. 10.

[17] As stated, we assume that before-tax profits are not affected by the tax reforms.

D. NET EXPORTS

Net exports (excluding exports and imports of capital services) will be affected by any loss of export markets that might follow the tax reforms, and by any change in imports resulting from a change in the composition of final demand. For reasons to be discussed below, we assume that there will be no loss of export markets.

An import equation is based on the input-output equation developed by J. A. Sawyer.[18] This equation relates imports to the components of final demand as follows:

$IMP = .193CONS + .243IE$ (excluding land purchases)

$$+ .290IN + .066G + .134EXP.$$

However, as GNP is constant in the equilibrium solutions of the model, and since exports are constant by assumption, we may solve the above equation in terms of G, IE, and IN, by substituting for C from the GNP identity, thus obtaining the following equation:

$$X = .158G - .120IN - .062IE.$$

E. THE DOMESTIC DEMAND FOR DOMESTIC SECURITIES

The supply of domestic securities is composed of net sales by foreigners (the inverse of the capital inflow), net new equity issues by Canadian corporations, and new issues of bonds by Canadian corporations and by Canadian governments.

The demand is simply the financial saving of the household sector less net purchases of foreign securities by Canadians. A portion of this saving flow may, of course, be channeled through financial intermediaries, such as life insurance companies and pension plans.

The model requires specification of the effects of relative changes in yields on equities, bonds, and foreign securities upon the composi-

[18] J. A. Sawyer, "Some Effects on the Current Account of the Balance of International Payments of Implementing Recommendations of the Royal Commission on Taxation." Institute for the Quantitative Analysis of Social and Economic Policy, University of Toronto, Working Paper #6805.

tion of the flow of personal saving.[19] Unfortunately, there is as yet no evidence on the yield sensitivity of the allocation of personal saving between these assets in Canada. However, we have already constructed an estimate of the sensitivity of Canadian purchases of foreign securities to changes in Canadian equity yields. It is reasonable to suppose that the bulk of such changes in holdings represents a switch of domestic equities for foreign securities, since most foreign securities held are equities. We shall therefore assume that a rise in Canadian interest rates induces such switching from foreign to Canadian equities (when the price of equities relative to bonds is constant).

In addition, a fall in the price of equities relative to the price of bonds will induce switching from domestic bonds, as well as from foreign equities to domestic equities. While bonds are not as close substitutes for domestic equities as are foreign equities, domestic holdings of bonds are much larger than are domestic holdings of foreign securities. We therefore assume that the extent of switching from bonds to Canadian stocks is twice as important as switching from foreign securities to Canadian stocks. Using the yield sensitivities estimated by Rhomberg, this would imply that the total response of the domestic demand for equities with respect to a one percentage point rise in stock yields is $217.2 million. This implies a relative price sensitivity of -1177.

Since the tax reforms would affect the attractiveness of Canadian equities at prevailing levels of interest rates and stock prices, allowance must be made for an impact effect. The impact effects are based on estimates of the effect of the tax reforms upon after-tax rates of return to resident noninstitutional investors, given the above yield sensitivity.

In addition, one of the tax-reform proposals analyzed provides a great inducement to hold equities for pension plans and for life insurance companies that set up trusteed pension plans. The impact of the original Carter proposals upon equity holdings of pension plans and life insurance companies has been studied by Courchene and Robin-

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[19] We ignore residential construction throughout the analysis, and assume that none of the induced changes in personal saving leads to increases in owners' equity in owner-occupied houses.

son,[20] and estimated impact effects based on their work are presented below.

However, since the size of present holdings of equities by such financial intermediaries is not large, it would not be reasonable to adjust downward the estimate of the increase in direct acquisitions of equities by households by that amount. For the analysis of the original Carter proposals, we therefore add the estimate of the increased holdings of equities by pension plans to the estimated impacts for non-institutional investors.

While the adjustments in the demands for assets following the reforms will reflect mainly the repercussions of changes in after-tax yields and resulting adjustments in relative prices, it would be unwise to neglect the effect of changes in personal saving on these demands. To ignore these would be to assume that the whole of any change in personal savings induced by the reforms is felt in the domestic demand for bonds, since the latter is determined residually from the personal saving identity. We therefore assume that any increase in personal saving is divided between purchases of domestic bonds, purchases of domestic equities, and purchases of foreign securities in proportion to the observed relative importance of these purchases.

F. PERSONAL SAVING

The estimates of the effects of tax reforms upon personal saving are obtained by combining an equation determining discretionary personal saving based on the work of Winder,[21] with an estimated shock effect on contractual savings for the original Carter reform provided in the study by Courchene and Robinson. The shock effects of the alternative tax system upon the components of personal saving are presented below.

The equation determining personal saving is based on a simple

[20] T. J. Courchene and T. R. Robinson, "Contractual Savings With and Without Carter." Institute for the Quantitative Analysis of Social and Economic Policy, Working Paper #6801.

[21] J. W. L. Winder, "Discretionary Personal Savings." Institute for the Quantitative Analysis of Social and Economic Policy, Working Paper #6802.

permanent-income model. Since we lock the economic system at a given level of aggregate demand via compensatory change in government expenditures or general tax levels, personal saving will be affected by changes in personal taxes resulting directly and indirectly from the reforms, as well as by changes in dividends and corporate tax rebates that vary with the level of investment. The marginal propensity to save out of changes in these tax payments is set at .10. Following Winder, the marginal propensity to save out of dividend payments is set at .30.

The only other variable allowed to affect personal saving is the rate of interest. The coefficient for this variable is taken directly from the study by Winder.

G. CORPORATE RETENTIONS

The estimated impact effects and the feedback equations for the retentions of resident-owned firms are based on a study by one of the authors.[22] The impact effects, which take the integration or partial integration of personal and corporate taxes into account along with the proposed increases in taxes at the corporate level, are discussed more fully in the next section.

Since investment is an endogenous variable in the model, allowance must be made for a feedback effect upon gross retentions via changes in capital consumption allowances. According to the estimates presented by Wilson, a unit change in capital consumption allowances (CCA) leads to an increase in gross retentions of .82, financed by a reduction in corporate taxes of .50 and a decrease in dividends of .32. Since investment in the extractive sector is assumed to be insensitive to changes in interest rates or equity prices, such a feedback need only be specified for the nonextractive sector.

However, in the impact effect for resident-owned firms in the extractive sector, allowance must be made for their estimated reduction in investment. We make implicit allowance for this by specifying that

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[22] T. A. Wilson, "Implications of the Carter Corporate Reforms for Corporate Savings Behaviour." Institute for the Quantitative Analysis of Social and Economic Policy, Working Paper #6803.

the total reduction in the retentions of these firms equals the total increase in their corporate taxes.

The effects of the reforms upon the gross retentions of foreign-owned firms is simply the estimated reduction in dividends paid abroad, described above, less the increase in corporate taxes paid by these firms. For example, under the original Carter proposals, the dividend outflow from nonresident-owned firms in the extractive industries will fall by $19 million, but their corporate taxes are estimated to rise by $142 million. Hence their retentions must *fall* by $123 million. For nonresident firms in the nonextractive industries, on the other hand, the increase in corporate taxes of $117 million is largely offset by a reduction in the dividend outflow of $92 million. Gross retentions are therefore estimated to fall by $25 million.

The equations determining retentions used in the analyses are obtained by adding the relevant equations for resident and nonresident-owned firms.

H. INVESTMENT

The investment relation for the nonextractive sector is based on a study prepared by one of the authors for the Carter Commission.[23] The equations estimated in that study imply an interest-elasticity of investment of −0.67. Therefore, a negative interest-rate feedback effect is specified, based on this elasticity. It is assumed that there will be no feedback via adjustments of equity prices, on the grounds that any incentive or disincentive provided by the tax reforms would have already been accounted for in the calculation of the impact effects described in the next section.

The investment effects in the mineral extractive sector of the original Carter proposals are based on a study by G. D. Quirin.[24] No allowance is made for any feedback effects from either interest rates or equity prices. Since the tax reforms for the mineral industry proposed

[23] T. A. Wilson, *Capital Investment and the Cost of Capital: A Dynamic Analysis.* Study No. 30, Royal Commission on Taxation, Ottawa, Queen's Printer, 1967.
[24] G. D. Quirin, "Economic Consequences on the Primary Mineral Industries of the Adoption of the Recommendations of the Royal Commission on Taxation." Institute for the Quantitative Analysis of Social and Economic Policy, Working Paper #6804.

in the White Paper will have no effect on revenues within the period of our analysis, we assume that they will also have no effect on investment in that sector.[25]

I. NEW EQUITY ISSUES

The integration or partial integration of the corporate and personal income taxes could affect the volume of new issues by affecting the relative price of equities. In the absence of empirical estimates of the sensitivity of new issues to changes in yields, we simply assume that the elasticity of these issues to changes in the relative price of equities is unity for each of the two sectors.

J. GOVERNMENT REVENUES

We assume that ultimately any necessary compensatory variations in discretionary fiscal policy will be effected by either changes in government expenditure (G) or changes in other taxes (TO); in neither case do corporate taxes vary. However, induced changes in investment in the nonextractive industries will have direct effects on government revenues by changing capital consumption allowances (CCA). An increase in CCA would imply an increase in corporate taxes, offset to some extent by a reduction in personal tax rebates under integration.[26] Assuming that the average allowable CCA rate for the first year is 12½ per cent, this would imply a reduction in revenues from corporate taxes of .0625 per dollar change in investment in that sector.

More important than these feedback effects are the estimated impact effects of any tax reform upon government revenues. These are discussed in the following section, in which we turn from specifying the behavioral relations (and thus the coefficient matrix) for our model to representing the proposed tax reforms as a perturbation of that system.

[25] It should be remembered that we are focusing the analysis on a Keynesian-type intermediate run, during which financial flows may adjust to new equilibrium levels, but within which real capital stocks are unlikely to be significantly altered.

[26] As will be explained later, integration of the corporate and personal income taxes permits stockholders to obtain a rebate for corporate income tax paid.

ALTERNATIVE TAX SYSTEMS AND THEIR REPRESENTATION IN THE MODEL

THE MACROECONOMIC flow model described in the previous section can be used to estimate the over-all effects of changes in the tax structure upon saving, investment, the components of the balance of payments, and other endogenous variables in the model. As described earlier, what is required in addition to the matrix of coefficients linking the various variables is:

1. A vector of shock effects — measuring the partial effects of tax proposals on each endogenous variable, holding the other variables constant; and
2. The specification of the compensatory adjustments in fiscal and monetary policy designed to maintain both a given level of aggregate demand and equilibrium in the balance of payments.

Given these specifications, the model solutions provide estimates of the equilibrium effects upon the endogenous variables of changes in the tax structure; these effects take into account the specified interactions among all the variables of the model.

We shall use this model to assess the economic effects of the following three tax reform proposals:

1. That of the Carter Report on taxation [27] (also referred to below as "original Carter");
2. That put forward by the Minister of Finance in the recently published White Paper on Taxation; [28] and
3. A set of proposals based on the original Carter recommendations, but modified to be comparable with the White Paper proposal (henceforth described as "modified Carter").

Before proceeding to the specification of the vectors of initial shocks, a brief description of the relevant features of each of these tax proposals in relation to the present Canadian tax structure is in order.

[27] See note 1, above.
[28] E. J. Benson, *op. cit.*

THE ORIGINAL CARTER PROPOSALS

The Carter Royal Commission recommended the most sweeping tax-reform package since the original evolution of the income-tax system. The revenue-raising features of this package most relevant for our analysis are the following:

1. Special provisions in the existing tax law that favor the extractive sector (oil and mining) were to be abolished. These include percentage depletion and a three-year tax holiday for new mines.
2. Special provisions favoring life-insurance companies and financial institutions were to be eliminated.
3. The low 21 per cent rate on the first $35,000 of corporate income was to be eliminated—henceforth all corporate income would be taxed at a flat 50 per cent rate. The effects of this provision on existing incorporated small businesses and on new businesses would be offset, in part, by a special provision for accelerated capital-cost allowances.
4. In contrast to the existing Canadian system, where capital gains bear no tax, all capital gains were to be taxed henceforth at full personal rates upon realization. Deemed realization would occur upon the gift or bequest of an asset.
5. Gifts and bequests were to be treated as income to the recipient and to be taxed at full marginal rates. Under the present law, bequests are subject to an estate tax, and gifts are taxed to the donor. The rates of this tax are well below those of the personal income tax.

Most of the other changes in the tax law recommended by the Carter Commission involved the "spending" of much of the revenue gained by the above set of reforms. These involved lower marginal rates in the personal income tax, the treatment of the family as the basic unit of taxation, and the establishment of a separate schedule of family rates,[29] liberalized averaging and employment-expense deductions, and

[29] Unlike the American "income-splitting" provision, under Canadian law husbands and wives are taxed as individuals. This means that families in the middle- and upper-

lower revenues from federal sales taxes. For our analysis, however, the most important revenue-losing reform recommended is the full integration of the corporate and personal income taxes. Under this proposal corporate and personal income taxes were to be fully integrated for *resident stockholders of Canadian corporations*. All corporate income was to be reported as income by the shareholder, who would receive full credit for the corporate tax paid. In essence, this provision would mean that the corporate tax would be abolished for resident shareholders of Canadian corporations.

The net revenue effects of the various Carter proposals in relation to the system prevailing at the time of the Carter Report are shown in Table 3. As is apparent, reasonably large increases in taxation at the corporate level would be offset by reductions in personal-income and sales taxes. On balance the system proposed would have increased revenues by a modest amount.

During the interval between the publication of the Carter Report and the publication of the White Paper, several tax changes were made,[30] the net effects of which were to raise sales and income taxes. In the budget of 1968,[31] the government changed the treatment of life-insurance and financial institutions, largely following the recommendations of the Carter Report. Consequently a comparison of the original Carter proposals with the present (1969) tax system would show that the Carter proposals would *reduce* revenues substantially.

THE WHITE PAPER PROPOSALS

The proposals made in the White Paper differ from the Carter proposals in several ways. First, although modifications in the treatment of oil and mining were provided for, the new proposals — replacing percentage depletion and the three-year tax holiday for new mines by a

income brackets are taxed relatively more heavily than is the case in the United States. For most families, the Carter Family Rates Schedule would be virtually equivalent to American "income-splitting."

[30] The two most important changes were the imposition of the surtax on corporate and personal incomes and the imposition of the "social development tax."

[31] Budget Speech delivered by the Hon. Edgar J. Benson, Minister of Finance, House of Commons, October 22, 1968.

TABLE 3

Revenue Effects of Proposed Tax Reforms
(millions of dollars per year)

Tax Change	Original Carter (in relation to 1966 system) [a]	Modified Carter (in relation to 1969 system)	White Paper (in relation to 1969 system) [b]
A. Corporate income tax			
Oil & mining reforms (extractive)	+176 [c]	+204 [d]	22 [e]
Abolition of dual rate	+258	+390 [f]	390
Other corporate reforms (excluding life insurance)	+48	+30 [g]	148
Subtotal (nonextractive)	+306	+420	538
Life insurance and cooperatives	+15 [h]	—	—
B. Personal income tax			
Integration	−363	—	−230
Gifts and bequests [i]	+210	—	—
Other personal reforms	−38	—	+300
Total personal income tax	−191	−960 [j]	+70
C. Sales tax	−125	no change	no change
D. Total revenue	+181	−336	+630

[a] Source: Tables 35–15 and 37–3 of the Carter Report (Vol. 6). Corporate revenues are as estimated in Table 37–3; personal income-tax revenues are adjusted downwards by $6 million to preserve consistency with total revenues as estimated in Table 35–15. (All estimates relative to the tax system as at 1966.)

[b] Source: The White Paper, *op. cit.*, Tables 15 and 16.

[c] Takes into account the federal tax gain as a result of reduced write-offs because investment declines, and the provincial revenue loss due to backward shifting onto land values.

[d] Carter estimates from column 1 were multiplied by the ratio of profits in 1969 to profits in 1964 for the mining sector.

new "incentive depletion" scheme and more rapid depreciation of mining equipment—were not to take effect for five years. Secondly, for "widely held" Canadian corporations, the corporate and personal income taxes were to be partly, rather than fully, integrated,[32] and pension funds were not to benefit from this integration. Under this proposal, cash or stock dividends would be subject to a 50 per cent gross-up, but only 50 per cent of the corporate tax paid on the income would be credited.

One-half of the capital gains on the shares of widely held Canadian companies would be subject to the capital-gains tax. In addition, there would be a deemed realization of gains on such shares every five years. Capital gains on all other assets would be subject to taxation at full rates *only* upon actual realization. Upon bequest of assets at death, capital gains would escape taxation until subsequently realized by the recipient of the asset.

[32] Income from "closely held" Canadian corporations was to be fully integrated. A corporation is defined as widely held if its stocks are listed on any exchange, or traded over the counter.

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[e] Total revenues raised by corporate reforms other than the dual rate have been prorated between the extractive and nonextractive sectors on the basis of the division of revenues for "other corporate reforms" shown in Table 37–3 of the Carter Report, *op. cit.*

[f] Estimates are taken from the White Paper, Table 16.

[g] Carter estimates from column I were multiplied by the ratio of corporate profits in 1969 to corporate profits in 1964; estimated revenues yielded by the current corporate surtax were then deducted.

[h] Additional revenue loss due to life insurance companies and other intermediaries shifting the composition of their portfolios in favor of equities, and thereby benefiting from integration, is taken into account.

[i] Net effect of including gifts and bequests in income and abolishing existing separate taxes.

[j] Carter revenue estimates from Table 35–15 of the Carter Report, *op. cit.*, were projected to 1969 using an income elasticity estimated as follows: the measured income elasticity of the 1967 system across the 1964–69 period was adjusted upward by Bossons' estimate of the difference in the income elasticities of the two systems (John Bossons, *A General Income Tax Analyser,* Ottawa, Queen's Printer, 1967, pp. 52–54). The large revenue loss in relation to the 1969 system reflects the existence of the personal income-tax surcharge and the social development tax, neither of which was in effect in 1967.

While the top marginal rates in the personal income tax were to be lowered to 51.2 per cent under the White Paper proposals, marginal rates throughout most of the income distribution were to be raised. The generous proposals of the Carter Report regarding averaging, employment-expense deductions, and so on, were made less generous, and Carter's family-unit proposal was not recommended.[33] As the White Paper dealt only with income taxes, the sales-tax reductions proposed by Carter need not be taken into account. The main revenue-losing proposal in the White Paper was an increase in the exemptions for adults from the present level of $1000 to $1400.

The estimated revenue effects as presented in the White Paper are shown in Table 3. In contrast to the Carter proposals, the tax structure proposed by the White Paper would raise a more substantial amount of revenue at the end of five years. Moreover, there is some reason to believe that these revenue estimates may err on the conservative side.[34]

Because of the various tax changes enacted between the publications of the two reports, and because the White Paper does not deal with sales taxes, we believe that it is necessary to modify the Carter proposals for purposes of comparison with the White Paper, as well as to update the estimated revenue effects to a more current year. These modifications are as follows:

1. The sales-tax recommendations of the Carter Report are ignored.
2. The recommended reforms on life-insurance and financial institutions are ignored.
3. Credit for corporation income tax is not extended to pension plans.
4. The revenue estimates are updated to the year 1969, to make them directly comparable with those of the White Paper.

[33] The Minister of Finance did state, however, that it would be possible to consider the family unit proposal as a further installment of reform subsequently (White Paper, p. 15).

[34] According to press reports, the Ontario government has prepared estimates of the revenue effects of the White Paper proposal that are double those of the federal government.

The revenue effects of the modified Carter scheme evaluated for the year 1969 are also shown in Table 3. While this scheme would raise larger revenues at the corporate level than would the White Paper proposals, this increase is more than offset by the substantial revenue loss occurring at the personal level. The result, in contrast to the White Paper scheme, is that the modified Carter scheme would *reduce* government revenues in relation to the current tax structure.

SPECIFICATION OF IMPACT VECTORS

The three tax schemes are directly represented in our model in terms of three tax variables:

TE (corporate taxes paid by the mineral extractive sector);
TN (other corporate taxes — excluding taxes on life insurance companies);
TO (all other taxes).

However, the details of the tax structure are also taken into account in the specification of the shock effects in the equations determining investment, corporate saving, and demands for asset flows. Before proceeding to the specification of shock effects upon corporate retentions and investment, a brief description of the way in which integration of the corporate and personal taxes could affect corporate behavior is in order.

Integration or partial integration of the corporate and personal income taxes can be viewed as consisting of two steps:

1. A reduction in the rate of tax upon cash dividend distributions, and
2. A change in the effective rate of tax on corporation profits.

Algebraically the existing system and the two alternative systems for large companies can be specified as follows:

1. Current system —

$$TC = .50\pi + (m - .20)*DC.$$

2. Carter proposals —

$$TC = .50\pi + (m - .50)^*(DC + RET) + mGW$$

or

$$TC = m(\pi + GW).$$

3. White Paper proposals (assuming retentions are declared as stock dividends) [35] —

$$TC = .50\pi + m(1.50)(DC + RET) - .25\pi + m \cdot GW/2$$

or

$$TC = (.75m + .25)\pi + m \cdot GW/2,$$

where

TC = total tax paid on corporate source income

π = before-tax corporate profits

m = marginal rate of tax on personal income

DC = cash dividends

RET = retentions

GW = "Goodwill Gains" [36] (capital gains on shares in excess of reported retentions).

It is reasonable to assume that firms will react to that portion of the tax change that bears on cash dividends in the same way as they have reacted to changes in the dividend credit under the existing system,[37] and that they would react to changes in the effective over-all rate of tax in the same way as they reacted in the past to changes in marginal corporate-tax rates. On the basis of these assumptions, we estimate the shock effects of the reforms upon corporate saving by

[35] Unlike the Carter Proposals, under the White Paper stockholders would not receive credit for corporate tax paid on retained earnings, unless they were declared as stock dividends.

[36] For a study of the relative importance of dividends, retentions, and goodwill gains in the over-all rate of return on Canadian equities, see John Bossons' *Rates of Return on Canadian Common Stocks: Dividends, Retentions, and Goodwill Gains.* Royal Commission on Taxation, Study No. 27, Ottawa, Queen's Printer, 1967.

[37] Dividends received from Canadian corporations are subject to a 20 per cent dividend credit under the present system. The dividend credit was originally introduced in 1949 at a level of 10 per cent, and was doubled to the present level four years later.

resident-owned corporations, using an empirically estimated cash-dividend function.[38] The effect on investment in the nonextractive sector is based on an aggregate-investment function,[39] on the further assumption that the elasticity of investment with respect to changes in the after-corporate-tax rate of return is the same as its (negative) interest elasticity.

The estimated negative shock effects of the Carter proposals on investment in the extractive sector are based on a study of that sector by G. D. Quirin.[40] Since the revenue impact of the mineral industry reforms proposed in the White Paper is estimated to be negligible for the first five years,[41] we shall assume that these reforms will also have no effect on investment. (A subsequent computation allowing for a significant reduction in investment in this sector revealed no drastically different results.)

The equations referred to above indicate that, for the typical stockholder in the 35–40 per cent marginal-rate bracket for personal income tax, the Carter proposals would lower the marginal tax burden on corporate-source income, whereas the White Paper proposals would increase it. Hence, the impact effect of the White Paper on investment is negative, whereas, outside the extractive sector, the Carter proposals would have a positive effect.

The impact effect on the demand for assets is based on the various yield sensitivities discussed above, together with estimates, developed by John Bossons,[42] of the impact effects of the alternative tax proposals on after-tax rates of return to shareholders. While Bossons did not consider the specific White Paper proposals, the White Paper proposals may be approximated by a linear combination of two alternatives to the Carter proposals that were explicitly studied by Bossons. As is shown in Table 4, we estimate that, whereas the Carter proposals would raise total after-tax yields to resident noninstitutional investors

[38] An empirical examination of the effects of changes in the dividend credit is contained in the study of corporate savings behavior by Wilson (T. A. Wilson, "Implications of the Carter Corporate Reforms for Corporate Savings Behaviour").

[39] T. A. Wilson, Capital Investment and the Cost of Capital.

[40] G. D. Quirin, op. cit.; cf. White Paper, Table 16, p. 96.

[41] E. J. Benson, op. cit.

[42] J. D. Bossons, "The Effect of the Carter Proposals and Alternative Proposals on Stock Prices." Canadian Tax Foundation, Annual Tax Conference, 1967, pp. 132–152.

TABLE 4

Effects of Alternative Tax Proposals on After-Tax Yields
(Nonextractive Sector)
(*per cent*)

Income Class (thousands of dollars)	Modified Carter [a]	Half-Credit, Half-Gain [b]	Cash Dividend Integration	White Paper [c]
5–6	18.9	−3.1	+2.3	+0.5
8–10	17.1	−5.2	+1.6	−0.7
15–20	11.0	−10.4	−0.6	−3.9
35–50	−0.2	−21.1	−4.8	−10.2
200–300	−8.0	−29.8	−8.0	−15.2
Over-all effect	17.5	−10.0	+1.0	−2.7

[a] Source: John Bossons, "The Effect of the Carter Proposals and of Alternative Proposals on Stock Prices," Table 5, p. 140.

[b] Source: *Ibid.*, Table 6, p. 143.

[c] Assuming marginal personal rates unchanged, the White Paper proposal may be derived by a weighted average of the two alternatives to Carter examined by Bossons; the cash dividend integration scheme has a weight of $2/3$, and the half-credit, half-gain scheme a weight of $1/3$.

by about 17 per cent, the White Paper proposals would depress after-tax yields slightly.[43]

Because these reforms will affect corporate cash flow, investment, and retentions, they must necessarily affect either the dividend outflow to nonresidents or the direct-investment component of the capital inflow. Since the balance-of-payments consequences do not depend on the mechanism of transfer, we shall adopt the convention that the

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[43] This is, of course, consistent with the estimated impact effects on investment. It might, however, be inconsistent with the estimates of the revenue effects of partial integration published in the White Paper itself. Since the White Paper estimates show that integration would lose revenue, the two analyses would be consistent only if the increase in the effective tax burden on investment at the margin is more than offset by the elimination of dividend taxes and the reduction in the taxes to intramarginal stockholders, such as persons in lower income groups, and by the reduction in taxes to owners of closely held corporations (who, under the White Paper proposals, would benefit from the full integration of corporate and personal income taxes).

TABLE 5

Effects of Alternative Tax Proposals on Dividend Outflows
(*millions of dollars per year*)

Variable	Original Carter	Modified Carter	White Paper
Extractive (nonresident)			
Tax revenues [a]	+121	+143	+15
Investment [b]	−94	−94	0
Capital requirements	+27	+49	+15
Increased use of Canadian sources of funds	+7	+13	+4
Reduction in dividend outflow	+20	+36	+11
Nonextractive (nonresident)			
Tax revenues	+117	+138	+197
Investment	0	0	0
Capital requirements	+117	+138	+197
Increased use of Canadian sources of funds	+20	+22	+34
Reduction in dividend outflow	+97	+114	+163

[a] Includes changes in provincial land revenues.
[b] Excludes land costs.

corporate responses to tax changes affect the dividend outflows for the two producing sectors. Table 5 presents the relevant calculations of the effects on these flows, and demonstrates one effect of these tax changes, particularly those of the Carter proposals, which has appeared paradoxical to some observers — that the increase in the tax burden on the corporate-source income of nonresidents would have positive balance-of-payments effects via these financial flows. Given our assumptions, what is happening is that the reduction in corporate cash flow for nonresident firms is greater than the reduction in investment by these firms,[44] so that capital requirements are increased. If the nonresident

[44] Since the marginal corporate income tax rate is not changed for firms outside the extractive sector in any of the reforms, we assume that there will be no change in real domestic investment by any such firms. The estimated reduction in investment by foreign-owned firms in the extractive sector is based on the study by Quirin.

firms continue to finance their over-all capital requirements in the same proportions as between domestic and foreign sources, these firms will have to reduce their dividend outflow (or increase their direct investment into Canada), thereby giving rise to the positive balance-of-payments effects.

Under the original Carter proposals, a great incentive to invest in Canadian equities would be provided to pension funds. It is likely that this incentive would stimulate a large increase in both contractual savings and in the demand for equities. We have taken estimates of both these impact effects from a detailed study by Courchene and Robinson[45] on the likely reaction of life-insurance companies and pension plans to the reforms proposed by the Carter Commission. The estimated total shock effect of the Carter proposals upon personal saving is the sum of the shock effect on contractual saving and the shock effect on discretionary saving. Estimates of the latter, found in the study by Winder, take the former into account and are consistent with them.

The shock effects of the reforms upon foreign direct investment in Canada are zero, since, as noted above, any effects on the flow of funds from foreign firms to their Canadian subsidiaries are represented as opposite adjustments in dividend outflows. However, it is likely that there will.be a small negative shock effect on Canadian direct investment abroad under the Carter proposals, since full integration of the personal and corporate income taxes would increase the attractiveness of domestic investments relative to foreign. Since partial integration would not provide nearly as great an incentive to invest in domestic real assets, we specify a zero impact effect in the analysis of the White Paper proposals.[46]

The alternative vectors of impact effects of the three tax schemes are presented here in Table 6. The detailed calculations underlying these estimates are discussed elsewhere.[47] As is apparent, the vector of impact effects differs sharply between Carter (or modified Carter) and the White Paper, indicating that these are indeed quite different tax systems when viewed in this way.

[45] Courchene and Robinson, *op. cit.*

[46] The proposed treatment of foreign-source income of Canadian corporations is discussed in sections 4.40 and 6.16 of the White Paper.

[47] Dobell and Wilson, *op. cit.*

TABLE 6
Vector of Initial Shocks for Alternative Tax Reform Proposals and Alternative Base Years
(components not shown taken to be zero throughout)

Shock in Equation for:	Carter 1966 [a]				Carter Modified 1969		White Paper 1969	
	Rhomberg				Rhomberg	TRACE	Rhomberg	TRACE
	1:1	1:2	1:4	TRACE				
RE C(12)	-.156	-.156	-.156	-.156	-.168	-.168	-.006	-.006
RN C(13)	-.003	-.003	-.003	-.003	-.027	-.027	-.102	-.102
DPAE C(14)	-.020	-.020	-.020	-.020	-.036	-.036	-.011	-.011
DPAN C(15)	-.097	-.097	-.097	-.097	-.114	-.114	-.163	-.163
CDN C(19)	-.012	-.012	-.012	-.012	-.012	-.012	0	0
CSE C(26)	0	0	0	0	0	0	-.006	-.002
CSN C(27)	.583	.413	.315	.280	.206	.074	-.026	-.009
FSE C(28)	-.039	-.022	-.011	-.008	-.022	-.008	0	0
CF C(31)	-.125	-.069	-.036	-.025	-.069	-.025	0	0
TE C(32)	.176	.176	.176	.176	.204	.204	.022	.022
TN C(34)	.306	.306	.306	.306	.420	.420	.538	.538
TO C(36)	-.301	-.301	-.301	-.301	-.960	-.960	.070	.070
PS C(37)	.120	.120	.120	.120	0	0	0	0
IE C(39)	-.115	-.115	-.115	-.115	-.115	-.115	0	0
IN C(40)	.318	.318	.318	.318	.369	.369	-.186	-.186

[a] For revised (1967) revenue estimates in the original Carter system, set $C(36) = -.582$, $C(37) = .153$.

COMPENSATORY POLICY ADJUSTMENTS

The behavior model developed earlier is designed explicitly for the purpose of examining the equilibrium effects of changes in the tax structure at a given level of national income, and the conventional multiplier-accelerator trappings of models of national-income determination are therefore absent. As noted, in order to evaluate properly the structural effects of specific proposals for tax reform, it is necessary to build in a compensatory mechanism designed to stabilize aggregate demand. Otherwise the results will reflect a mixture of the structural effects and changes in national income, making the results most difficult to interpret, particularly when, as is the case with the White Paper and Carter proposals, the recommended tax structures have opposite effects on government revenue.

In a highly open economy, such as Canada's, a system of fixed-exchange rates means that only those solutions compatible with balance-of-payments equilibrium represent viable choices open to the policymaker.[48] Therefore we further constrain the analysis by setting the rate of change of official holdings of foreign exchange equal to zero, which means that we treat the balance-of-payments equilibrium as a constraint on the solutions.

These two restrictions — balance-of-payments equilibrium and maintenance of aggregate demand at a fixed level — are, of course, not automatically satisfied in the system of equations. In general, in the absence of compensatory macroeconomic policies, a specific set of tax changes would affect aggregate demand and upset the equilibrium in the balance of payments — even if the tax changes had no net impact effect on government revenues.

Balance-of-payments equilibrium, at a given level of aggregate demand, may be ensured by allowing for compensatory variations in general fiscal and monetary policies. In all solutions of the model, the function of interest rates and equity prices is to clear the flows of demands and supplies in the relevant capital markets at yields consistent with balance-of-payments equilibrium. This means that monetary policy must act so as to accommodate the changes in yields necessary,

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[48] Other solutions are necessarily transitory and are therefore inconsistent with the flow equilibrium model that we have constructed.

since the resulting interest rates would not automatically equate the demand for money with the existing stock of money.

In the case of general fiscal policy, two simple alternatives exist: variations in government expenditure and variations in general tax revenues. We use both mechanisms in alternative solutions, since the effects of the changes in the tax structure are not independent of the compensatory fiscal mechanism specified. The use of government expenditure, (G), as a policy instrument presents no conceptual difficulties and may indeed represent the most likely policy action that would be adopted, particularly in the case of a set of revenue-raising reforms put forward by the government itself.[49] However, the use of this variable has the drawback that it implies a contraction or expansion in the size of government expenditure in response to the tax changes, a response that would not be neutral with respect to either interest rates or the balance of trade. Hence, in a comparison of alternative tax reforms that have widely differing effects on government revenues, the comparative effects of using this particular compensatory mechanism could be distorted.

At first glance it is tempting to allow for a general scaling upward or downward of all three tax variables. This is inappropriate, however, since certain features of the recommended tax changes may be regarded as more fundamental than others. In particular, both Carter and the White Paper recommended a particular rate of tax on corporate profits, in part because of prevailing levels of corporate tax rates in the United States. Consequently, in the "general tax compensated"

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[49] Indeed the Canadian business community has expressed the fear that the White Paper proposals are being put forward partly as a means of raising government expenditure levels in the future. However, other possible explanations should be mentioned:

1. because of the uncertainties of estimating the revenue effects of such far-reaching tax changes, the government may hesitate to commit itself to revenue-losing reforms or reductions in rates at this time;
2. since sales-tax reforms are the next item on the tax-reform agenda, the government may intend to spend the revenues gained in the income-tax reforms in sales-tax reductions;
3. the government may feel, in the light of the current economic situation, that a tightening of fiscal policy is desirable;
4. in order to ensure no reduction of revenue in the early transitional years of reform, the government may adopt rates that would ultimately yield revenue increases, intending to introduce successive future tax reductions as the transition proceeds.

solutions, we allow for only TO – general revenues from personal-income and sales taxes – to vary. Since sales taxes are presumably more neutral with respect to saving and investment decisions than are income taxes, purists may choose to regard compensatory changes in TO as resulting from changes in sales taxes alone. Needless to add, a comparison of the solutions using the alternative compensatory mechanism provides some insight into the structural effects of tax-compensated changes in government expenditure as well.

Having specified all the elements to be used in our analysis, we turn, in the next section, to a discussion of the alternative model solutions, and of the implications for capital flows and the balance of payments.

RESULTS AND CONCLUSIONS

MODEL solutions were obtained for three variations on each of the three tax proposals. Using the yield elasticities estimated by Rhomberg, we carried out the computations first with compensating fiscal policy accomplished through expenditure variations, and then through changes in taxes. The third variation involved the use of the TRACE yield sensitivities within a government-expenditure-compensated solution.

The runs analyzing the original Carter reforms are not directly comparable with the others, since the former refer to incomes as of 1964 rather than 1969. We therefore concentrate our discussion on a comparison between the White Paper and the modified Carter proposals, both of which take as their basis the income and revenue structure of the 1969 tax system. First, we shall examine the effects on the balance of payments. Second, we shall consider the implications of these for the equity and bond market. Third, we assess the effects on the sources and uses of gross saving – saving, investment, government revenues, government expenditure, and net exports. Finally, we discuss very briefly the sensitivity of our results to various changes in the underlying assumptions.

BALANCE-OF-PAYMENTS EFFECTS OF THE TAX REFORMS

The consequences of the alternative tax reforms for the components of the balance of payments are summarized in Table 7. All three tax proposals have net positive impact effects on the balance of payments, indicating that in the absence of compensatory policy adjustments and changes in the rates of interest and equity prices, these proposals would cause an increase in the accumulation of official holdings of gold and foreign exchange. This positive impact effect can be traced, in all three cases, to the increase of the tax burden on corporations owned by nonresidents, which causes a reduction in their dividend outflows.

The equilibrium solutions reveal that all the final changes in the components of the balance of payments are modest; however, the pattern of effects differs between the modified Carter and the White Paper proposals in interesting ways. The modified Carter proposals would, according to our estimates, cause a net worsening of the current account on merchandise trade, whereas the White Paper would improve the merchandise balance. This reflects the fact, discussed further below, that the modified Carter proposal would increase investment, whereas the White Paper would reduce it. Since investment has a high import content, this explains the worsening in the balance of merchandise trade that occurs under the modified Carter proposals as compared with the improvement projected under the White Paper proposals.

Of perhaps greater interest — given Canadian concern about foreign ownership and control — are the effects on the various flows of equity and direct investment. The modified Carter proposals apparently would cause a modest (but not trivial) reduction in foreign purchases of Canadian equity (including direct investment). In the tax-compensated solutions, the over-all gross swing [50] in the portfolio-equity and direct-investment flows amounts to $120 million per year

[50] The gross swing is the reduction in Canadian purchases of foreign equity (including direct investment abroad) *plus* the reduction in foreign purchases of Canadian equity (including direct investment in Canada), on the grounds that in an expanding economy both of these changes would tend to increase Canadian ownership of Canadian equity. The net balance-of-payments effect is, of course, the difference between the two equity flows.

TABLE 7

Balance-of-Payments Effects of Selected Tax Reforms [a]

(millions of dollars per year)

| | | | | Equilibrium Solutions | | | | | |
| | | | | G Compensated | | | T Compensated | | |
Flow	Carter	Modified Carter	White Paper	Carter	Modified Carter	White Paper	Carter	Modified Carter	White Paper
				Capital Account					
$-CF$	67	69	2	3	45	-3	3	47	-4
FSE	-22	-22	0	-17	-17	0	-17	-17	0
FSN	0	0	0	-96	-38	-8	-96	-39	-7
FB	0	0	0	31	3	-189	14	-96	-153
FDE	0	0	0	4	3	-6	0	0	-5
FDN	0	0	0	-4	-2	-14	-10	-10	-12
$-CDN$	12	12	0	14	12	-9	7	7	-7
				Current Account					
$-DPAE$	20	36	11	20	36	11	20	36	11
$-DPAN$	97	114	103	97	114	163	97	114	163
X	-31	-37	22	-51	-156	55	-30	-43	14
				Change in Official Reserves					
	143	172	198	0	0	0	0	0	0

[a] All of the entries in the table refer to solutions using the Rhomberg yield sensitivities.

with a net effect on the over-all balance of payments of −$12 million per year. Under the White Paper proposals, the incentive to "buy back" Canadian industry appears to be much less; the gross swing is only $13 million per year, with a slightly larger net negative balance-of-payments effect (−$35 million per year).

In the tax-compensated runs, the proposed reforms cause a reduction in foreign purchases of bonds because of the downward pressure on interest rates. Since the decrease in interest rates is larger under the White Paper, so is the reduction in foreign purchases of bonds. The expenditure-compensated runs give rise to a larger reduction in bond purchases in the White Paper solutions, and a tiny increase in bond purchases under the modified Carter proposals, reflecting the wide divergence in government expenditure necessary to compensate for the divergence in revenue effects.

It is also noteworthy, in comparing the government-expenditure-compensated runs with the tax-compensated trials, that the net balance on merchandise trade is quite sensitive to the compensatory mechanism specified. This reflects the very low import content of government expenditure. Aside from these two items, the equilibrium response of the components of the balance of payments is not much affected by the change in the compensatory mechanism.

The balance-of-payments results thus indicate that, provided appropriate compensatory macroeconomic policies are adopted, the ultimate effect of these two tax reforms upon the components of the balance of payments is quite modest. The estimated changes lie, generally, within observed year-to-year changes in these flows.

CAPITAL MARKETS EFFECTS OF THE TAX REFORMS

TURNING to the capital markets, we see a different picture of the various adjustments in capital flows and of the shifts in yields and relative prices required to achieve equilibrium. Table 8 tabulates the equilibrium effects of the various reform proposals on the bond and equity markets. Under the modified Carter proposals, positive shock effects would occur in the market for nonextractive equities, and negative shock effects in the market for extractive equities.

TABLE 8

Equilibrium Effects in Bond and Equity Markets of Selected Tax Reforms
(*millions of dollars per year*)

| Market | G Compensated | | T Compensated | |
	Modified Carter	White Paper	Modified Carter	White Paper
A. Bond Market				
New issues:				
Extractive	56	18	62	15
Nonextractive	263	68	318	47
Government	−396	−360	−665	−261
Demands:				
Domestic	−79	−86	−189	−46
Foreign	3	−189	−96	−153
Change in interest rate				
(basis points)	0	−31	−16	−25
B. Equity Markets				
Extractive:				
New issues	−7	−5	−9	−4
Domestic demand	10	−5	8	−5
Foreign demand	−38	0	−17	0
Change in relative price				
(per cent)	−8.0	−6.3	−11.2	−5.2
Nonextractive:				
New issues	85	−29	83	−28
Domestic demand	123	−21	122	−21
Foreign demand	−38	−8	−39	−7
Change in relative price				
(per cent)	8.2	−4.1	5.2	−3.1

NOTE: All solutions based on Rhomberg yield sensitivities.

This table shows fairly large changes in flows occurring in the bond market under the modified Carter proposals, mainly as a result of the reduction in government borrowing requirements. This reduction is offset by reductions in demand by both domestic and foreign lenders,

and by increases in new corporate issues in response to the rise in investment and the fall in the rate of interest.

Under the White Paper proposals, these effects, while in the same direction, are muted. This softening of response reflects the reduction in private investment that directly reduces the new issues of corporate bonds, but that indirectly creates a need for a more expansionary fiscal policy. This, in turn, causes a smaller reduction in government borrowing requirements.

Interestingly enough, the adjustments to both sets of reforms apparently require only very modest reductions in interest rates – 16 basis points under the modified Carter proposals, and 25 basis points under the White Paper proposals.

In the equity markets the modified Carter proposals would cause a modest rise in the price of nonextractive equities relative to bonds, while the White Paper would cause a slight reduction. This result mainly reflects the stimulus to investment in nonextractive equities under the modified Carter proposals, and the slight initial reduction in after-tax rates of return to investors that would occur under the White Paper. Given the slight reduction in interest rates that would occur, however, the absolute price of nonextractive equities would, virtually, be unchanged under the White Paper proposals.

Equity prices in the extractive sector would experience a more substantial reduction of 11 per cent under the modified Carter proposals, reflecting the much more stringent tax changes applied to that sector. Under the White Paper proposals, there is not much difference between the two corporate sectors.

Summary sources-and-uses-of-funds statements for the four key runs involving the White Paper and modified Carter proposals are presented in Table 9.

In the tax-compensated solutions, both the White Paper and modified Carter proposals would cause a reduction in private saving and an increase in the government surplus, as well as an increase in net investment abroad. However, the modified Carter proposals would give rise to a much more substantial increase in the government surplus. This difference reflects the divergent effects of the two proposals on total domestic investment: Whereas the modified Carter proposals would give rise to an increase in investment of $299 million, the White

TABLE 9

Summary of Sources and Uses of Funds: Equilibrium Effects of Selected
Tax Reforms
(*millions of dollars per year*)

Sources and Uses [a]	G Compensated		T Compensated	
	Modified Carter	White Paper	Modified Carter	White Paper
Personal saving	8	−109	−105	−68
Corporate saving	−157	−118	−153	−120
Total private saving	−151	−227	−258	−188
Total government revenues	−359	636	665	261
Government expenditure	−755	276		
Government surplus	396	360	665	261
Domestic investment	253	−97	299	−114
Current account balance (net investment abroad)	−6	229	107	188

[a] Sources and uses do not exactly balance because of rounding.

Paper proposals would reduce investment by $114 million. Although a net swing in investment of $400 million is not large, it is also not trivial (it would amount to about five per cent of total plant and equipment expenditures for this past year). Hence we could draw the conclusion that there is a nontrivial difference between the two proposals with respect to the objective of economic growth.[51] For the modified Carter proposals, the use of expenditure changes rather than tax changes in the compensatory mechanism leads to a reduction in the government surplus, which is largely offset by effects on private saving in the current-account balance. Under the White Paper, expenditure compensa-

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[51] Of course a complete assessment of the total impact of these proposals on rates of economic growth must include an analysis of the resource allocation effects and the impact of altered effective marginal tax rates on the supply of labor. On both grounds, however, the modified Carter proposals would appear to have an edge over the White Paper proposals.

tion leads to an increase in the surplus, which is ultimately offset by reductions in private saving and an increase in the current-account balance.

SENSITIVITY OF RESULTS

Before turning to our conclusions, it is worth pausing to consider the sensitivity of our results to variations in some of our basic assumptions. The model presented in this paper is designed to be an explicit general-equilibrium flow model, and many of its parameters are based on empirical estimates. However, many of these estimates have large standard errors, and others are derived on the basis of assumptions for which little evidence can be adduced in support. However, trials embodying elasticities based on the low interest-rate sensitivities from the annual econometric model TRACE show roughly the same qualitative results as those that use the Rhomberg elasticities. The same is true of two further sets of runs (not shown) in which the ratio of the yield sensitivity of bond flows to that of equity flows is allowed to vary from $1:1$ to $1:4$.

Furthermore, in an earlier version of this study dealing only with the original Carter proposals, we also carried out an analysis of the sensitivity of results to variations in a single element or a single column of the coefficient matrix. For coefficients within a wide interval around the estimated values we adopt here, our general conclusions appeared to hold. Thus these sensitivity experiments appear to confirm the general robustness of the over-all system when allowance is made for equilibrating adjustments in asset markets, as well as for the direct impacts of proposed tax structure changes.

CONCLUSIONS

Our purpose in carrying out this analysis has been to study not only the relations between tax changes and capital flows per se (although we find that an increasingly fascinating subject). We have also been motivated by a desire to know whether the requirement to maintain balance-of-payments equilibrium in a highly open economy seriously constrains the scope for policy choices within the general area

of tax reform. Since all our experiments involve the acceptance of a system of fixed exchange rates, they can perhaps be regarded as providing a stringent test of the assumption—frequently made in Canada, both in general and with reference to the two formal tax proposals examined here—that the great degree of openness in our economy means that we cannot freely choose a tax structure radically different from that of our major trading partner.[52]

Our model does not permit us to address the question of the short-run adjustments that may follow upon fundamental changes in the tax structure. It is conceivable—if one believes in the stock-adjustment models now gaining increased currency on theoretical grounds—that very large destabilizing flows of capital could occur during the period in which portfolios are being adjusted following a change in the tax structure. Nevertheless, none of the empirical work we have seen suggests any tendency for flows of saving and wealth accumulation to become as specialized as models having rapid portfolio adjustment would require. Nor do we discount the effects of inertia and institutional rigidities in smoothing the process of stock adjustment likely to follow a major tax-reform bill.

What our results do suggest is that, in any case, once any short-run storm has been weathered, the equilibrium effects of tax changes on capital flows and yields are modest enough to be readily accommodated through the use of normal macroeconomic policies for compensatory purposes.

We have examined three tax-reform proposals, all of which can be described as more fundamental than any tax reform seriously put forward in the United States in the 1960's. Any of the three structural reforms apparently could have been implemented without devastating side effects on the balance of payments or on the flow of funds within the domestic economy. Therefore, we venture the conclusion that it is likely that the internal political constraints within a federal state, and the political pressures exerted by special-interest groups, may well set effective constraints on the choices of federal policymakers regarding the tax structure long before balance-of-payments considerations need become important.

[52] This phrase has recently been repeated *ad nauseam* in some circles despite the fact that there are already major differences between the tax structures of Canada and the United States.