The Sensitivity of the Corporate Income Tax to the Statutory Rate

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February 1997

WORKING PAPER 97-1

Prepared for the
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Abstract

This study examines the implications for the Canadian economy of potential changes in the federal corporate tax rate. There are two major sections: (1) a simulation study of potential tax changes and fiscal offsets, and (2) an extensive examination of the issues in corporate tax impacts and of past research both in Canada and in other industrial countries.

The first section presents a series of macroeconometric model simulations intended to show the economic impact of possible reductions in the federal corporate statutory rate – both alone and in combination with policies designed to neutralize the fiscal impact of the corporate tax cut.

A first set of simulations examines the impact of a hypothetical reduction in the federal statutory corporate tax rate. Under the most favourable assumption for monetary policy, there are positive impacts on real GDP and employment diminishing to zero near the end of the 10-year simulation horizon. There is also a permanent but modest increase in the capital stock due to accumulated additional investment stimulated by the corporate tax cut. But there is little significant tax recapture and the increase in investment in each year is always considerably less than the *ex ante* corporate tax cut.

The second set of simulations offsets the corporate tax rate cut with three different revenue-raising measures. With an offsetting increase in the Personal Income Tax, a corporate rate cut has virtually no impact on real GDP in the short run and a small positive impact in the longer run with a modest increase in the capital stock. With an increase in the Employment Insurance premium rate as the offset, there are negative impacts on GDP for most of the simulation and corresponding negative impacts on the federal fiscal balance, but there is still an increase in the capital stock. With a reduction in capital cost allowances there is a negative impact on GDP throughout and a *reduction* in investment and the capital stock.

The second part of the paper reviews the literature dealing with key issues related to corporate tax policy and conducts some additional exploratory empirical analysis. In particular, it examines the potential effects of changes in the tax structure on the corporate tax base – especially the impact of changes in statutory rates on the base. The results suggest that the increase in the tax base would provide a modest (10-12 percent) offset to the initial revenue loss from a reduction in the rates.

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1. Introduction

This study examines the implications for the Canadian economy of potential changes in the federal corporate income tax (CIT) rate. We have approached the subject on two broad fronts: a simulation study of potential tax changes and fiscal offsets, and an extensive examination of the issues in corporate tax impacts and past research both in Canada and in other industrial countries.

Section two below presents a series of macroeconometric model simulations intended to show the economic impact of possible reductions in the federal corporate statutory rate – both alone and in combination with policies designed to neutralize the fiscal impact of the corporate tax cut. The simulations were conducted with the FOCUS macroeconometric model, built and maintained at the Institute for Policy Analysis of the University of Toronto.

A first set of simulations examines the impact of a hypothetical 5 percentage point reduction in the federal statutory corporate tax rate. Several alternative assumptions are made about the responses of the Bank of Canada to the tax cut. A simulation horizon of 10 years (1997-2006) was chosen so as to begin to pick up the long-term effects of increases in the capital stock if, as we supposed, a corporate tax cut led to increases in investment above what might otherwise occur.

Under the most favourable assumption for monetary policy (one that permits some additional inflation in response to the stimulus of the corporate tax cut) there are positive impacts on real GDP and employment through most of the 10-year simulation horizon. The positive impact on GDP peaks in the fourth and fifth years of the simulation with increases of just over .4 percent in GDP (just over $3 billion 1986 dollars). Employment impacts peak in the fifth year at just over 50,000 additional person-years of employment added. By the tenth year of the simulation, output and employment impacts have largely disappeared – as would be expected from a long-run neo-classical model that tends, after shocks, to return to full employment. After 10 years, however, there is also a .4 percent increase in the capital stock due to accumulated additional investment stimulated by the corporate tax cut. Once demand had fully adjusted, this would imply a permanent increase in GDP of .1 to .2 percent.

Before allowance is made for tax recapture or for feedback effects on government revenues and expenditures through the economy, the hypothetical 5 percentage point corporate tax cut "costs" from $3 billion to $5 billion (depending on the year) in lost revenue. While there are positive impacts on GDP and employment, these are not large enough to yield a significant tax recapture (the extent of recapture on corporate taxes is in all years considerably less than $1 billion). The federal deficit worsens by just over $3 billion in the first year of the simulation to almost $7 billion in the tenth year as, among other things, interest payments on extra accumulated debt build over the simulation span. There are, however, improvements in the combined fiscal balances of the provinces of about $0.5 billion to $1 billion per year.

As noted, the corporate tax cut does stimulate investment and lead to an increase in the capital stock. However, the increase in investment in each year is always less than $1 billion – considerably less than the *ex ante* corporate tax cut of $3-5 billion.

The second set of simulations offsets the corporate tax rate cut with three different revenue-raising measures. We consider increases in the personal income tax (PIT), increases in the employment insurance (EI) premium rate, and reductions in the capital consumption allowances (CCAs) on new investments (which serve to increase corporate tax collections). The simulations are again run assuming several alternative responses by the Bank of Canada.

For comparison purposes, we concentrate on the simulations in which it is assumed the Bank of Canada manages interest rates so as to keep nominal GDP unchanged from the base case. With this monetary response and an offsetting increase in the PIT, a corporate rate cut has virtually no impact on real GDP in the short run and a small positive impact in the longer run (around 0.1 percent) with an increase in the capital stock after 10 years of about 0.7 percent. There is also a small net improvement in the federal fiscal balance. With an increase in the EI premium rate as the offset, there are negative impacts on GDP for the first eight years of the simulation and corresponding negative impacts on the federal fiscal balance. There is, however, still a positive stimulus to investment with the capital stock up 0.5 percent after 10 years. With a reduction in capital cost allowances there is a negative impact on GDP throughout and a *reduction* in investment and the capital stock – the disincentive to invest from the reduced CCAs is greater than the incentive from a reduced corporate tax rate.

The third section of the paper reviews the literature dealing with key issues related to corporate tax policy. As noted above, the FOCUS model equations reveal significant effects of tax policy on investment. While this issue remains controversial, it is heartening to learn that the most recent studies that use micro data have found that taxation does matter, and are therefore broadly supportive of our analysis.

The other key tax policy issues relate to the potential effects of changes in the tax structure on the corporate tax base – in particular the impact of changes in statutory rates on the base.

There are several channels by which multinational firms can shift their tax bases from high to low tax jurisdictions. Domestic firms have incentives to change their sources of finance when statutory rates are changed. A recently published paper by Shum (1996) enables us to calculate the strength of the latter effect. We also carried out some exploratory work to estimate the influence of Canada-U.S. corporate tax differentials on the corporate tax base.

Taken together, these results suggest that the increase in the tax base in response to a reduction in statutory rates would provide a modest (10-12 percent) offset to the initial revenue loss from a reduction in the rates.

2. Simulation Study of the Sensitivity of the Corporate Income Tax to Statutory Rate Changes

In this section we present a series of macroeconometric model simulations designed to show the impact on the corporate income tax, and on other major economic indicators, of reductions in the corporate statutory rate – both alone and in combination with other policies to offset any net revenue losses.

Section 2.1 introduces the FOCUS macroeconometric model used to conduct the study. It also describes in greater detail the key features of the model's corporate tax equation and of the its private-sector investment equations – the equations with the greatest relevance to this study.

Section 2.2 concludes our examination of the model by listing all the *potential* major paths by which a change in the statutory tax rate might affect corporate tax revenues and then identifying both those that should be captured by FOCUS and those that are missing from the current specification. We also discuss briefly how possible alternative specifications might affect the results obtained.

Section 2.3 examines a series of simulations in which only the corporate statutory tax rate is changed. Several simulations are presented, each assuming a different response by the monetary authorities to the assumed corporate tax reduction.

Section 2.4 presents a further series of simulations in which the corporate tax-rate cut is combined with some other revenue-enhancing measure (e.g. corporate tax base broadening or an increase in payroll taxes) so that the net effect is neutral on the federal deficit. Again, several alternative responses by the Bank of Canada are examined. The section concludes with a brief comparison of the effectiveness of these various fiscal offset alternatives.

2.1 The FOCUS Macroeconometric Model

FOCUS is a quarterly macroeconometric model of the Canadian economy, developed and maintained at the Institute for Policy Analysis, University of Toronto. In size, FOCUS is a medium-scale model consisting of 300+ behavioural equations and identities and somewhat over 600 variables in total.

The model's orientation is Keynesian, as opposed to Monetarist or Neo-Classical, but the model does depict full-employment long-run equilibria in addition to the familiar under-employment equilibria of the Keynesian short-run. Some care has been taken in developing the model's structural equations to ensure that they embody desirable long-run properties as well as plausible short-run dynamics.

While the model is not Monetarist in structure, it turns out that model simulations show monetary policy to be generally quite powerful – as is perfectly possible in an open-economy Keynesian IS-LM model, depending on relative slopes and elasticities. For this reason, we pay close attention to the response of the Bank of Canada to fiscal shocks, or to the assumed targets for monetary policy, in the simulation experiments below.

As is of course appropriate, FOCUS is an open-economy model with endogenous (and sensitive) international trade and capital flows. The exchange rate is also fully endogenous, but it is not determined by a regression equation of its own; rather it is a market-clearing price used to "balance" the balance of payments. Any shock to trade or to capital flows (short or long) can and usually will have an effect on the exchange rate. However, our estimation work for FOCUS does not yield a "perfect capital mobility," Mundell-Fleming world in which our interest rate is determined solely by foreign rates (or, in the textbook depiction, in which the "external balance"

curve is flat). Although capital flows in FOCUS are quite sensitive to interest-rate changes, international trade is also sensitive to domestic demand and to prices, and it is the interaction of both these elements that determines the path of the exchange rate. A common "litmus test" for the foreign side of a macro model is to ask what happens to the exchange rate when government expenditure is increased. In a (near) perfect capital mobility world, an increase in government expenditure tends to raise interest rates, producing a massive capital inflow that appreciates the exchange rate and chokes off any multiplier from the fiscal stimulus. In FOCUS, an increase in government expenditure raises interest rates and brings capital inflows, but it also raises aggregate demand and stimulates imports, and it raises prices further, stimulating imports and discouraging exports. The net result in FOCUS is a depreciation of the exchange rate that actually amplifies the multiplier.

Moreover, the "supply-side" of the model is fully developed and quite powerful in affecting simulation results in the long run, through effects on labour-force participation and, especially, through changes in the capital stock. The wage equation (an "expectations augmented Phillips Curve") will tend to push the economy to full-employment (although the model's estimated lags and coefficients suggest the process is a protracted one). To the extent that changes in corporate tax rates affect investment, they will have cumulating effect on the capital stock and on aggregate supply, as will be shown in some of the simulations below.

Finally, while short-run models often can ignore stock effects, FOCUS tracks both government and foreign debt stocks, which in turn have important feedback effects on interest payments and hence on government deficits and domestic income. These cumulative effects will become apparent in the longer-run results of some of the simulations.

A full description of the FOCUS model is available in the model's documentation[1] (available on request). However, there are two equation groups in the model that bear especially on the subject of the sensitivity of revenues to the corporate tax rate: the corporate tax equation itself and the equations describing private-sector non-residential investment. We now describe these sections in greater detail.

2.1.1 The FOCUS Corporate Tax Equation

The following is a brief description of the Federal Corporate Tax equation of FOCUS. A more detailed description (drawn from the FOCUS Model Manual) is available on request.

Throughout the FOCUS model we attempt to build tax equations by constructing as detailed an identity as possible of (rate x base) and then estimating a simple regression relating this construct to actual tax collection data from the National Accounts. Limits on the detail that can be included in the (rate x base) construct are imposed by the level of detail elsewhere in the model. The federal corporate tax equation in FOCUS is as follows:

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[1] FOCUS: Quarterly Forecasting and User Simulation Model of the Canadian Economy. Version 94A, by Peter Dungan and Gregory Jump, Institute for Policy Analysis, University of Toronto, 1995.

Federal Corporate Tax (national accounts basis) = TAXCALC x

(1.10 – .113 DTAX – .052 J4AYC/J4AYC(-1) – .047 J4AYC/J4AYC(-2) ....

... –.0043 J4AYC/J4AYC(-12))

Sum of coefficients on J4AYC/J4AYC(-i) terms = –.337

TAXCALC is the model's approximation to (rate x base) using detail available in the model. It is calculated as the weighted average of the High and Low Income Federal Corporate Tax rates times a measure of taxable income. The measure of taxable income is equal to corporate plus government business profits, less the difference between capital consumption allowances (national accounts concept) and Capital Cost Allowances for tax purposes. There are further small adjustments for royalty deductions and for inventory allowances (when they were in effect).

DTAX is a dummy for the major revision to corporate taxes in 1972. It has the value of 1 prior to reform and 0 after. The coefficient indicates that more revenues were generated after this reform than before for any given value of TAXCALC – as would be expected.

The "J4A.." terms are to capture the effects of loss carry-forwards and similar adjustments over time. J4A stands for a four-quarter moving average and YC is corporate profits. The higher is the current four-quarter moving average of YC relative to its past values over the last 12 quarters, the *lower* will be federal corporate taxes for any current value of TAXCALC due to the presence of loss carry-forwards and previously unused tax credits[2]. In the long run, the value of J4AYC over its lags will tend to a number slightly greater than 1.0 (because of trend growth in the nominal YC). The long-term impact of a $1 increase in TAXCALC will therefore be just under $0.76 on federal corporate taxes (1.10 - 0.34), indicating that our initial (rate x base) proxy from the model overpredicts actual federal collections. Fortunately, however, these coefficients appear to be relatively stable over different estimation periods, indicating that the ratio between the (rate x base) proxy and actual collections can be relied upon.

2.1.2 The FOCUS Private Non-Residential Investment Equations

Following the National Accounts, FOCUS divides private non-residential investment into the categories "machinery and equipment" (M&E) and "non-residential structures" – the latter also including all engineering investment (such as hydro dams) and other construction and development related investments (such as architects' fees and some mineral exploration). A slightly different approach is taken to modelling each component. (Detailed equation descriptions from the FOCUS manual are available on request).

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[2] The ratio of taxable income to a lagged moving average could also be affected by loss carry-backs. If loss carry-backs dominated loss carry-forwards, the coefficient on this variable would then be negative. The fact that the estimated coefficient is positive indicates that the carry-forward of losses and unused credits is more important than loss carry-backs. This result is not surprising given the generally large volume of unused credits and deductions.

Gross investment in new non-residential structures is determined by depreciation replacement for the stock of real structures and by current and lagged values of the difference between the after-tax real rate of return on new investment and the after-tax real rate of interest. Of course, the higher the real after-tax rate of return relative to the real after-tax rate of interest, the higher will be investment. The corporate tax rate enters this equation in two (opposing) ways. First, a lower corporate rate will raise the after-tax rate of return on new investment. However, it will also raise after-tax interest costs since nominal interest charges represent a smaller deduction at a lower tax rate. The overall effect is positive for investment, but it is important to note that the "negative" effect from the after-tax real interest side actually depends upon *nominal* interest rates, and can be higher at nominal interest rates higher than those in the base we have used.

There is no explicit stock-adjustment mechanism in the actual FOCUS investment equation for non-residential structures, but the same effect prevails with a long lag. A sustained drop in the corporate tax rate will encourage net new investment by increasing the after-tax rate of return to new capital (which is very roughly proxied as an average of the recent gross rate of return to the existing capital stock). However, as investment proceeds the capital stock builds and, generally, more so than corporate cash flow, so the rate of return variable gradually declines back to its base value, together with the level of *net* investment (but not the size of the capital stock).

A portion of investment in M&E represents "overhead" investment, which is associated with non-residential structures. The basic idea is that no "empty" plants are built – they all come equipped with a fixed component of equipment. This portion of M&E is influenced by corporate taxes in the same way as non-residential structures.

The remainder of M&E (roughly 60 percent of the total) represent the "variable" component of equipment. The equation for this component of investment in machinery and equipment is more of a straightforward Jorgensonian user-cost-of-capital equation. In this approach to investment, it is possible for a corporate tax change to have no effect on the desired stock of capital, and hence on investment. This occurs if all capital financing at the margin is by borrowing and if all interest charges are deductible from tax. In this case, a change in the corporate tax rate leaves the profit-maximizing level of investment unchanged (although after-tax profits do change infra-marginally). This result does not hold in FOCUS, and a reduction in corporate taxes does generate some investment in M&E, but the effect is not huge and the Jorgensonian formulation, in which the corporate tax rate operates on both the returns and the cost of capital side, is the reason. Moreover, the Jorgensonian machinery and equipment equation is explicitly a stock-adjustment model. A change in the corporate tax rate changes the desired level of the capital stock; net investment responds *until* the new stock level is reached and then falls back to base levels. Note, however, that it is *net* investment that falls back to base levels. Since the capital stock is now larger, there is greater depreciation in each year and therefore *gross* investment (net investment plus replacement investment) will be higher than base.

Alternative theories of investment will, of course, produce different impacts on investment for a change in the corporate tax rate. A pure accelerator model, in which investment is driven by changes in GDP, will generate virtually zero impact for a corporate tax change. On the other hand, an "available funds" model, in which firms do not profit maximize, but instead growth maximize subject to a profit constraint, might generate large impacts, since retained earnings are

the cheapest and least-constrained funds available to firms and, of course, are directly affected by corporate taxes.[3]

2.2 Paths by Which the Corporate Tax Rate Can Affect Revenues: Those in the Model and Those Not Included

Obviously, there are a number of paths by which a change in the corporate tax rate will affect corporate (and other) tax revenues – aside from the direct impact of a rate change applied to the existing base. In this section we briefly catalogue the main routes and note whether or not they are present in the FOCUS model.

First, there is the traditional "aggregate demand" or "multiplier" path: A corporate tax rate reduction will (at least potentially) stimulate aggregate investment demand – hence the need to examine the investment equations in FOCUS. As noted above, however, on some theoretical bases this effect need not be large. Moreover, in the longer run it may be temporary in that a change in the corporate tax rate may alter the desired level of the capital stock, and any impact on net investment will cease when the new desired capital stock level is attained (although gross investment may be permanently increased).

Nonetheless, some demand impact might be expected in the short run, and this will generate higher corporate taxes by increasing the size of the corporate tax base somewhat. Of course, there may be far larger effects on government balances (at all levels of government) through other categories of revenues (and expenditures); for example, increased personal and payroll tax collections and reduced employment insurance expenses.

The FOCUS model was designed to capture these multiplier effects and their impacts on revenues and expenditures. Note that it also captures some important leakages: For example, the model recognizes that machinery and equipment expenditures have a much higher import content than many of the other categories of final demand, and this will tend to reduce the multiplier (depending on monetary and exchange-rate policy).

These multiplier effects may be all the larger in experiments conducted for the next few years since the base case used describes a significant output gap, and unused resources that can be employed by a tax cut. However, in the long-run the model tends to full employment and the effects of a pure demand impact will evaporate. The long-run effect of a reduction in corporate taxes will probably be some change in the mix of final demand but not a change in the aggregate level unless the supply side of the economy has been affected. The final effects on corporate revenue and on total budget balances will depend on the demand mix change and on any supply impacts.

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[3] In fact, earlier versions of the FOCUS investment equations contained a rudimentary "cash flow" variable with a modest positive effect. However, this term is not statistically significant when introduced into the equation estimated on the currently available data set.

It is also important to recognize that any aggregate demand impacts on corporate revenues or total government balances will also be affected by the response of the Bank of Canada. This too the model can handle, and we examine a number of possible monetary responses in the simulations below.

A second, but smaller path of impact from a corporate tax change is through corporate after-tax incomes and their eventual distribution. The increased after-tax profits resulting from a corporate tax rate cut can be held in retentions or distributed as dividends either to Canadians (which will augment the base of the personal income tax) or to foreigners (which will affect withholding taxes). FOCUS captures both these effects. In the model, the ratios by which increased after-tax earnings are distributed to foreigners, to Canadians and into retentions are not affected by the corporate tax rate itself.[4]

A third route by which the corporate tax rate may affect corporate tax revenue is through its impact on international transfer pricing. Changes in corporate tax rates may affect the corporate tax base by altering the behaviour of multinational corporations (MNCs). If the statutory rate in Canada increases above the rate in another country in which the MNC operates, it could trigger changes in transfer prices,[5] international shifts in debt or even redirection in foreign direct investment, all of which could reduce the corporate tax base over time.[6] These effects are absent from the FOCUS model, since the corporate income component of the tax base is determined residually from the income=expenditure identity. We have conducted some tests of the sensitivity of the corporate tax base to Canada-U.S. corporate rate differentials. The variable has the expected negative sign, but its coefficient was statistically insignificant and quantitatively small.

Following from three above, a fourth path of potential effect is through real investment in Canada stimulated by the desire of multinationals to site plants in Canada (or away from it) due to the Canadian corporate tax rate. This is likely to be a non-linear function of both the Canadian and foreign effective tax rates. A decision to site (or not) in Canada would of course affect the corporate tax base both through a demand effect (while the investment was in progress) and then through the higher economic activity associated with the extra capital stock once in place. There would also perhaps be some temporary impact on international capital flows, which might have temporary effects on the aggregate economy and hence on corporate tax revenues. The FOCUS model does not directly capture this effect either. Or, strictly speaking, the effect has been linearized around the Canadian corporate tax rate only, through its impact in the two investment

[4] An increase in corporate retentions would presumably be reflected in higher equity values, which would increase future capital-gains taxes when the gains are realized. This effect is not captured in FOCUS.

[5] Transfer pricing is also affected by the transfer pricing rules implemented by the fiscal authorities of different countries.

[6] It is important to note that other dimensions of the corporate income tax – such as Capital Consumption Allowance rates, investment and research and development credits, and loss carry-forward/carry-back rules, also affect the relative attractiveness of investment in different countries.

equations described above. That is to say, one of the reasons why a higher Canadian corporate tax rate leads to lower investment in the FOCUS investment equations would be because some international investment is sited outside Canada. The more non-linear the response would be under a hypothetical change in the corporate tax rate (say, as the Canadian rate got further and further from the rates of competitive jurisdictions), the more the FOCUS model will understate the impact on investment, the corporate tax base and hence on corporate revenues.

Fifth and finally, there is a potential impact of corporate tax rate changes on corporate tax revenues through the switching of corporate financing from equities to debt or vice versa. An increase in the corporate statutory rate could induce an increase in debt financing relative to equity financing by domestic firms. The size of this response depends on the effective personal tax rate on dividends, capital gains and interest income, as well as on the corporate rate. Basically, if the combined CIT/PIT rate on income from equities is greater than the PIT rate on interest, firms would have a tax incentive to finance via debt rather than equity. The FOCUS model does not incorporate this potential causal path, nor is debt vs. equity financing specifically tracked. The FOCUS model may therefore understate positive impacts on the corporate tax base of a corporate rate reduction. However, in this case it will tend to be more accurate for total government balances, since it will also not correspondingly reduce the personal income tax base.

2.3 Simulating the Impact of A Corporate Tax Rate Cut With No Fiscal Offsets

We turn now to examine the FOCUS model simulations of a hypothetical corporate income tax rate cut. The simulations shown in this section are for a rate cut only, under several alternative responses by the Bank of Canada. In the subsequent section we will examine the joint impact of a rate cut and several alternatives designed to replace the lost revenue.

Simulations are run over the period 1997-2006, permitting an analysis of medium-term impacts. An arbitrary corporate rate reduction of 5 percentage points was selected for the experiments. Note that it is notionally the federal rate on large manufacturing and non-manufacturing firms that is being cut. In FOCUS, the non-manufacturing and manufacturing rates for large corporations (and the federal corporate surtax) are all blended in one basic rate; the percentage change in the tax rates shown in Table 2.1 is not therefore exactly what one would expect from applying a 5 percentage point reduction to a given statutory rate. Note also that the rate used in the model is before the abatement (currently 10 percentage points) applied to give corporate tax room to the provinces. The "effective" marginal corporate tax rate shown in Table 2.1 only reflects the application of the abatement and the average provincial corporate tax rate; it is not the "effective" rate defined in terms of cost of capital.

The simulations are conducted using a base case for the Canadian economy for 1997-2006 that was prepared recently by the Policy and Economic Analysis Program. Details of the base case are generally unimportant, since we are concerned solely with the impact of changes in key policy variables. Most relevant is the fact that the base case sees considerable underemployment in the Canadian economy through at least the year 2000. The corporate rate cut is therefore imposed in a situation of less-than-full employment where some slack exists to produce for additional demand. The results would generally show less output change and more price response if the

base case were significantly closer to full employment. Also relevant is the fact that in the base case, the share of corporate profits in GDP is generally growing through the year 2000, and corporate profit taxes are therefore growing faster than GDP, and faster than some other government revenue sources as well. As a result, a cut in the corporate tax rate will have a larger impact, both in dollar terms and in relation to GDP, as we proceed through the estimation period.

Table 2.1 shows the impact of a "null" solution. In this experiment, only the equation for federal corporate taxes is operating and the rest of the model is shut off. The results indicate the *ex ante* impact of our selected rate reduction on corporate revenues, before any allowance is made for tax recaptures through the "multiplier."

As can be seen, the rate cut selected costs just over $3 billion in corporate tax revenue (again, *ex ante*) in 1997. This dollar figure rises steadily to just over $5 billion by 2006. In each year, given the linear nature of the equation, and that no feedback is yet permitted, this represents about 19.5 percent of base federal corporate tax revenues.

Before proceeding with full model simulations, we must make some decision as to the response of the monetary authorities. For this and subsequent experiments, we will generally examine three possibilities. The first assumes that the Bank of Canada responds quite passively, maintaining whatever money growth path is in the base case (very loosely, a "Friedman" type approach) and accepting whatever changes result in real GDP, the exchange rate and the price level. This option ("Money Targets Base Money Supply" in the tables) is the closest to textbook IS/LM descriptions of shocks in which the money supply is unchanged and the LM curve stays put (except when prices begin to move). This case also may be relevant in situations in which, even if there is some extra inflation, it might be deemed that the Bank of Canada would tolerate it because they are in the lower range of their target inflation band.

The second monetary response assumed is that the Bank of Canada targets the base CPI ("Money Targets Base CPI"). In this alternative, the Bank is assumed to set short rates such that there is no change from base in the CPI, despite whatever shock we impose on the model. In effect, this alternative is a strict interpretation of the Bank’s stated target for monetary policy. The base is assumed to have the desired or proper evolution of the CPI, and no deviations are permitted in response to shocks.

The third monetary response takes another popular target for monetary policy and assumes the Bank will set short rates so that base case *nominal* GDP is maintained ("Money Targets Base Nominal GDP").

Tables 2.3 - 2.5 show detailed model results from cutting the corporate tax rate by 5 percentage points under the three possible monetary responses described above. Table 2.2 summarizes the results of each of these simulations, plus the "null solution," for corporate tax revenues and for the aggregate federal balance.

The results of these three simulations can be briefly described as follows:

(1) When **monetary policy targets the base money supply** (Table 2.3), the corporate tax rate cut provides mild stimulus to domestic demand and real GDP. The effect peaks at just over 0.4 percent of GDP (approximately $3.1 billion in 1986 dollars) and diminishes thereafter as the economy slowly adjusts back to its full-employment level. The primary impact is on non-residential investment and on machinery and equipment investment. Nonetheless, despite a corporate tax cut of from $3 - $5 billion (depending on the year), the increase in investment is under $1 billion in each year. There are secondary impacts on consumption and on residential investment from increases in income and reductions in unemployment. Exports are marginally stimulated because the exchange rate depreciates under the extra demand, but imports increase considerably more and the current account shows a negative impact.

With output up, there are increases in employment and a drop in the unemployment rate. With a lag, the drop in unemployment causes the real wage to rise and this puts upward pressure on the price level. After 10 years, the CPI is almost 1 percent above base, but there has been at most a 0.16 percentage point increase in the inflation rate (which diminishes thereafter), so it might be argued that the Bank of Canada would permit at least this much inflationary response.

After five years or so, the effect of the shock on real output begins to diminish to zero. Aggregate price pressures from the employment side are part of the cause (recall that the nominal money supply is fixed), and there are diminished impacts on both categories of private business investment and especially for machinery and equipment. Recall that the latter had an explicit stock-adjustment mechanism; when the desired new capital stock is reached, net investment falls back to base values. For non-residential structures, stock adjustment is at work, as well as a reduction in corporate profits relative to GDP as wage costs build up. Residential investment shows a large cyclical response as stock-adjustment works itself out.

In the longer run, the simulation should support a small permanent increase in real GDP because there has been a net addition to the capital stock of about 0.4 percent. This partly shows up in the real GDP gains we do observe in the last several years of the simulation, however the last year of the experiment shows a negative impact on real GDP because several cyclical responses are still working themselves out.

As far as corporate revenues are concerned, the experiment shows a modest amount of net corporate tax recapture, but at maximum only in the range of $200 - $300 million. Given that the "null" cut in corporate taxes is approximately 19 percent and that pre-tax corporate profits improve by at most 1.4 percent in the simulation, the low rate of recapture is perhaps not surprising. Given the causal routes in FOCUS, any major improvement in this recapture rate would require a bigger positive stimulus to real GDP (or prices).

If we consider the federal balance as a whole, the recapture looks a bit better. By the fourth year of the simulation, $700 million of the $4 billion *ex ante* loss of that year has been recovered through higher taxes of all kinds or reduced transfer expenditures. Unfortunately, the improvement in the federal balance does not last. As the years progress, the level of federal debt is rising above base, and with it the level of interest payments on the debt. By the tenth year of

the simulation, the federal balance is actually $1.8 billion *worse* than the *ex ante* revenue loss calculation.

Finally, it might be noted that there is also some recapture at the non-federal level. The corporate tax rate cut improves provincial balances by a maximum of just under $1.2 billion by the fifth year of the simulation.

(2) When **monetary policy targets the base** CPI (Table 2.4), monetary policy must be more restrictive than in the previous simulation, since we observed there that the CPI rose by almost a full percentage point above base by the tenth year. In the present simulation, interest rates rise by between 10 and 15 basis points and the exchange rate comes to appreciate by about 0.1 percent in order to keep the CPI from rising above base. Of course, as a result, there is much less of an impact on real GDP. The fact that there is any increase at all is due to at least two factors: First, the monetary restriction entails an appreciation of the exchange rate and this works more strongly on the CPI than on the GDP deflator. Some increase in aggregate demand (and therefore eventually on employment and wages) can take place, raising domestic prices at factor cost but not the CPI due to its imported content now made slightly cheaper by the appreciation. Second, there is still a modest increase in the capital stock, which permits output to be slightly higher without putting any pressure on prices.

Within a nearly fixed GDP, there is still significant movement among components. The lower corporate tax rate still stimulates private non-residential investment, although the effect is certainly smaller due to higher interest rates and reduced corporate profits relative to the previous simulation. GDP is kept roughly unchanged because higher interest rates seriously discourage housing investment, and because an appreciated dollar discourages exports.

Not surprisingly, the fiscal results of this simulation are not encouraging. There is *no* corporate tax recapture. In fact, there are some slight additional losses because the appreciated dollar bites into corporate profits and there are higher interest charges. The total federal balance shows a worse impact than the pure *ex ante* revenue loss throughout, with the effect steadily worsening. With virtually no additional net economic activity or inflation, other revenues and program expenditures are largely unchanged from base, while higher interest rates immediately impact upon debt interest payments. Then, as debt grows through accumulated deficits, interest payments rise still more.

(3) Finally, if **monetary policy targets nominal GDP**, there is a still smaller gain in real GDP, with a small reduction in prices. There is still less capital stock accumulation, and negative, impacts on corporate revenues and on the federal balance are greater. Note that this simulation is not a particularly interesting or relevant one for a pure corporate tax rate cut; however, this monetary policy can be an interesting alternative when the corporate rate cut is combined with revenue-raising measures, and is included here for comparison purposes.

2.4 Simulating the Impact of A Corporate Tax Rate Cut With Selected Fiscal Offsets

It is clear from the simulations above that a major corporate tax rate cut will have a serious negative effect on the federal deficit, even *ex post*. We therefore consider several alternative fiscal offset moves that might be put in place together with the corporate rate cut in order to keep deficits from being worsened.

In each simulation below, the fiscal offset was calibrated to yield a revenue gain equal to the corporate tax rate revenue loss *ex ante.* Thus, for example, if the corporate tax cut "costs" $4 billion in the year 2000, and the selected offset is the PIT, then PIT is raised by $4 billion in 2000, and so on for each year of the simulation and for each selected offset. Of course, because the corporate tax rate and the selected offset may have very different impacts on the economy, and because those effects may vary with the selected monetary response, it is likely that there will be an *ex post* impact on the federal deficit, whether positive or negative.

The fiscal offsets examined are:

1) an increase in federal personal income taxes;

2) an increase in the EI contribution rate; and

3) an increase in the corporate tax base by reducing capital cost allowances.

2.4.1 Offset by Personal Income Tax

For this simulation, the federal PIT is increased by the amount of the "null" solution reduction in federal corporate tax revenues. In the model, there are no supply-side impacts (e.g., discouraged effort or participation rate behaviour) from this tax increase. The impacts are almost totally a result of the increased taxes reducing disposable income, and the subsequent multiplier effects.

Results for this experiment under the three monetary response assumptions are presented in Tables 2.6 - 2.8. From the results, when **money targets the base money supply**, it is clear that the PIT outweighs the corporate rate reduction in impact on the economy. For the first several years of the experiment, there is net negative impact on both GDP and prices. With the economy pushed below base employment, there is a lagged negative effect on real wages and then something of a snap-back in real output in the last several years. From longer-term simulations with FOCUS, we have confirmed that this is part of a long and damped oscillating response of the model to a demand shock. However, there is also some positive impact appearing in the later years from the accumulation of capital encouraged by the corporate rate reduction. Finally, while the *ex ante* deficit impact of the combined shock is neutral, the greater demand impact of the PIT, leading to reduced GDP, also yields a negative impact on the federal deficit through almost the entire period. Despite a small turnaround in the last year of experiment due to the snap-back in GDP, the federal debt/GDP ratio is still almost 1 percentage point worse due to the accumulation of past deficits.

Interestingly, this simulation actually serves to stimulate more investment than does the corporate tax rate cut alone. By seven years into the simulation, investment is up over $1 billion above base, and by the final year it is up $1.5 billion. Still, both of these figures are well below the $3 -$5 billion in corporate tax revenue foregone. The reason for the extra stimulus is that, with PIT increasing, interest rates fall more than when there is no fiscal offset, thereby giving an extra small boost to investment.

When the Bank of Canada **targets base CPI**, much of the negative impact of the combined fiscal shock is undone by somewhat looser monetary policy. GDP impacts fluctuate modestly around zero, and there is some indication at the end that the extra capital stock encouraged by the corporate rate reduction is having a net positive impact on GDP. The deficit impact also fluctuates under this shock with, in the later years, a small reduction in the federal debt/GDP ratio.

Finally, when the Bank of Canada **targets nominal GDP**, the result is very little change at all in either real GDP or prices. In the last several years, there is a marginal increase in real GDP obtained with no inflationary pressure, indicating that the 0.7 percent increase in the capital stock obtained by the tenth year is having a supply-side effect. This simulation actually generates the largest sustained increase in investment of any of the experiments tried – but the $1.5 billion of extra investment generated by the tenth year of the simulation is still well below the *ex ante* corporate tax cut. The impact on the federal budget balance is small but uniformly positive, and largely the result of the lower interest rates the Bank of Canada can set because of the net fiscal restriction of the combined corporate tax cut and PIT increase. The provincial balance shows, however, a small negative impact. This is because lower interest rates have a relatively smaller effect on provincial expenditures, and because the shift in GDP (away from consumption and into investment and net exports) caused by the joint policy move, adversely affects provincial retail sales tax revenues. (GST revenues are also negatively affected, but do not dominate the reduction in interest on the debt.)

2.4.2 Offset by Employment Insurance Contribution Rate

This experiment is designed to examine the impact of offsetting a corporate tax rate reduction through new or increased payroll taxes on businesses. We have chosen to do this by using the EI contribution or premium rate, since it is the only federal payroll tax now in existence (and consequently the only one in the FOCUS model).[7] It would be unlikely that the EI could itself be used for this purpose, since the premium rate is at least indirectly tied to the EI system balance. Moreover, the EI premium is split between employers and employees (in a ratio of 1.4 to 1.0) while a pure payroll tax would fall entirely on employers (although it would likely be passed through to real wages in time). Nonetheless, using the EI contribution rate should give us some idea of the impact of a pure payroll tax when combined with a corporate rate reduction. As will be seen, the model indicates on the whole that an EI premium increase would be a poor offset to

[7] The other payroll taxes in the model include CPP/QPP contributions by employers and employees, and provincial payroll taxes.

a corporate rate reduction, and the results would only be worse if a pure, employer-only, payroll tax were to be used instead.

To do the simulations, we have calculated the EI premium increase necessary *ex ante* to raise the same amount of revenue as is being lost through the corporate tax rate reduction. It turns out that the necessary EI premium increase (on the employee portion) varies between 0.0045 percent and 0.0055 percent, where the 1996 employee premium is 0.0295 percent. Thus the increase required is about 17 percent of the current premium. Since the base case has the EI premium rate declining to 0.019 percent by 2004, the necessary premium increase is an even larger percentage of the base premium in later years.

Results under the three assumed monetary responses are shown in Tables 2.9 - 2.11.

With **monetary policy targeting the base money supply**, the impact of the combined policies on GDP is strongly negative for at least six years. There is a smaller snap-back beginning by the ninth year and the capital accumulation at the end of the simulation is lower than under the PIT offset. Moreover, in the initial years of the simulation the impact on prices is positive, despite the GDP loss. This is because the employer portion of the EI premium increase is at least partly passed through to prices, since it raises unit labour costs. Only after a number of years of unemployment higher than base do real wages decline sufficiently to absorb the premium increase from the employers' perspective. With lower GDP and a significant shift out of consumption, it is no surprise that both federal and provincial deficits are worsened for much of the simulation period.

Because this particular fiscal offset actually increases inflation in the short and medium terms, when the **Bank of Canada targets CPI** the effect is to worsen the initial downturn even more – GDP is down an unrealistic 3 percent in the second year of the simulation. Such a sharp downturn generates a swifter snap-back through reduced wages and prices and the Bank, to hit its CPI base target, then becomes expansionary. This, in turn, overshoots in the other direction, causing another round of tightening – and so on. Under a cost-push shock of this sort, a rigid CPI target yields excessively severe oscillations. Nonetheless, the average effect on GDP is clearly negative, and the capital stock on average appears to decline as the positive impact of a lower corporate tax rate is wiped out by severely higher interest rates. The simulation also yields poor results for the federal balance, with the federal debt/GDP ratio rising several percentage points.

A smoother result is forthcoming if we assume that the **Bank of Canada targets nominal GDP** (see Table 2.11). There is a prolonged negative impact on GDP (and a positive impact on prices), but eventually the payroll tax is passed through and both prices and output return to near base. The capital stock is increased (although again not to the extent as under a PIT increase), but there is a prolonged period of increased deficits that increases the federal debt/GDP ratio by about 0.5 percentage point by the tenth year.

2.4.3 Offset by Reducing Capital Cost Allowances

In the final offset simulation set, the fiscal impact of the corporate rate cut is assumed to be offset by a widening of the corporate tax base through reduction in capital consumption allowances on

new investment. As it turns out, preliminary tests with the model indicated that to offset a full 0.5 percentage point reduction in the corporate tax rate would require that capital consumption allowances on new capital be virtually eliminated. Instead, it was decided to impose a 20 percent reduction in capital consumption allowances and cut the corporate tax rate by an amount representing roughly the same revenue. From the model and base case, it was found that a 1 percentage point reduction in the corporate rate was needed for approximate *ex ante* fiscal balance. The results for the null solution with these two policy moves are shown in Table 2.12.

The results of this policy combination under the alternative monetary responses are shown in Table 2.13 - 2.15. We turn immediately to the case in which money targets base nominal GDP (Table 2.15). As can be seen, the impact is a slight reduction in GDP and a very slight increase in prices. The effect gets larger in the later years from the supply side, because the real capital stock is actually declining relative to base in this alternative. That is, the capital cost allowance reduction has a larger effect on investment than does the corporate tax rate cut. It will be seen that investment is consistently below base in the simulation. The Bank of Canada has had to cut interest rates somewhat to stimulate housing, consumption and a mild exchange-rate depreciation to raise net exports.

Interestingly, the impact of this experiment on the federal balance is positive in all but the first year. Although GDP is slightly lower, so are interest rates, with a positive effect on debt-interest payments. Moreover, final demand is shifted from investment to (among other things) consumption and residential construction, both of which are more subject to both GST and provincial retail sales taxation. Finally, positive impacts on balances cumulate over time into lower debt interest payments.

2.4.4 The Alternative Fiscal Offsets Compared

Table 2.16 compares results from the alternative fiscal offset for real GDP, the capital stock and the federal government balance. Results for the case in which the Bank of Canada targets base nominal GDP are shown; this response offers the smoothest results in the long-run, while staying close to the Bank's announced long-term policy target.

While judgment will vary with the weights on different objectives, it appears to us that the PIT increase (however unpalatable politically) is the superior alternative. Under the chosen monetary target there is no short-run loss in GDP and there are modest long-run gains because of gradual additional capital accumulation. There are no inflation impacts and there are modest gains in the federal balance. The latter indicates that, if *ex post* fiscal neutrality were the objective, somewhat smaller PIT increases than we have imposed would be needed. On the other hand, the payroll tax increase results in short-term output loss, a lower impact on the capital stock and a negative *ex post* impact on the federal balance. And reduced capital cost allowances actually work to *reduce* investment and the capital stock.

Table 2.1

FOCUS MODEL – INSTITUTE FOR POLICY ANALYSIS

Corporate Tax Rate Reduced by 5 Percentage Points
Null Solution – *Ex Ante* Impact on Corporate Taxes
(Impacts are percentage changes unless otherwise indicated)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Nominal Pre-Tax Corporate Profits ($ bill)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nominal Pre-Tax Corporate Profits	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nominal After-Tax Corporate Profits ($ bill)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nominal After-Tax Corporate Profits	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Federal Corporate Tax Revenues ($ bill)	-3.07	-3.31	-3.64	-4.00	-4.39	-4.64	-4.83	-4.96	-5.11	-5.20
Federal Corporate Tax Revenues	-19.56	-19.58	-19.60	-19.60	-19.60	-19.59	-19.58	-19.57	-19.56	-19.55
Federal "High" Rate of Corporate Tax (% pt)	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
Federal "High" Rate of Corporate Tax	-14.29	-14.29	-14.29	-14.29	-14.29	-14.29	-14.29	-14.29	-14.29	-14.29
Effective Marginal Corp Tax Rate (% pt)	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
Effective Marginal Corp Tax Rate	-12.63	-12.63	-12.63	-12.63	-12.63	-12.63	-12.63	-12.63	-12.63	-12.63

Table 2.2

Fiscal Impacts of a 5 Percentage Point Cut in the Federal Corporate Tax Rate

Experiment	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Impact on Federal Corporate Tax Revenues ($ bill)										
Null Solution	-3.1	-3.3	-3.6	-4.0	-4.4	-4.6	-4.8	-5.0	-5.1	-5.2
Money Targets Base	-3.0	-3.2	-3.5	-3.8	-4.2	-4.4	-4.6	-4.8	-4.9	-5.0
Money Supply (Change from Null)	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Money Targets Base	-3.1	-3.3	-3.7	-4.1	-4.5	-4.7	-4.9	-5.0	-5.2	-5.3
CPI (Change from Null)	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	-0.1
Money Targets Base	-3.1	-3.3	-3.7	-4.1	-4.5	-4.7	-4.9	-5.0	-5.2	-5.3
Nominal GDP (Change from Null)	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	-0.1
Impact on Federal Balance ($ bill)										
Null Solution	-3.1	-3.3	-3.6	-4.0	-4.4	-4.6	-4.8	-5.0	-5.1	-5.2
Money Targets Base	-3.1	-3.1	-3.1	-3.3	-3.7	-4.1	-4.8	-5.5	-6.3	-7.0
Money Supply (Change from Null)	0.0	0.2	0.5	0.7	0.7	0.5	0.0	-0.5	11.4	-1.8
Money Targets Base	-3.2	-3.6	-4.4	-5.0	-5.6	-6.2	-6.8	-7.3	-7.9	-8.6
CPI (Change from Null)	-0.1	-0.3	-0.8	-1.0	-1.2	-1.6	-2.0	-2.3	-2.8	-3.4
Money Targets Base	-3.3	-3.9	-4.6	-5.2	-5.8	-6.4	-7.0	-7.6	-8.3	-8.9
Nominal GDP (Change from Null)	-0.2	-0.6	-1.0	-1.2	-1.4	-1.8	-2.2	-2.6	-3.2	-3.7

Table 2.3

FOCUS MODEL – INSTITUTE FOR POLICY ANALYSIS

Corporate Tax Rate Reduced by 5 Percentage Points
Money Targets Base Money Supply

Experiment	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
				(Impacts are percentage changes unless otherwise indicated)						
Real Gross Domestic Product	0.07	0.24	0.37	0.43	0.43	0.36	0.24	0.13	0.02	-0.04
Real GDP (Change in $ 1986 bill)	0.45	1.57	2.57	3.10	3.15	2.71	1.92	1.01	0.20	-0.32
Consumption	0.01	0.18	0.40	0.54	0.57	0.53	0.42	0.28	0.15	0.05
Business Investment	0.39	0.71	0.80	0.79	0.73	0.65	0.55	0.44	0.35	0.28
Non-Residential Construction	0.44	0.86	1.10	1.17	1.16	1.12	1.06	1.01	0.99	1.01
Machinery and Equipment	0.37	0.65	0.70	0.66	0.59	0.50	0.39	0.26	0.15	0.05
Residential Construction	0.05	0.33	0.70	0.92	0.87	0.58	0.15	-0.30	-0.66	-0.86
Exports	0.02	0.08	0.15	0.20	0.22	0.21	0.17	0.12	0.07	0.03
Imports	0.02	0.11	0.26	0.36	0.41	0.41	0.37	0.29	0.21	0.14
Consumer Price Index	0.01	0.03	0.09	0.19	0.32	0.48	0.63	0.76	0.85	0.89
CPI Inflation Rate (Change in % pts)	0.01	0.03	0.06	0.10	0.14	0.16	0.16	0.13	0.09	0.04
Labour Productivity	0.06	0.15	0.17	0.15	0.12	0.08	0.04	0.01	0.00	0.00
Capital Stock	0.01	0.08	0.16	0.24	0.30	0.35	0.38	0.40	0.40	0.39
Employment (% change)	0.02	0.11	0.23	0.31	0.33	0.29	0.22	0.12	0.03	-0.04
Employment (Change in '000)	3.0	16.0	33.4	46.8	50.8	45.7	34.0	19.2	4.5	-6.7
Unemployment Rate (Change in % pts)	-0.01	-0.08	-0.15	-0.20	-0.21	-0.18	-0.12	-0.05	0.01	0.05
Industrial Bond Rate (Change in % pts)	0.01	0.03	0.05	0.07	0.07	0.08	0.08	0.07	0.07	0.06
Exchange Rate (US$/C$)	-0.05	-0.18	-0.33	-0.48	-0.60	-0.70	-0.76	-0.78	-0.78	-0.76
Current Account Balance (Change in $ bill)	-0.19	-0.70	-1.19	-1.58	-1.82	-1.95	-1.97	-1.92	-1.87	-1.90
Federal Surplus/Deficit (Change in $ bill)	-3.08	-3.05	-3.12	-3.30	-3.68	-4.14	-4.76	-5.45	-6.26	-6.96
Ratio of Federal Debt to GDP (Change in % pts)	0.20	0.44	0.66	0.87	1.12	1.40	1.73	2.11	2.52	2.97
Prov'l Surplus/Deficit (Change in $ bill)	0.09	0.46	0.79	1.05	1.16	1.12	0.95	0.72	0.48	0.30
Federal Corporate Tax Revenues (% change)	-19.35	-19.08	-18.89	-18.72	-18.66	-18.70	-18.77	-18.83	-18.86	-18.83
Federal Corporate Tax Revenues (Change in $ bill)	-3.03	-3.22	-3.50	-3.82	-4.18	-4.43	-4.63	-4.78	-4.92	-5.00

Table 2.4

FOCUS MODEL – INSTITUTE FOR POLICY ANALYSIS

Corporate Tax Rate Reduced by 5 Percentage Points
Money Targets Base CPI

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	(Impacts are percentage changes unless otherwise indicated)									
Real Gross Domestic Product	0.05	0.08	0.06	0.03	0.02	0.02	0.02	0.04	0.04	0.00
Real GDP (Change in $ 1986 bill)	0.29	0.54	0.43	0.18	0.14	0.14	0.12	0.33	0.32	0.04
Consumption	0.01	0.17	0.31	0.32	0.26	0.22	0.22	0.23	0.24	0.22
Business Investment	0.37	0.53	0.35	0.20	0.22	0.30	0.27	0.20	0.16	0.05
Non-Residential Construction	0.41	0.66	0.67	0.64	0.69	0.74	0.73	0.73	0.72	0.66
Machinery and Equipment	0.36	0.48	0.25	0.05	0.07	0.15	0.12	0.03	-0.02	-0.15
Residential Construction	-0.04	-0.40	-0.67	-0.61	-0.37	-0.31	-0.48	-0.44	-0.42	-0.60
Exports	0.00	0.00	-0.04	-0.07	-0.09	-0.10	-0.09	-0.08	-0.07	-0.07
Imports	0.05	0.18	0.27	0.25	0.21	0.20	0.17	0.13	0.14	0.11
Consumer Price Index	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Labour Productivity	0.04	0.04	0.02	0.00	0.02	0.03	0.03	0.05	0.04	0.02
Capital Stock	0.01	0.07	0.12	0.14	0.14	0.16	0.18	0.19	0.19	0.19
Employment (% change)	0.01	0.04	0.05	0.03	0.00	-0.01	-0.01	0.00	0.00	-0.01
Employment (Change in '000)	2.1	6.4	7.2	3.8	0.3	-1.1	-1.8	-0.5	0.7	-1.6
Unemployment Rate (Change in % pts)	-0.01	-0.03	-0.03	-0.01	0.00	0.01	0.01	0.00	0.00	0.01
Industrial Bond Rate (Change in % pts)	0.04	0.13	0.17	0.14	0.11	0.13	0.16	0.16	0.19	0.21
Exchange Rate (US$/C$)	0.00	0.02	0.08	0.13	0.15	0.16	0.14	0.11	0.11	0.12
Current Account Balance (Change in $ bill)	-0.28	-1.11	-1.78	-2.19	-2.44	-2.76	-3.07	-3.35	-3.92	-4.52
Federal Surplus/Deficit (Change in $ bill)	-3.16	-3.62	-4.35	-5.03	-5.61	-6.15	-6.80	-7.29	-7.90	-8.62
Ratio of Federal Debt to GDP (Change in % pts)	0.22	0.58	0.99	1.45	1.92	2.40	2.89	3.38	3.88	4.40
Prov'l Surplus/Deficit (Change in $ bill)	0.08	0.33	0.45	0.45	0.39	0.35	0.38	0.44	0.46	0.42
Federal Corporate Tax Revenues (% change)	-19.47	-19.59	-19.76	-19.89	-19.90	-19.92	-19.91	-19.84	-19.89	-19.98
Federal Corporate Tax Revenues (Change in $ bill)	-3.05	-3.31	-3.67	-4.06	-4.45	-4.72	-4.91	-5.03	-5.19	-5.31

Table 2.5

FOCUS MODEL – INSTITUTE FOR POLICY ANALYSIS

Corporate Tax Rate Reduced by 5 Percentage Points
Money Targets Base Nominal GDP

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	(Impacts are percentage changes unless otherwise indicated)									
Real Gross Domestic Product	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02
Real GDP (Change in $ 1986 bill)	0.09	0.16	0.16	0.16	0.18	0.21	0.23	0.23	0.13	0.15
Consumption	0.01	0.15	0.28	0.28	0.26	0.24	0.25	0.25	0.22	0.18
Business Investment	0.34	0.42	0.25	0.18	0.23	0.25	0.19	0.11	0.06	0.05
Non-Residential Construction	0.37	0.55	0.60	0.64	0.70	0.72	0.71	0.69	0.67	0.71
Machinery and Equipment	0.33	0.37	0.13	0.03	0.08	0.09	0.02	-0.07	-0.14	-0.15
Residential Construction	-0.20	-0.77	-0.84	-0.55	-0.34	-0.38	-0.47	-0.49	-0.48	-0.42
Exports	-0.01	-0.04	-0.06	-0.09	-0.10	-0.09	-0.08	-0.08	-0.08	-0.07
Imports	0.07	0.16	0.21	0.21	0.20	0.19	0.16	0.13	0.11	0.07
Consumer Price Index	-0.01	-0.01	-0.02	-0.03	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
CPI Inflation Rate (Change in % pts)	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
Labour Productivity	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.03
Capital Stock	0.01	0.06	0.10	0.11	0.12	0.14	0.15	0.15	0.15	0.14
Employment (% change)	0.00	0.01	0.01	0.04	0.00	0.00	0.00	0.00	-0.01	-0.01
Employment (Change in '000)	0.5	1.2	1.3	1.0	0.7	0.4	0.3	0.1	-0.9	-1.6
Unemployment Rate (Change in % pts)	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Industrial Bond Rate (Change in % pts)	0.07	0.16	0.16	0.13	0.13	0.16	0.18	0.19	0.18	0.18
Exchange Rate (US$/C$)	0.04	0.08	0.13	0.17	0.18	0.17	0.16	0.15	0.14	0.11
Current Account Balance (Change in $ bill)	-0.37	-1.17	-1.76	-2.18	-2.58	-2.92	-3.28	-3.70	-4.24	-4.73
Federal Surplus/Deficit (Change in $ bill)	-3.28	-3.91	-4.59	-5.17	-5.79	-6.40	-7.04	-7.64	-8.30	-8.90
Ratio of Federal Debt to GDP (Change in % pts)	0.24	0.65	1.09	1.55	2.03	2.52	3.03	3.54	4.07	4.60
Prov'l Surplus/Deficit (Change in $ bill)	0.05	0.27	0.39	0.40	0.39	0.40	0.44	0.46	0.44	0.40
Federal Corporate Tax Revenues (% change)	-19.61	-19.73	-19.83	-19.87	-19.86	-19.85	-19.84	-19.84	-19.85	-19.74
Federal Corporate Tax Revenues (Change in $ bill)	-3.07	-3.33	-3.68	-4.06	-4.45	-4.70	-4.89	-5.03	-5.18	-5.25

Table 2.6

FOCUS MODEL – INSTITUTE FOR POLICY ANALYSIS

Corporate Tax Rate Reduced by 5 Percentage Points
Compensating Increase in Personal Income Tax (Ex Ante)
Money Targets Base Money Supply

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	(Impacts are percentage changes unless otherwise indicated)									
Real Gross Domestic Product	-0.15	-0.33	-0.42	-0.39	-0.30	-0.15	0.02	0.18	0.30	0.36
Real GDP (Change in $ 1986 bill)	-0.96	-2.21	-2.90	-2.81	-2.22	-1.15	0.17	1.47	2.49	3.06
Consumption	-0.39	-0.83	-1.02	-1.05	-0.98	-0.81	-0.59	-0.36	-0.17	-0.05
Business Investment	0.32	0.47	0.47	0.52	0.61	0.71	0.84	0.95	1.04	1.09
Non-Residential Construction	0.37	0.57	0.66	0.78	0.93	1.07	1.19	1.28	1.34	1.36
Machinery and Equipment	0.30	0.43	0.41	0.43	0.50	0.60	0.72	0.85	0.95	1.01
Consumer Price Index	0.00	-0.02	-0.10	-0.21	-0.35	-0.49	-0.62	-0.69	-0.72	-0.69
CPI Inflation Rate (Change in % pts)	0.00	-0.02	-0.07	-0.11	-0.14	-0.15	-0.13	-0.08	-0.02	0.03
Labour Productivity	-0.11	-0.16	-0.11	-0.03	0.03	0.10	0.16	0.21	0.23	0.22
Capital Stock	0.01	0.06	0.11	0.16	0.20	0.26	0.32	0.39	0.46	0.53
Employment (% change)	-0.06	-0.20	-0.33	-0.38	-0.34	-0.25	-0.13	-0.01	0.10	0.17
Employment (Change in '000)	-7.9	-28.4	-49.1	-57.0	-52.6	-39.0	-20.6	-1.1	15.9	26.9
Unemployment Rate (Change in % pts)	0.04	0.13	0.22	0.24	0.21	0.14	0.06	-0.02	-0.09	-0.13
Industrial Bond Rate (Change in % pts)	-0.02	-0.04	-0.06	-0.07	-0.07	-0.06	-0.05	-0.04	-0.03	-0.02
Exchange Rate (US$/C$)	0.01	0.07	0.19	0.28	0.35	0.37	0.36	0.32	0.25	0.17
Current Account Balance (Change in $ bill)	0.19	0.64	1.19	1.50	1.57	1.51	1.33	1.10	0.89	0.80
Federal Surplus/Deficit (Change in $ bill)	-0.30	-0.68	-1.17	-1.47	-1.50	-1.31	-0.95	-0.52	-0.10	0.24
Ratio of Federal Debt to GDP (Change in % pts)	0.11	0.29	0.47	0.64	0.79	0.88	0.92	0.90	0.84	0.76
Prov'l Surplus/Deficit (Change in $ bill)	-0.28	-0.62	-0.91	-1.01	-0.94	-0.71	-0.38	-0.03	0.28	0.49
Federal Corporate Tax Revenues (% change)	-20.15	-20.46	-20.61	-20.70	-20.61	-20.46	-20.29	-20.16	-20.08	-20.07
Federal Corporate Tax Revenues (Change in $ bill)	-3.16	-3.46	-3.82	-4.23	-4.61	-4.85	-5.01	-5.11	-5.24	-5.33

Table 2.7

FOCUS MODEL – INSTITUTE FOR POLICY ANALYSIS

Corporate Tax Rate Reduced by 5 Percentage Points
Compensating Increase in Personal Income Tax (Ex Ante)
Money Targets Base CPI

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	(Impacts are percentage changes unless otherwise indicated)									
Real Gross Domestic Product	-0.16	-0.23	0.01	0.17	0.00	0.04	0.25	0.06	-0.03	0.35
Real GDP (Change in $ 1986 bill)	-1.00	-1.53	0.06	1.22	0.04	0.32	1.95	0.52	-0.28	2.98
Consumption	-0.39	-0.83	-0.95	-0.77	-0.53	-0.50	-0.52	-0.43	-0.42	-0.42
Business Investment	0.31	0.55	0.99	1.45	1.02	0.48	0.97	1.25	0.67	1.05
Non-Residential Construction	0.36	0.68	1.23	1.59	1.23	1.08	1.56	1.49	1.16	1.75
Machinery and Equipment	0.29	0.50	0.92	1.40	0.94	0.28	0.78	1.17	0.52	0.84
Consumer Price Index	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Labour Productivity	-0.11	-0.08	0.15	0.17	-0.02	0.09	0.23	0.03	0.04	0.36
Capital Stock	0.01	0.06	0.14	0.27	0.41	0.44	0.46	0.54	0.60	0.61
Employment (% change)	-0.06	-0.17	-0.13	0.02	0.02	-0.04	0.04	0.04	-0.08	0.02
Employment (Change in '000)	-8.2	-24.3	-19.8	3.0	3.1	-5.9	5.9	6.2	-12.2	3.8
Unemployment Rate (% pts)	0.04	0.11	0.08	-0.02	-0.02	0.02	-0.03	-0.03	0.06	-0.02
Industrial Bond Rate (Change in % pts)	-0.01	-0.14	-0.30	-0.11	0.11	-0.11	-0.25	0.06	-0.05	-0.36
Exchange Rate (US$/C$)	0.01	-0.09	-0.35	-0.46	-0.38	-0.44	-0.49	-0.30	-0.32	-0.54
Current Account Balance (Change in $ bill)	0.18	1.05	2.28	2.05	1.41	2.53	2.90	1.42	2.64	4.52
Federal Surplus/Deficit (Change in $ bill)	-0.32	-0.36	0.41	0.85	-0.18	-0.14	1.06	0.34	-0.43	1.29
Ratio of Federal Debt to GDP (Change in % pts)	0.12	0.22	0.11	-0.06	-0.02	0.00	-0.14	-0.15	-0.08	-0.23
Prov'l Surplus/Deficit (Change in $ bill)	-0.29	-0.55	-0.51	-0.25	-0.08	0.02	0.05	-0.13	-0.12	0.23
Federal Corporate Tax Revenues (% change)	-20.17	-20.03	-19.32	-19.27	-19.74	-19.38	-19.02	-19.89	-19.71	-18.50
Federal Corporate Tax Revenues (Change in $ bill)	-3.16	-3.38	-3.58	-3.94	-4.42	-4.59	-4.69	-5.05	-5.15	-4.92

Table 2.8

FOCUS MODEL – INSTITUTE FOR POLICY ANALYSIS

Corporate Tax Rate Reduced by 5 Percentage Points
Compensating Increase in Personal Income Tax (Ex Ante)
Money Targets Base Nominal GDP

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	(Impacts are percentage changes unless otherwise indicated)									
Real Gross Domestic Product	0.02	0.01	0.00	0.00	0.00	0.02	0.04	0.07	0.10	0.12
Real GDP (Change in $ 1986 bill)	0.12	0.09	0.00	-0.01	0.03	0.14	0.35	0.58	0.84	1.04
Consumption	-0.39	-0.75	-0.79	-0.72	-0.68	-0.65	-0.59	-0.50	-0.41	-0.31
Business Investment	0.50	1.02	1.16	1.01	0.89	0.94	1.04	1.06	1.05	1.03
Non-Residential Construction	0.60	1.09	1.25	1.22	1.24	1.32	1.39	1.42	1.43	1.45
Machinery and Equipment	0.47	0.99	1.13	0.94	0.77	0.81	0.92	0.95	0.93	0.90
Consumer Price Index	0.03	0.06	0.08	0.09	0.08	0.06	0.04	0.01	-0.02	-0.05
CPI Inflation Rate (Change in % pts)	0.03	0.03	0.02	0.01	-0.01	-0.02	-0.03	-0.03	-0.03	-0.03
Labour Productivity	0.02	0.02	0.02	0.05	0.07	0.08	0.11	0.12	0.14	0.15
Capital Stock	0.02	0.10	0.23	0.33	0.41	0.46	0.52	0.58	0.64	0.68
Employment (% change)	0.00	0.00	-0.02	-0.05	-0.06	-0.06	-0.05	-0.04	-0.03	-0.02
Employment (Change in '000)	0.7	-0.1	-3.5	-6.9	-8.9	-9.4	-8.5	-7.0	-4.9	-2.9
Unemployment Rate (Change in % pts)	0.00	0.00	0.02	0.03	0.04	0.04	0.04	0.03	0.02	0.01
Industrial Bond Rate (Change in % pts)	-0.17	-0.20	-0.11	-0.09	-0.12	-0.14	-0.13	-0.11	-0.10	-0.09
Exchange Rate (US$/C$)	-0.22	-0.38	-0.42	-0.46	-0.44	-0.40	-0.36	-0.33	-0.29	-0.23
Current Account Balance (Change in $ bill)	0.68	1.26	1.70	2.16	2.45	2.62	2.77	2.93	3.15	3.33
Federal Surplus/Deficit (Change in $ bill)	0.34	0.76	0.63	0.41	0.43	0.55	0.62	0.67	0.74	0.86
Ratio of Federal Debt to GDP (Change in % pts)	-0.02	-0.10	-0.17	-0.21	-0.24	-0.28	-0.32	-0.36	-0.41	-0.46
Prov'l Surplus/Deficit (Change in $ bill)	-0.16	-0.29	-0.33	-0.25	-0.23	-0.25	-0.23	-0.15	-0.05	0.05
Federal Corporate Tax Revenues (% change)	-19.46	-19.45	-19.51	-19.56	-19.63	-19.66	-19.69	-19.73	-19.76	-19.84
Federal Corporate Tax Revenues (Change in $ bill)	-3.05	-3.29	-3.62	-3.99	-4.39	-4.66	-4.86	-5.00	-5.16	-5.27

Table 2.9

FOCUS MODEL – INSTITUTE FOR POLICY ANALYSIS

Corporate Tax Rate Reduced by 5 Percentage Points
Compensating Increase in UI Contribution Rate (Ex Ante)
Money Targets Base Money Supply

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	(Impacts are percentage changes unless otherwise indicated)									
Real Gross Domestic Product	-0.32	-0.76	-1.03	-1.15	-1.10	-0.85	-0.47	-0.06	0.31	0.57
Real GDP (Change in $ 1986 bill)	-2.07	-5.05	-7.15	-8.24	-8.10	-6.45	-3.68	-0.46	2.58	4.81
Consumption	-0.43	-1.14	-1.62	-1.84	-1.86	-1.64	-1.22	-0.72	-0.24	0.14
Business Investment	0.25	0.25	0.12	0.07	0.11	0.26	0.50	0.77	1.01	1.16
Non-Residential Construction	0.20	0.28	0.31	0.40	0.56	0.82	1.12	1.39	1.60	1.72
Machinery and Equipment	0.26	0.24	0.05	-0.04	-0.04	0.08	0.30	0.57	0.82	0.99
Consumer Price Index	0.40	0.69	0.74	0.69	0.48	0.18	-0.14	-0.41	-0.58	-0.62
CPI Inflation Rate (Change in % pts)	0.41	0.29	0.05	-0.06	-0.21	-0.31	-0.32	-0.27	-0.17	-0.04
Labour Productivity	-0.17	-0.32	-0.30	-0.22	-0.12	0.03	0.18	0.29	0.35	0.35
Capital Stock	0.01	0.04	0.06	0.06	0.06	0.08	0.11	0.18	0.27	0.37
Employment (% change)	-0.18	-0.50	-0.81	-1.00	-1.04	-0.91	-0.66	-0.33	-0.01	0.25
Employment (Change in '000)	-25.3	-71.6	-118.5	-150.3	-158.6	-141.0	-103.1	-53.1	-1.3	41.5
Unemployment Rate (Change in % pts)	0.12	0.34	0.54	0.66	0.67	0.56	0.38	0.15	-0.07	-0.23
Industrial Bond Rate (Change in % pts)	-0.01	-0.04	-0.07	-0.09	-0.10	-0.09	-0.08	-0.05	-0.02	0.01
Exchange Rate (US$/C$)	-0.13	-0.15	0.00	0.15	0.30	0.40	0.42	0.34	0.18	-0.02
Current Account Balance (Change in $ bill)	-0.34	0.00	0.91	1.61	1.95	1.99	1.67	1.10	0.45	-0.07
Federal Surplus/Deficit (Change in $ bill)	-0.25	-1.03	-2.05	-2.91	-3.40	-3.44	-2.76	-1.77	-0.59	0.55
Ratio of Federal Debt to GDP (Change in % pts)	-0.02	0.15	0.45	0.80	1.17	1.47	1.66	1.72	1.65	1.49
Prov'l Surplus/Deficit (Change in $ bill)	-0.22	-0.70	-1.28	-1.70	-1.82	-1.55	-0.91	-0.08	0.79	1.52
Federal Corporate Tax Revenues (% change)	-20.26	-20.41	-20.70	-20.76	-20.65	-20.29	-19.86	-19.36	-18.99	-18.76
Federal Corporate Tax Revenues (Change in $ bill)	-3.18	-3.45	-3.84	-4.24	-4.62	-4.81	-4.90	-4.91	-4.96	-4.99

Table 2.10

FOCUS MODEL – INSTITUTE FOR POLICY ANALYSIS

Corporate Tax Rate Reduced by 5 Percentage Points
Compensating Increase in UI Contribution Rate (Ex Ante)
Money Targets Base CPI

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	(Impacts are percentage changes unless otherwise indicated)									
Real Gross Domestic Product	-2.45	-3.29	1.17	1.24	-2.97	-0.37	2.92	-2.77	-2.79	3.80
Real GDP (Change in $ 1986 bill)	-15.71	-21.91	8.08	8.87	-22.01	-2.84	22.88	-22.27	-23.08	32.14
Consumption	-0.45	-2.06	-2.85	-0.78	1.28	-0.21	-0.75	0.72	-0.84	-1.90
Business Investment	-1.75	-4.68	2.16	8.98	-1.30	-7.33	4.41	3.78	-8.50	0.38
Non-Residential Construction	-2.41	-4.06	3.59	5.62	-3.59	-3.23	5.47	-0.84	-6.48	4.22
Machinery and Equipment	-1.51	-4.90	1.67	10.09	-0.55	-8.65	4.08	5.26	-9.14	-0.83
Residential Construction	-10.37	-16.83	14.06	14.44	-22.51	-8.29	23.11	-8.81	-23.81	19.78
Exports	-1.17	-1.92	-0.17	0.28	-1.07	-0.30	0.94	-1.11	-1.23	1.49
Imports	1.82	-1.71	-3.54	2.45	3.23	-3.85	-0.97	5.73	-3.15	-5.34
Consumer Price Index	0.01	0.01	0.00	0.00	0.01	-0.02	-0.02	0.01	0.00	-0.05
Labour Productivity	-1.81	-1.03	2.55	0.58	-2.55	1.18	2.49	-2.98	-0.64	4.03
Capital Stock	-0.04	-0.43	-0.73	0.13	0.87	0.07	-0.38	0.47	0.18	-0.69
Employment (% change)	-0.91	-2.53	-1.16	0.74	-0.71	-1.49	0.66	-0.05	-2.32	0.11
Employment (Change in '000)	-128.2	-363.6	-170.3	111.4	-108.9	-231.5	104.0	-7.9	-373.3	18.4
Unemployment Rate (Change in % pts)	0.63	1.71	0.69	-0.62	0.46	0.98	-0.54	0.02	1.60	-0.18
Industrial Bond Rate (Change in % pts)	1.98	-0.22	-3.35	1.06	4.06	-1.77	-2.01	4.85	-0.19	-2.96
Exchange Rate (US$/C$)	2.93	2.73	-0.59	0.02	2.25	-0.57	-1.29	3.17	0.71	-3.08
Current Account Balance (Change in $ bill)	-6.92	-1.19	9.15	-7.59	-16.51	9.08	2.95	-32.32	2.27	22.88
Federal Surplus/Deficit (Change in $ bill)	-7.92	-13.47	5.25	5.92	-18.76	-9.32	10.52	-14.41	-24.56	5.34
Ratio of Federal Debt to GDP (Change in % pts)	1.60	3.83	1.80	0.54	3.35	3.87	1.77	3.79	6.21	4.03
Prov'l Surplus/Deficit (Change in $ bill)	-1.70	-3.60	-1.67	-0.20	0.11	1.33	1.67	-2.10	-1.44	3.76
Federal Corporate Tax Revenues (% change)	-29.91	-25.73	-18.20	-22.43	-31.41	-18.13	-17.29	-37.26	-24.41	-15.26
Federal Corporate Tax Revenues (Change in $ bill)	-4.69	-4.35	-3.38	-4.58	-7.03	-4.30	-4.26	-9.45	-6.37	-4.06

Table 2.11

FOCUS MODEL – INSTITUTE FOR POLICY ANALYSIS

Corporate Tax Rate Reduced by 5 Percentage Points
Compensating Increase in UI Contribution Rate (Ex Ante)
Money Targets Base Nominal GDP

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	(Impacts are percentage changes unless otherwise indicated)									
Real Gross Domestic Product	-0.37	-0.63	-0.71	-0.71	-0.62	-0.46	-0.30	-0.14	0.00	0.11
Real GDP (Change in $ 1986 bill)	-2.40	-4.21	-4.88	-5.06	-4.56	-3.53	-2.36	-1.13	0.02	0.95
Consumption	-0.44	-1.15	-1.55	-1.61	-1.49	-1.25	-0.96	-0.71	-0.48	-0.30
Business Investment	0.17	0.34	0.67	0.81	0.74	0.67	0.67	0.70	0.75	0.80
Non-Residential Construction	0.12	0.43	0.82	1.01	1.10	1.21	1.30	1.38	1.45	1.51
Machinery and Equipment	0.18	0.31	0.61	0.75	0.61	0.49	0.46	0.48	0.53	0.58
Consumer Price Index	0.40	0.70	0.80	0.84	0.76	0.61	0.43	0.26	0.11	-0.01
CPI Inflation Rate (Change in % pts)	0.40	0.31	0.09	0.04	-0.07	-0.16	-0.18	-0.17	-0.16	-0.12
Labour Productivity	-0.20	-0.21	-0.12	-0.05	0.01	0.08	0.12	0.15	0.17	0.18
Capital Stock	0.01	0.03	0.09	0.17	0.25	0.30	0.34	0.38	0.43	0.47
Employment (% change)	-0.21	-0.47	-0.63	-0.70	-0.66	-0.56	-0.43	-0.29	-0.16	-0.05
Employment (Change in '000)	-29.2	-68.1	-92.8	-104.3	-100.7	-86.1	-67.3	-46.5	-26.1	-8.7
Unemployment Rate (Change in % pts)	0.14	0.32	0.42	0.46	0.42	0.34	0.25	0.15	0.07	0.00
Industrial Bond Rate (Change in % pts)	0.02	-0.19	-0.22	-0.18	-0.14	-0.11	-0.08	-0.07	-0.05	-0.04
Exchange Rate (US$/C$)	-0.07	-0.30	-0.36	-0.45	-0.48	-0.44	-0.37	-0.31	-0.26	-0.23
Current Account Balance (Change in $ bill)	-0.42	0.48	1.43	2.12	2.56	2.63	2.42	2.23	2.09	2.06
Federal Surplus/Deficit (Change in $ bill)	-0.50	-0.56	-0.66	-1.03	-1.23	-1.24	-0.94	-0.61	-0.23	0.16
Ratio of Federal Debt to GDP (Change in % pts)	0.03	0.10	0.16	0.24	0.35	0.45	0.53	0.57	0.58	0.55
Prov'l Surplus/Deficit (Change in $ bill)	-0.26	-0.63	-1.00	-1.10	-0.97	-0.70	-0.37	-0.01	0.33	0.64
Federal Corporate Tax Revenues (% change)	-20.41	-19.93	-19.89	-19.56	-19.32	-19.18	-19.15	-19.10	-19.13	-19.17
Federal Corporate Tax Revenues (Change in $ bill)	-3.20	-3.37	-3.69	-3.99	-4.32	-4.55	-4.72	-4.84	-4.99	-5.10

Table 2.12

1 Percentage Point Cut in the Federal Corporate Tax Rate
combined with a 20 percent reduction in Capital Consumption Allowances:
Impact on Corporate Tax Revenues Before "Multiplier"

	1997-2006
Change in Federal "High" Rare of Compensation	
in percentage points	-1.0
as percent of rate in base	-2.9

	1997-2006
Change in Total Effective Marginal Corporate Tax Rate	
in percentage points	-1.0
as percent of rate in base	-2.5

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Change in Federal Corporate Tax Revenues before "Multiplier" or "Feedback" Effects										
in $ billions	-0.23	-0.02	0.07	0.14	0.17	0.16	0.14	0.10	0.04	-0.02
as percent of base	-1.4	-0.1	0.4	0.7	0.7	0.7	0.6	0.4	0.2	-0.1

Table 2.13

FOCUS MODEL – INSTITUTE FOR POLICY ANALYSIS

Corporate Tax Rate Reduced by 1 Percentage Point
Compensation Decrease in Capital Cost Allowances of 20 percent
Money Targets Base Money Supply

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	(Impacts are percentage changes unless otherwise indicated)									
Real Gross Domestic Product	-0.11	-0.22	-0.27	-0.25	-0.19	-0.12	-0.04	0.02	0.04	0.02
Real GDP (Change in $ 1986 bill)	-0.73	-1.50	-1.84	-1.79	-1.44	-0.88	-0.30	0.13	0.31	0.18
Consumption	-0.02	-0.09	-0.16	-0.17	-0.11	-0.02	0.09	0.19	0.24	0.26
Business Investment	-0.78	-1.32	-1.36	-1.28	-1.20	-1.13	-1.08	-1.05	-1.05	-1.08
Non-Residential Construction	-0.53	-0.89	-1.00	-0.98	-0.95	-0.92	-0.90	-0.91	-0.94	-1.00
Machinery and Equipment	-0.88	-1.47	-1.48	-1.37	-1.28	-1.19	-1.14	-1.10	-1.09	-1.10
Consumer Price Index	-0.01	-0.03	-0.09	-0.15	-0.22	-0.28	-0.32	-0.32	-0.29	-0.24
CPI Inflation Rate (Change in % pts)	-0.01	-0.03	-0.05	-0.07	-0.07	-0.06	-0.04	0.00	0.03	0.05
Labour Productivity	-0.09	-0.13	-0.11	-0.09	-0.08	-0.07	-0.06	-0.07	-0.09	-0.12
Capital Stock	-0.03	-0.15	-0.30	-0.42	-0.51	-0.58	-0.63	-0.68	-0.71	-0.74
Employment (% change)	-0.04	-0.12	-0.17	-0.17	-0.13	-0.06	0.02	0.08	0.12	0.14
Employment (Change in '000)	-5.4	-16.8	-25.1	-26.0	-19.8	-9.1	2.7	13.0	19.9	22.1
Unemployment Rate (Change in % pts)	0.03	0.08	0.11	0.11	0.07	0.02	-0.03	-0.07	-0.09	-0.09
Industrial Bond Rate (Change in % pts)	-0.01	-0.02	-0.03	-0.04	-0.04	-0.03	-0.02	-0.02	-0.01	-0.01
Exchange Rate	0.05	0.18	0.30	0.36	0.40	0.40	0.37	0.33	0.28	0.24
Current Account Balance (Change in $ bill)	0.24	0.72	1.03	1.14	1.10	0.99	0.85	0.72	0.64	0.67
Federal Surplus/Deficit (Change in $ bill)	-0.34	-0.35	-0.47	-0.47	-0.34	-0.11	0.17	0.44	0.63	0.72
Ratio of Federal Debt to GDP (Change in % pts)	0.07	0.17	0.26	0.32	0.35	0.35	0.31	0.24	0.16	0.08
Prov'l Surplus/Deficit (Ch in $ bill)	0.03	-0.04	-0.12	-0.12	-0.02	0.16	0.35	0.53	0.64	0.68
Federal Corporate Tax Revenues (% change)	-1.71	-0.42	0.08	0.47	0.67	0.80	0.84	0.81	0.66	0.45
Federal Corporate Tax Revenues (Change in $ bill)	-0.27	-0.07	0.02	0.10	0.15	0.19	0.21	0.21	0.17	0.12

Table 2.14

FOCUS MODEL – INSTITUTE FOR POLICY ANALYSIS

Corporate Tax Rate Reduced by 1 Percentage Point
Compensation Decrease in Capital Cost Allowances of 20 percent
Money Targets Base CPI

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	(Impacts are percentage changes unless otherwise indicated)									
Real Gross Domestic Product	-0.09	-0.05	0.02	-0.04	-0.10	-0.04	-0.06	-0.18	-0.10	-0.03
Real GDP (Change in $ 1986 bill)	-0.57	-0.36	0.17	-0.26	-0.75	-0.32	-0.43	-1.47	-0.86	-0.25
Consumption	-0.02	-0.08	-0.06	0.03	0.07	0.04	0.04	0.06	0.03	0.07
Business Investment	-0.76	-1.12	-0.90	-0.92	-1.21	-1.17	-0.93	-1.10	-1.21	-0.89
Non-Residential Construction	-0.50	-0.68	-0.60	-0.71	-0.92	-0.86	-0.78	-0.99	-0.97	-0.80
Machinery and Equipment	-0.86	-1.27	-1.00	-0.99	-1.30	-1.27	-0.98	-1.14	-1.28	-0.92
Consumer Price Index	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Labour Productivity	-0.07	-0.01	0.01	-0.08	-0.12	-0.06	-0.10	-0.20	-0.10	-0.09
Capital Stock	-0.03	0.14	-0.25	-0.32	-0.40	-0.50	-0.56	-0.59	-0.65	-0.69
Employment (% change)	-0.03	-0.05	0.01	0.04	0.00	0.01	0.04	0.00	-0.01	0.05
Employment (Change in '000)	-4.4	-6.5	1.7	5.4	0.5	1.4	6.1	-0.7	-2.4	8.5
Unemployment Rate (Change in % pts)	0.02	0.03	-0.01	-0.03	0.00	-0.01	-0.03	0.00	0.01	-0.04
Industrial Bond Rate (Change in % pts)	-0.04	-0.14	-0.11	0.01	0.00	-0.12	-0.05	0.02	-0.13	-0.09
Exchange Rate	0.01	-0.04	-0.08	-0.02	0.02	0.01	0.07	0.15	0.09	0.10
Current Account Balance (Change in $ bill)	0.33	1.18	1.46	1.17	1.32	1.76	1.34	1.17	2.18	1.88
Federal Surplus/Deficit (Change in $ bill)	-0.26	0.29	0.74	0.54	0.31	0.75	0.93	0.38	0.71	1.22
Ratio of Federal Debt to GDP (Change in % pts)	0.05	0.02	-0.08	-0.12	-0.13	-0.20	-0.27	-0.27	-0.32	-0.42
Prov'l Surplus/Deficit (Change in $ bill)	0.05	0.10	0.21	0.31	0.36	0.37	0.33	0.26	0.35	0.42
Federal Corporate Tax Revenues (% change)	-1.57	0.26	0.97	1.14	1.16	1.36	1.04	0.59	0.91	0.69
Federal Corporate Tax Revenues (Change in $ bill)	-0.25	0.04	0.18	0.23	0.26	0.32	0.26	0.15	0.24	0.18

Table 2.15

FOCUS MODEL – INSTITUTE FOR POLICY ANALYSIS

Corporate Tax Rate Reduced by 1 Percentage Point
Compensation Decrease in Capital Cost Allowances of 20 percent
Money Targets Base Nominal GDP

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	(Impacts are percentage changes unless otherwise indicated)									
Real Gross Domestic Product	-0.03	-0.05	-0.05	-0.04	-0.05	-0.05	-0.06	-0.08	-0.09	-0.10
Real GDP (Change in $ 1986 bill)	-0.21	-0.35	-0.32	-0.30	-0.34	-0.40	-0.50	-0.62	-0.72	-0.87
Consumption	-0.02	-0.06	-0.05	0.00	0.04	0.06	0.07	0.07	0.08	0.10
Business Investment	-0.69	-1.04	-1.00	-1.01	-1.05	-1.06	-1.04	-1.04	-1.05	-1.09
Non-Residential Construction	-0.42	-0.64	-0.71	-0.75	-0.80	-0.83	-0.86	-0.88	-0.91	-0.95
Machinery and Equipment	-0.79	-1.18	-1.10	-1.09	-1.14	-1.13	-1.10	-1.09	-1.10	-1.13
Consumer Price Index	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.04
CPI Inflation Rate (Change in % pts)	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
Labour Productivity	-0.03	-0.04	-0.04	-0.05	-0.07	-0.09	-0.10	-0.12	-0.13	-0.14
Capital Stock	-0.03	-0.13	-0.24	-0.33	-0.41	-0.48	-0.54	-0.59	-0.63	-0.67
Employment (% change)	-0.01	-0.02	-0.01	0.00	0.02	0.03	0.03	0.03	0.03	0.03
Employment (change in '000)	-1.3	-2.9	-2.0	0.04	2.8	4.3	5.0	5.1	5.2	5.0
Unemployment Rate (Change in % pts)	0.01	0.01	0.01	0.00	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02
Industrial Bond Rate (Change in % pts)	-0.09	-0.10	-0.07	-0.05	-0.05	-0.06	-0.06	-0.06	-0.05	-0.05
Exchange Rate	-0.06	-0.04	-0.03	-0.03	-0.01	0.02	0.04	0.05	0.06	0.08
Current Account Balance (Change in $ bill)	0.48	1.03	1.34	1.47	1.51	1.52	1.57	1.66	1.80	1.93
Federal Surplus/Deficit (Change in $ bill)	-0.03	0.38	0.49	0.56	0.66	0.77	0.85	0.90	0.93	0.96
Ratio of Federal Debt to GDP (Change in % pts)	0.01	-0.02	-0.07	-0.12	-0.18	-0.24	-0.30	-0.37	-0.43	-0.49
Prov'l Surplus/Deficit (Change in $ bill)	0.09	0.12	0.18	0.27	0.34	0.37	0.38	0.38	0.40	0.42
Federal Corporate Tax Revenues (% Change)	-1.31	0.17	0.79	1.20	1.27	1.22	1.11	0.98	0.79	0.56
Federal Corporate Tax Revenues (Change in $ bill)	-0.21	0.03	0.15	0.24	0.28	0.29	0.27	0.25	0.21	0.15

Table 2.16

FOCUS MODEL – INSTITUTE FOR POLICY ANALYSIS

Corporate Tax Rate Cut With Alternative Fiscal Offsets
(Money Targets Base Nominal GDP)

Fiscal Offset:	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	End Period Capital Stock (% change)
Impact on Real GDP (%)											
Personal Income Tax Increase	0.02	0.01	0.00	0.00	0.00	0.02	0.04	0.07	0.10	0.12	0.68
Employ Insurance Rate Increase	-0.37	-0.63	-0.71	-0.71	-0.62	-0.46	-0.30	-0.14	0.00	0.11	0.47
Reduced Capital Cost Allowances*	-0.03	-0.05	-0.05	-0.04	-0.05	-0.05	-0.06	-0.08	-0.09	-0.10	-0.67
Impact on Federal Balance ($ bill)											
Personal Income Tax Increase	0.3	0.8	0.6	0.4	0.4	0.6	0.6	0.7	0.7	0.9	
Employ Insurance Rate Increase	-0.5	-0.6	-0.7	-1.0	-0.1	-1.2	-0.9	-0.6	-0.2	0.2	
Reduced Capital Cost Allowances*	-0.0	0.4	0.5	0.6	0.7	0.8	0.9	0.9	0.9	1.0	

*Reduced Capital Cost Experiment is for 1 percentage point decreased in corporate tax rate.

3. The Elasticity of Corporate Tax Revenues to Rate Changes: A Review of the Issues

Our search of the literature[8] failed to turn up any studies that provide direct estimates of the revenue elasticity for changes in statutory rates. This is perhaps not surprising, since changes in statutory rates have been infrequent and or minor unless accompanied by other major reforms of the corporate income tax (and indeed other taxes, in particular the PIT).

In Canada, the average combined federal/provincial statutory rate was relatively stable over the 1961-70, 1972-87, and 1989-95 periods. In 1971 the major Carter reform was implemented. In the mid-1980s Canada implemented another major tax reform, which involved substantial reductions in corporate statutory rates, coupled with the elimination of the investment tax credit, reduced CCA rates, and other base broadening measures. At the same time, major PIT reforms lowered the top marginal personal rate, while reducing the dividend credit and increasing the inclusion rate for capital gains.

These tax policy "experiments" have generated a data set ill-suited to an analysis of the elasticity of revenues to changes in statutory rates: three periods with changes in statutory rates so small that the noise to signal ratio in the data will likely be high, and two transition periods involving major reductions in rates coupled with other tax structure changes. To make matters worse, the recent tax reforms in Canada occurred about the same time as major tax reforms in the United States.

Although empirical estimates of elasticities have not been found, the literature on corporate taxation does bear on a number of issues related to this elasticity:

a) the impact of taxation on the financial structure of corporations – particularly the possible impact of statutory rates on debt;

b) the shifting of taxable income from high tax to low tax jurisdictions by multinational firms;

c) the effects of corporate taxation on investment;

d) the effects of taxation on the location of firms;

e) the shifting or incidence of the corporate tax in the short run; and

f) the effects of corporate taxes on organizational form (corporations vs. partnerships or proprietorships).

[8] An extensive annotated bibliography is available on request.

The effect of a change in corporate taxation on organizational form, a response that is clearly important in the United States [Poterba (1992), Gordon and Mackie-Mason (1994)] has not been relevant in Canada since the 1970 tax reform effectively integrated the PIT and CIT for Canadian controlled small corporations.[9] So long as full integration is preserved for small corporations, changes in statutory rates should have little or no impact on the choice of organizational form.[10]

Whether the corporate income tax can be fully or partially shifted in the short-term remains a controversial issue.[11] Note that this issue must be distinguished from the issue of the long-run incidence of the tax through its effects on capital formation and potential output.

In the FOCUS model, no short-run shifting of the corporate tax occurs – i.e. the initial incidence of the tax falls on retained earnings and dividends – hence on the owners of corporate equity capital. The model is therefore "neo-classical" in this respect. It is worth noting, moreover, that short run shifting would actually increase the elasticity of corporate tax revenues to changes in statutory rates. If firms preserve their after-tax profit margins by raising prices or reducing wages, when corporate tax rates are increased, the corporate tax base would increase.

3.1 Tax and Investment

The literature on tax policies and investment has recently been reviewed by Rushton (1992) and by Hassett and Hubbard (1996).

The literature on taxes and investment reflects competing theories of the determinants of investment. Historically, proponents of the accelerator theory of investment argued that taxes were unimportant, whereas the proponents of the cash flow theory and the neoclassical model argued that they were.

More recent developments in the analysis of investment have emphasized models based on Tobin's "Q" and have endogenized adjustment costs.

While aggregate time series analysis based on the neoclassical model appear to fit the data pretty well, it turns out that a flexible accelerator model with no user cost variable (and hence no tax effects) fits the data about as well. As Hassett and Hubbard point out in their review of this evidence, "Accelerator effects are strong and obvious; user cost effects appear weaker and more subtle." (p. 13)

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[9] For a brief period (1977-79) there was over-integration for small corporations, which provided a stimulus to incorporate.

[10] However, the use of flow-through shares and limited partnership ventures to avoid corporate tax may be affected by changes in statutory rates.

[11] For a general discussion of tax incidence issues see, Whalley (1984).

In his 1992 survey paper, Rushton concludes, "We do not know very much about tax policy and business investment, at least at the aggregate level." (p. 664) And expressed the hope that "it is perhaps to the microdata that we should look to learn something about user costs and investment." (p. 665)

In recent years several empirical studies using microdata have addressed the issue of taxes and investment. These studies are included in the survey by Hassett and Hubbard. They conclude that "Recent studies appear to have reached a consensus that the elasticity of investment with respect to the user cost of capital is between -0.5 and -1.0." (p. 32) But they also state that "one should be cautious, however, in moving from the microeconomic evidence to aggregate predictions . . . very little continues to be known about the general equilibrium effects of major policy changes." (pp. 32-33)

They nevertheless conclude that "most recent studies imply a high long-run elasticity of the capital stock to the user cost of capital, so that tax policy clearly has the potential to have a powerful effect on equipment investment and the capital stock in the long run." (p. 46)

Since the FOCUS model incorporates key elements of the corporate tax structure in its investment equations, this type of adjustment is already incorporated in our results. We are therefore on the "taxation does matter" side of this issue.[12]

3.2 Impacts of Taxes on Business Location

Ernst & Young (EY) in *Business Taxation in Ontario* (1992) as part of the research program of the Ontario Fair Tax Commission looks at the theoretical and (particularly) the empirical literature on the impact of taxes on business location at the international, national and regional levels. While this study is somewhat dated, it does provide a comprehensive review of the empirical studies on location theory to that point in time.

EY summarizes the theoretical literature by saying "the theoretical literature does not suggest a simple, unidirectional relationship from taxes to business investment in a jurisdiction at the local, regional, or national level. Taxes and investment are likely to be jointly endogenous, and taxes affect investment not only directly, but indirectly through tax impacts on portfolio behaviour, labour migration, savings, and the supply of public goods." (p. 174)

EY subdivides the empirical literature on taxes and business-location decisions into four categories:

(1) anecdotal evidence;

(2) surveys of business executives on the factors important in choosing a location;

(3) econometric analyses of the determinants of investment locations or relocations; and

[12] For a recent analysis of taxation and equipment investment, see Clark (1993).

(4) econometric analyses on the linkages between taxes and other factors that are considered in investment location decisions.

We will concentrate on categories (2) to (4), as (1) while interesting, is neither convincing nor complete.

3.2.1 The Survey Approach

Several studies have surveyed firms (both domestic and foreign) investing in Canada to determine the reasons for their investment-location decision. EY concluded that "these studies have generally concluded that taxes play a modest role in such decisions." (p.178)

One recent representative example is a telephone survey that EY conducted in 1989 of 50 senior executives in Canadian and U.S. manufacturing firms in Ontario, Alberta, Quebec and nine U.S. states. The survey sample concentrated on industries where firms were not tied to local markets and where prospects for future investment were strong. The results suggest that taxes were not a major factor influencing location decisions. Taxes had a relative weight of only 3.7 percent, well behind such factors as labour costs (22.6 percent), transport costs (19 percent), land and building costs (11.7 percent) and energy costs (5.7 percent). The "quality of life for senior employees" (a composite of crime, cultural and recreational amenities, climate, cost of living, and health care) had a weight of 24.6 percent.

3.2.2 Econometric Analyses of Location Decisions

Many empirical studies have been undertaken to identify the reasons for industrial location or relocation. While there is some Canadian work, the analysis is predominantly focussed on the United States. Three types of empirical studies exist: (1) single variable correlation between tax rates and industrial-location choices; (2) multivariate regression analysis on time-series data on interjurisdictional aggregate investment flows; and (3) multivariate regression analysis on cross section (or cross section time-series) panel data on investment-location choices.

EY feels that much of the research "suffers from methodological or data weaknesses." (p. 189) One problem area that EY cites is the difficulty in the choice of the tax variable. In the studies where the effective tax rate is used (the majority of studies), many simplifying assumptions must be made and special sectoral treatments ignored, so it is "therefore not surprising that empirical models conducted on very broad aggregate investment data can, in some cases, fail to identify tax policy impacts that have differential impacts across firms." (p. 189) The location-determinants literature often uses even less sound tax variables. Since they may not represent effective tax rates, "their use poses problems in interpreting the significance of the results of these studies." (p. 189). To sum up, EY states, "Among the other problems that are common in the literature are poor econometric techniques and errors in the data on corporate locations." (p. 190)

The only empirical study focussing on international foreign direct investment (FDI) in Canada is Murray (1982), "The Tax Sensitivity of U.S. Direct Investment in Canadian Manufacturing" in the *Journal of International Money and Finance.* Murray applied a neoclassical investment model similar to Jorgenson for closed economies to explain annual flows from 1948-78. He finds

that "U.S. FDI is quite responsive to changes in Canadian tax provisions." (p. 192) He finds that the elasticity of investment with respect to the tax rate ranges from 0.5 to 1.2. There have been some concerns raised over the methodology (the model could be improperly specified) and whether an average tax rate is appropriate (some concern over a potential "simultaneity" problem).

There have been some studies that have looked at Canadian regional investment decisions. The work done using a general equilibrium framework, however, (for example, Jones and Whalley, 1989 in the *Journal of Urban Economics)* is deemed not very useful by EY since the coefficients for capital movements are imposed and not estimated. The evidence on the efficacy of regional incentives (see, for example, Cohen and LeGoff, 1987, *Canadian Journal of Regional Science*) is not strong and serious concerns exist on the methodology used to analyse the impacts.

In summarizing the results from the U.S. studies, EY states,"Dozens of further studies have been conducted in the last two decades. While the results of this more recent work do vary, the general trend in the literature is toward a somewhat more significant role for tax differences in location decisions, at least in the sense that the studies no longer reach a uniform conclusion that there are no tax impacts. The results broadly support the conclusions of the survey research that imply that taxes are secondary in importance to other factors. However, several studies fail to identify any impacts of state and local tax differences." (p. 197)

3.2.3 Econometric Analyses of the Indirect Impacts of Taxes on Business Location

EY feels that the general conclusion on this front is "that the current state of the art leaves much uncertainty about the potential impacts of taxes on determinants of business locations." (p. 201) Others share this view. For example, Pierre Fortin (J. Mintz and J. Whalley, eds. *The Economic Impacts of Tax Reform* (1989, p. 419) noted in his analysis of Tax Reform: "Great uncertainty still characterizes our knowledge of labour supply, saving and investment behaviour, productivity and efficiency, and international portfolio behaviour. These phenomena are complex, interdependent, and plagued with difficult measurement and modelling problems. Theory is often far ahead of measurement and empirical verification. We have, for example, sophisticated theories of saving and investment that are consistent with an important role for taxation, but for which the empirical evidence is often inconclusive or controversial."

The two remaining issues: international tax shifting by multinational corporations (MNCs) and changes in debt financing by domestic firms – represent two important possible sources of "leakage" of corporate tax revenues in response to changes in statutory rates.

3.3 Effects of Corporate Tax Rates on Multinational Corporations

The corporate tax structure in Canada and other countries may affect MNC decisions through several channels. First, even if the international location of the real economic activity of an MNC is unchanged, the MNC will try to minimize its total tax burden through accounting, financial and pricing decisions. Variations in internal transfer prices can be used, to some extent, to shift

net profits from high tax to low tax jurisdictions. Royalty payments and management fees can be used to similar effect. The MNC can also adjust inter-corporate dividend payments and debt issues to shift interest costs to high tax jurisdiction.

Corporate tax structures of the countries in which the MNC may locate its plants could influence real economic decisions. Foreign direct investment, research and development, and exports are among the real economic variables that may be affected by international differences in the taxation of corporate income.

The extensive literature on these issues has been recently reviewed by Hines (1996). Tables summarizing the findings of the studies he reviewed are reproduced below (see Tables 3.1 through 3.5).

Regarding transfer pricing, dividends, and debt financing, he concludes (p. 34) "The evidence indicates that the financial behaviour of multinational corporations is quite sensitive to tax considerations, although not completely determined by them." As for foreign direct investment by U.S. MNCs, he concludes (p. 17) "taxation exerts a significant effect on the magnitude and location of FDI. While it is somewhat unscientific to summarize the results of so many different studies in a single number, they appear to be generally consistent with a unit elasticity of investment with respect to after-tax returns."

Although these findings are relevant, they do not indicate how sensitive the behaviour of MNCs is to changes in statutory tax rates in one country, since many facets of the tax structure in the host and source countries could affect their decisions.

For example, a paper by Harris, Morck, Slemrod and Yeng (1993) analyses income shifting in U.S. MNCs using firm level data. They found evidence of tax shifting from the United States to low tax foreign jurisdictions, and from high tax foreign jurisdictions to the United States. Interestingly, there was no evidence of tax shifting from Canada (classified as high tax by Harris et al) to the United States. They attribute this anomalous result to "a large and increasing proportion of Canadian firms . . . in surplus tax loss situations during the early 1980s . . . so their effective marginal tax rates were lower than the statutory corporate tax rates." (p. 290)

3.4 Impact of Corporate Taxes on Debt Financing

A reduction in the corporate statutory rate will reduce the relative attractiveness of debt financing by corporations. At the same time, any increase in investment stimulated by the rate reductions increases the total amount of financing required (debt, retentions, or new equity issues).

The relative attractiveness of debt to retentions or new equities depends on the PIT as well as on corporate statutory rates. Other tax shields under the CIT [losses, CCA, investment credits] also affect firms' financing decisions.

Basically the net effect of taxes on the cost of debt relative to retentions depends on the difference between the relevant marginal personal rate applicable to interest income and the combined corporate and personal rate applicable to capital gains on shares (Sinn, 1991). If the personal rate on interest income is above the combined rate, retentions dominate debt from a tax standpoint (i.e. debt financing would not be used until retentions are exhausted). The net cost of debt relative to new equity issues depends on the difference between the marginal personal rate on interest income and the combined corporate and personal rate applicable to dividend income (Sinn, 1991).

If tax factors alone were the only influence on corporate financial decisions, the firms would frequently be in "corner" solutions, in which one source of funds dominated others. However, other factors are important (signalling, incentives, monitoring, bankruptcy costs, liquidity, etc.) and the typical corporation uses more than one source of financing even within a year and presumably all three over its "life cycle." In a year, many firms use both retentions and debt as sources of investment funds.

Given these relationships, the likely impact of changes in corporate statutory rates will be non-linear, but will not be a simple switching function. The marginal effect of changes in the statutory corporate tax rate on debt financing should be greatest at the points where a) a change in corporate taxes reverses the tax preference for retained earnings relative to debt, and b) a change in corporate taxes reverses the tax preference for debt relative to new equity issues.

The above analysis applies to firms in a positive tax position. For firms in a loss position, the relative attractiveness of debt is reduced substantially, and many of these firms may be insensitive to variations in statutory corporate rates.

In a recently published paper, Shum (1996) presents empirical results showing a significant positive linkage between corporate tax revenues and subsequent net debt issues.[13] Shum's model is a two-equation dynamic system. Tax revenues influence net debt issues with a one-year lag.

To determine the dynamic effects of the Shum (1996) model, we have set up a simplified three-equation system that uses the coefficient estimates from Shum[14] to simulate a one percentage point increase in the corporate tax rate. The model is as follows:

[13] In an earlier study using panel data for 1970-82, Bartholdy, Fisher and Mintz (1987) found that the corporate tax rate significantly increased the debt-asset ratio.

[14] The coefficient estimates presented here (Model 1 in the Shum paper) have been adjusted by the mean of the appropriate variables to make the equations more intuitive.

$$DEBT = Z + .496*TR_{-1} - .074*NETY_{-1} + .9663*DEBT_{-1} + .0337*DEBTBAR_{-1} + .039*ASSET_{-1} + .1512*FIX_{-1}$$

$$TR = X + t*(Y - r*DEBT_{-1})$$

$$NETY = Y - TR - r*DEBT_{-1}$$

where

DEBT	=	long-term net debt
TR	=	tax revenue
DEBTBAR	=	five-year moving average of debt
ASSET	=	change in total assets
FIX	=	change in fixed assets
t	=	corporate tax rate
Y	=	total income
NETY	=	net income
r	=	nominal interest rate
Z,X	=	effects of all other variables

Using the mean values of all variables for period 0, we simulated a one percentage point increase in the corporate tax rate (from 0.43 to 0.44) in period one. Ignoring the investment impacts (i.e. setting the coefficients on $ASSET_{-1}$ and FIX_{-1} equal to zero) of the increase in the tax rate (see Table 3.6), one can see that after three years the effect on tax revenues has been attenuated by 3.4 percent, after five years by 9.7 percent and after 10 years by 23.8 percent.

To capture the impacts on assets of the change in the tax rate, we use the FOCUS model. From all of the FOCUS model runs presented earlier in this study (adjusted to be comparable to the simulation that we have undertaken), we choose the one that provides the greatest investment offset effect: a one percentage point increase in the corporate tax rate accompanied by a compensating reduction in personal income taxes with the Bank of Canada targeting base nominal GDP. We use the impacts on capital stock as measured by FOCUS to adjust both ASSET and FIX in the Shum model. With these impacts included in the simulation (see Table 3.7), one can see that after three years the effect on tax revenues has been attenuated by 3.4 percent, after five years by 9.4 percent and after 10 years by 21.2 percent. Thus while the investment effects do have an impact on corporate tax revenues, the impact is slow in building up

and is only meaningful over the medium to longer term. Furthermore, as noted earlier, the modest reductions in corporate tax revenues generated by the adjustment of debt is offset by increased PIT and withholding tax revenues on the interest paid by corporations.

We conclude that the relative reliance of firms on debt will be influenced by the corporate tax structure, but the relationship will not be a simple linear function of the statutory rate (nor will it be a simple switching function). The existence of other tax shields – particularly loss carry forwards – and discretionary tax deductions such as CCA – complicates the relationship. Furthermore, changes in personal tax rates on interest, dividends, and capital gains will also have important effects on corporate financing decisions.

Shum's key finding is that there is a statistically significant positive effect of corporate tax revenues on corporate debt financing. However, the statutory rate *per se* has no special role – i.e. its impact is the same as that of other revenue-enhancing measures with the same revenue impact,[15] and the implied attenuation of the response of revenues to statutory rates as a result of debt financing is quite modest over the medium term.

3.5 Sensitivity of the Corporate Tax Base to the Canada-U.S. Corporate Tax Differential

To determine how sensitive the corporate tax base in Canada is to the differential between corporate tax rates in Canada and the United States, we estimate a single equation model using quarterly data. As a measure of the corporate tax base, we employ the pre-tax corporate profits/GDP ratio in Canada. We calculate two separate "tax differential" variables: (1) the difference between the Canadian federal "mixed" statutory rate (weighted average of the highest rate plus lower manufacturing rate) from the FOCUS model and the U.S. statutory federal corporate tax rate; and (2) the difference between the total corporate tax rate in Canada (from FOCUS) and the total tax rate in the United States (from U.S. Data Resources Inc.).

Given the nature of the dependent variable, we also include a cyclical variable defined as the current quarter's real GDP as a ratio of the five-year moving average of real GDP. As well, we have included corporate capital consumption allowances and a measure of long-term corporate interest rates. Thus the nature of the equation to be estimated is:

Profits/GDP = a +b*(Tax Differential) + c*(GDP Cyclical) + d*(Corp CCA/GDP)

+ e*(Real Long-Term Corporate Interest Rate)

As the effects of corporate differentials will likely not be instantaneous, we experimented with polynomial distributed lags for these variables.

[15] In Shum's model, changes in the statutory rate have a negative but statistically insignificant impact on net debt issues. We have ignored this effect in our calculations.

On balance, the results indicate that Canada-U.S. tax differentials have a statistically significant effect on the corporate tax base. An increase in Canadian rates relative to U.S. rates will, over time, reduce the relative size of the corporate tax base.

However, the equations show some peculiarities that suggest that these results cannot be viewed as definitive. First, the effects are highly sensitive to the length of the distributed lag. The magnitude and statistical significance typically increase with lag length. Second, and more important, estimated polynomial lags typically reveal perverse effects in the short run – i.e. an increase in Canada relative to U.S. rates initially increases the relative corporate tax base. Third, the coefficient on the tax differential is sensitive to whether or not state and provincial tax rates are included; the "federal-only" tax differential has a larger effect than the total tax differential.

Unfortunately the goodness of fit of the estimated equations is extremely insensitive to the specification of the lag structure and to the definition of the tax differential variable. Statistical criteria therefore shed no light on which equation should be presented as "most representative."

We therefore select a representative equation based on theoretical and pragmatic concerns as follows:

1) Since short-term positive effects are unreasonable, we use a polynomial with both end points constrained to zero.

2) Since the adjustment of the relative tax base to tax differentials typically involves accounting and financial adjustments, extremely long distributed lags should be ruled out.

3) Since corporate decisions designed to minimize taxes should take into account all corporate taxes, not just federal taxes, we will discuss equations using the total tax differential as well as the federal only variable.[16]

Table 3.8 summarizes the estimated effect of tax differentials for equations with lags up to four years and with constraints on both endpoints of the polynomial.[17] Results are presented for two estimation periods. The first period (1972-95) represents the period since implementation of the major Carter tax reforms. However, because of lags, tax differentials prior to the reforms are included in the analysis. The second period (1978-95) is designed to exclude any observations from the pre-Carter period up to a six-year lag on the tax differential variable.

The results for the three-year and four-year lags suggest a range of impacts of changes in tax differential from -0.13 to -0.33.

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[16] Note, however, that the total tax differential represents a blend of federal statutory rates and state and provincial average effective rates. It is therefore subject to some measurement error to the extent that state and provincial statutory rates deviate from average effective rates.

[17] Detailed regression results are available on request.

These results indicate that, if Canada were to reduce corporate tax rates relative to the United States, there would occur a gradual increase in the corporate tax base, which would provide a partial offset to the reduction in corporate rates. Taking the highest value in Table 3.8, a 1 percent point reduction in the Canada-U.S. tax differential would generate a 0.33 percentage point increase in corporate profits relative to GDP. At an average federal rate of 25 percent, this would offset about 8 percent of the revenue loss from the initial tax reduction. The increase in the corporate tax base would also have favourable effects on provincial tax revenues. With an average provincial corporate rate of 12.5 percent, a 1 percent point reduction in federal rates would generate a 0.3 percent increase in provincial corporate income tax revenues.

The combined provincial/federal revenue gain generated by the increase in the base would offset about 12 percent of the initial federal revenue loss. Moreover, this modest offset would take four years to be realized.

3.6 Conclusions re: Impacts of Changes in Statutory Rates on the Corporate Tax Base

The simulations with Shum's model, together with our exploratory analysis of international tax differentials, suggest that a reduction in corporate statutory rates may generate a modest increase in the corporate tax base over the medium term. While the increase in the tax base provides some offset to the revenue losses of the initial tax cut, the offset is partial. We would anticipate that about 10 percent of the initial revenue loss would be recouped after five years.

One must caution, however, that both Shum's empirical estimates and our own are based on data in which tax differentials are relatively modest.[18] If changes in statutory rates were to move tax differentials outside their historical ranges, larger effects on tax bases could well occur, given that some of the responses to tax differentials are probably non-linear.

[18] One must also caution that the results from the analysis based on Shum's model and the analysis of tax differentials cannot simply be added together to get an aggregate effect, as there is probably a great degree of overlap in the results.

Table 3.1

Studies of Investment Patterns: U.S. Direct Investment Abroad

(Hines Table 1)*

Study	Method/(Data)	Estimates
Hartman (1981)	Time series, aggregate U.S. investment financed by retained earnings, 1965-79. (BEA annual; 15 years.)	1.4 elasticity with respect to after-tax earnings, and -0.66 elasticity with respect to domestic after-tax returns.
Bond (1981)	Responses to Puerto Rican tax holidays, SIC 2342, 1949-72. (Labor Dept. survey; 152 firms.)	Significant effect of losing tax holiday on firm's decision to exit the industry.
Frisch/Hartman (1983)	Cross section, U.S. investment aggregated by 15 industries, 1972. (SOI aggregates, 16 countries.)	-0.26 elasticity of subsidiary assets to local tax rates.
Boskin/Gale (1987)	Time series estimates of aggregate FDI out of the U.S., 1965-84. (BEA annual; 20 years.)	1.2 elasticity with respect to after-tax return for FDI financed by retained earnings.
Newlon (1987)	Time series estimates of aggregate FDI out of the U.S., 1953-84. (Corrected BEA data; 32 years.)	U.S. and foreign after-tax returns influence FDI financed by retained earnings.
Grubert/Mutti (1991)	Capital demand by U.S. affiliates in cross section, manufacturing only, 1982. (BEA benchmark; 33 countries.)	-0.11 elasticity of capital demand with respect to local tax rate.
Harris (1993)	Foreign investment as fraction of total investment by U.S. multinationals, 1984-90. (Compustat; 36 firms.)	Firms with higher cost of capital in U.S. after 1986 shift investment significantly toward foreign countries.
Hines/Rice (1994)	Capital demand by U.S. affiliates in cross-section, 1982. (BEA benchmark; 73 countries.)	1% higher tax rates reduce capital demand by 3%.
Grubert/Slemrod (1994)	Demand for affiliates located in Puerto Rico. (Tax data; 4,099 firms.)	Firms with greater intangible assets more likely to have Puerto Rican affiliates.
Cummins/Hubbard (1995)	Investment Euler equations for unbalanced panel of foreign subsidiaries of U.S. firms, 1980-91. (Compustat; 1,047 firms.)	1% higher after-tax cost of capital reduces annual investment by 1%-2%.

Table 3.2

Studies of Investment Patterns: Foreign Direct Investment in the United States

(Hines Table 2)*

Study	Method/(Data)	Estimates
Hartman (1984)	Time series estimates of aggregate FDI into the U.S., 1965-79. (BEA annual data; 15 years.)	FDI financed by retained earnings responds negatively to higher U.S. taxes.
Boskin/Gale (1987)	Time series estimates of aggregate FDI into the U.S., 1956-84. (BEA annual data; 29 years.)	-1.7 elasticity with respect to relative tax rates for FDI financed by retained earnings.
Newlon (1987)	Time series estimates of aggregate FDI into the U.S., 1956-84. (Corrected BEA data; 29 years.)	1.1 elasticity with respect to after-tax return for FDI financed by retained earnings.
Young (1988)	Time series estimates of aggregate FDI into the U.S., 1953-84. (Revised BEA data; 32 years.)	1.7 elasticity with respect to after-tax return for FDI financed by retained earnings.
Slemrod (1990)	Estimates of aggregate FDI into the U.S. distinguished by investing country, 1962-87. (Adjusted BEA data; 7 countries.)	Higher U.S. taxes significantly reduced FDI financed by new fund transfers; no effect of home country repatriation taxes
Auerbach/Hassett (1993)	Cross sectional estimates of capital composition of U.S. firms acquired by foreigners, 1980-90. (Compustat; 243 acquired firms.)	Acquirers eligible to claim FTCs exhibit no shift of demand toward equipment-intensive firms after 1986.
Swenson (1994)	Time series estimates of tax effects on new investments by industry, 1979-91. (BEA data; 18 industries.)	1.13 elasticity of investment with respect to tax changes around 1986.
Coughlin et al. (1991)	Location of new manufacturing plants within the U.S., 1981-83. (Commerce survey; 736 plants.)	Insignificant tax effects.
Ondrich/Wasylenko (1993)	Location of new plants within the U.S., 1978-87. (Commerce survey; 1,184 plants.)	-0.57 elasticity of location probability with respect to state corporate tax rates.
Hines (forthcoming)	Location of FDI within the U.S., distinguishing investments by tax regime of investing country, 1987. (BEA benchmark; 7 countries.)	1% higher state tax rates reduced investment by 10%.

Table 3.3

Studies Evaluating Effects of Specific Incentives/Penalties

(Hines Table 3)*

Issue/Study	Method/(Data)	Estimates
Debt Finance:		
Collins/Shackelford (1992)	Preferred stock issuances by U.S. multinationals subject to interest allocation (Fortune 100), 1982-89. (Compustat plus 10-Ks; 100 firms.)	Significant effect of foreign assets on proclivity to issue preferred stock after 1986.
Altshuler/Mintz (1995)	Location of borrowing by U.S. multinationals subject to interest allocation, 1988-92. (Survey responses from 8 firms.)	1.7 elasticity of foreign indebtedness to interest allocation rate.
Froot/Hines (1995)	Borrowing and investment by U.S. multinationals subject to interest allocation, 1986-91. (Compustat; 416 firms.)	50% interest allocation reduces annual debt accumulation by 5% and capital accumulation by 3%.
Hines (1994a)	Loans by U.S. parent firms to foreign subsidiaries, 1984. (Aggregate tax data; 57 countries.)	Nonlinear effect of tax rates on parent loans to subsidiaries; strongest at low tax rates.
R&D:		
Hines (1993)	R&D by U.S. multinationals subject to expense allocation, 1984-89. (Compustat; 116 firms.)	0.8-1.8 elasticity of R&D to after-tax cost (as affected by cost allocation).
Hines (1995a)	R&D by U.S. and foreign firms subject to withholding taxes on royalties; 1987 and 1989. (BEA benchmarks; 43 countries.)	0.1-0.3 cross elasticity of R&D with respect to royalty withholding taxes.
Exports:		
Kensley (1995)	Exports as a fraction of total foreign sales by U.S. multinationals, 1985-92. (Compustat; 544 firms.)	Foreign-sourcing of export earnings generates additional $70 million exports for firms with excess FTCs.
Bribery:		
Hines (1995b)	Location of aggregate U.S. business activity after tax and criminal penalties imposed on bribe payments, 1977-1982. (BEA benchmark; 41 countries.)	Reduced U.S. activity in corrupt countries equivalent to 6% annual declines in GDP.

Table 3.4

Transfer Pricing Studies

(Hines Table 4)*

Study	Method/(Data)	Estimates
Lall (1973)	Pharmaceutical imports in Colombia. (Government audits; 14 firms.)	Significant underinvoicing of imports in response to taxes and capital controls.
Jenkins/Wright (1975)	Profit rates of U.S. oil affiliates, aggregate, 1966 and 1970. (BEA data; 10 country groups.)	Tax payments by U.S. firms to oil-consuming countries only 1/3 of predicted.
Kopits (1976)	Royalties paid by U.S. subsidiaries in developed countries, aggregated by country-industry, 1968. (SOI data; 14 countries.)	1% higher tax rate on royalties relative to dividends reduces royalties by 0.56%.
Bernard/Weiner (1990)	Differences between third party prices and within-firm transfer prices for oil, 1973-84. (EIA transaction data; 77 country-year observations.)	No significant effect of tax rates on price differences.
Grubert/Mutti (1991)	Profit/equity and profit/sales ratios for U.S. manufacturing affiliates, 1982. (BEA benchmark; 29 countries.)	1% higher tax rates reduce after-tax profit/equity by 0.26%.
Harris et al. (1993)	U.S. tax liabilities of American multinationals with tax haven affiliates, 1984-88. (Compustat; 469 firms.)	Significant dummy variables indicate that firms with haven affiliates have lower domestic tax liabilities.
Grubert et al. (1993)	U.S. tax liabilities of foreign-owned affiliates in the United States, 1987. (Tax returns; 600 foreign firms.)	Observable variables explain only half of profit disparities between foreign-owned and U.S.-owned firms in the United States.
Klassen et al. (1993)	Return on equity in U.S. and six foreign regions, 1984-90. (Compustat; 191 firms.)	10% higher U.S. pre-tax profitability of multinationals after 1986 tax reduction.
Hines/Rice (1994)	Profitability of U.S. affiliates, controlling for capital and labour inputs, 1982. (BEA benchmark; 59 countries.)	1% higher tax rates reduce profitability by 2%.

Table 3.5

Studies and Dividend Payments

(Hines Table 5)*

Study	Method/(Data)	Estimates
Kopits (1972)	Dividends from foreign subsidiaries to U.S. parents, 1962. (SOI cross-section; 18 countries.)	-0.4 elasticity of dividends to host-country tax rate.
Mutti (1981)	Dividends from foreign subsidiaries to U.S. parents, OLS, 11 countries, 1972. (Tax returns; 4,446 firms.)	1% higher U.S. tax rate on repatriated dividends reduces dividends by 0.75%.
Hines/Hubbard (1990)	Dividends from foreign subsidiaries to U.S. parents, Tobit, 1984. (Tax returns; 10,606 firms.)	1% higher tax cost of dividend repatriation reduces dividends by 4%.
Altshuler/Newlon (1993)	Dividends from foreign subsidiaries to U.S. parents, Tobit, 1986. (Tax returns; 3,116 firms.)	1% higher tax cost of dividend repatriation reduces dividends by 1.5%.
Altshuler et al. (1995)	Dividends from foreign subsidies to U.S. parents, unbalanced panel, 1980-86. (Tax returns; 22,906 firms.)	1% higher *transitory* cost of repatriation reduces dividends by 0.3%; no effect of higher *permanent* tax costs.
Hines (1996)	Dividends from U.S. multinationals to shareholders, 1984-1989. (Compustat; 505 firms. Also aggregate time series; 37 years.)	Foreign profits have three times the effect of domestic profits on payouts to shareholders.

Table 3.6

Dynamic Simulation of Shum (1996) Model Excluding Investment Impacts*
A One Percentage Point Increase in the Corporate Tax Rate

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Old Tax										
TR	22527.58	22527.58	22219.63	21921.92	21636.28	21360.18	21091.23	20827.23	20566.12	20308.04
NETY	29862.14	29862.14	29453.93	29059.29	28680.65	28314.66	27958.14	27608.18	27262.06	26919.95
DEBT	153891.00	162843.05	171497.40	179800.88	187827.03	195645.30	203319.91	210910.29	218412.64	225823.91
DEBTBAR	153540	153658.2	155536.81	159126.29	164356.47	171171.87	179522.73	187618.1	195500.68	203223.03
New Tax										
TR	23051.48	23051.48	22725.85	22411.06	22109.19	21817.54	21533.58	21254.97	20979.53	20707.40
NETY	29338.24	29338.24	28923.81	28523.17	28138.97	27767.78	27406.38	27051.78	26701.22	26354.88
DEBT	153891.00	163141.67	172084.58	180660.60	188946.03	197013.00	204928.15	212753.10	220484.03	228117.86
DEBTBAR	153540	153658.2	155596.53	159303.45	164705.57	171744.78	180369.18	188726.47	196860.18	204824.86
Difference										
TR	523.8972	523.8972	506.22408	489.14337	472.90717	457.3594	442.35051	427.744	413.41504	399.36698
NETY	-523.8972	-523.8972	-530.1138	-536.1177	-541.6847	-546.8798	-551.767	-556.4033	-560.8394	-565.0781
DEBT	0	298.6214	587.17927	859.7196	1119.0052	1367.7061	1608.2407	1842.8048	2071.3893	2293.9544
Tax Revenue Attenuation (% Change from Time 1)	0.00	0.00	-3.37	-6.63	-9.73	-12.70	-15.57	-18.35	-21.09	-23.77

* Tax changes from .43 to .44, r=.08, Y=64701 throughout, Debt0=153891, DebtBAR0=153540.

Table 3.7

Dynamic Simulation of Shum (1996) Model Including Investment Impacts*
A One Percentage Point Increase in the Corporate Tax Rate

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Old Tax										
TR	22527.58	22527.58	22219.63	21921.92	21636.28	21360.18	21091.23	20827.23	20566.12	20308.04
NETY	29862.14	29862.14	29453.93	28059.29	28680.65	28314.66	27958.14	27608.18	27262.06	26919.95
DEBT	153891.00	162843.05	171497.40	179800.88	187827.03	195645.30	203319.91	210910.29	218412.64	225823.91
DEBTBAR	153540	153658.2	155536.81	159126.29	164356.47	171171.87	179522.73	187618.1	195500.68	203223.03
New Tax										
TR	23051.48	23051.48	22725.96	22411.71	22111.07	21821.16	21539.31	21263.01	20990.15	20720.85
NETY	29338.24	29338.24	28923.95	28524.00	28141.37	27772.39	27413.67	27062.02	26714.73	26371.99
DEBT	153891.00	163138.57	172066.06	180607.01	188843.13	196850.16	204699.63	212451.54	220102.00	227647.88
DEBTBAR	153540	153658.2	155595.91	159299.12	164690.53	171709.15	180300.98	188613.2	196690.29	204589.29
Difference										
TR	523.8972	523.8972	506.33339	489.79551	474.79353	460.98163	448.08259	435.78795	424.02966	412.81433
NETY	-523.8972	-523.8972	-529.9747	-535.2877	-539.2839	-542.2697	-544.4716	-546.1655	-547.3299	-547.9633
DEBT	0	295.51615	568.65239	806.12966	1016.1008	1204.8629	1379.7193	1541.2532	1689.3623	1823.9737
Tax Revenue Attenuation (% Change from Time 1)	0.00	0.00	-3.35	-6.51	-9.37	-12.01	-14.47	-16.82	-19.06	-21.20

* Tax changes from .43 to .44, r=.08, Y=64701 throughout, Debt0=153891, DebtBAR0=153540.

Investment impact effects from FOCUS run with compensating personal tax decreases, Money Targets Nominal GDP.

Table 3.8

Estimated Cumulative Impact of the Canada-U.S. Difference in Corporate Tax Rates on Canadian Pre-Tax Corporate Profits/GDP Ratio by Estimation Period and Lag Structure

	1972-95	1978-95
Federal Only		
- BOTH Restriction		
Lag:		
2 Years	-.0591 (0.5)	-.0572* (0.5)
3 Years	-.2588 (2.1)	-.1819 (1.5)
4 Years	-.3336 (2.6)	-.2669 (2.0)
All Levels of Government		
- BOTH Restriction		
Lag:		
2 Years	-.0529 (0.6)	-.0249* (0.2)
3 Years	-.2072 (2.2)	-.1318 (1.2)
4 Years	-.2634 (2.7)	-.2060 (1.6)

* Initial impact is strongly positive.

Note: Numbers in parentheses are t-statistics.

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Technical Committee on Business Taxation

The Technical Committee was established by the Minister of Finance, at the time of the March 1996 federal budget, to consider ways of:

- improving the business tax system to promote job creation and economic growth,
- simplifying the taxation of businesses to facilitate compliance and administration, and
- enhancing fairness to ensure that all businesses share the cost of providing government services.

The Technical Committee will report before the end of 1997; consultations with the public will follow the release of the report.

The Technical Committee is composed of a panel with legal, accounting and economic expertise in the tax field. The members are:

Mr. Robert Brown
Price Waterhouse
Toronto, Ontario

Mr. James Cowan
Stewart McKelvey Stirling Scales
Halifax, Nova Scotia

Mr. Wilfrid Lefebvre
Ogilvy Renault
Montreal, Quebec

Professor Nancy Olewiler
Department of Economics
Simon Fraser University
Burnaby, British Columbia

Mr. Stephen Richardson
Tory, Tory, Deslauriers & Binnington
Toronto, Ontario

Professor Bev Dahlby
Department of Economics
University of Alberta
Edmonton, Alberta

Mr. Allan Lanthier
Ernst & Young
Montreal, Quebec

Professor Jack Mintz (Chair)
Faculty of Management,
University of Toronto (on leave)
Clifford Clark Visiting Economist
Department of Finance
Ottawa, Ontario

Mr. Norm Promislow
Buchwald Asper Gallagher Henteleff
Winnipeg, Manitoba

The Technical Committee has commissioned a number of studies from outside experts to provide analysis of many of the issues being considered as part of its mandate. These studies are being released as working papers to make the analysis available for information and comment. The papers have received only limited evaluation; views expressed are those of the authors and do not necessarily reflect the views of the Technical Committee.

A list of completed research studies follows. They may be requested from:

Distribution Centre
Department of Finance
300 Laurier Avenue West
Ottawa, Ontario K1A 0G5
Telephone: (613) 995-2855
Facsimile: (613) 996-0518

They are also available on the Internet at http://www.fin.gc.ca/

Technical Committee on Business Taxation
Completed Research Studies

☐ **WORKING PAPER 96-1**
Comparison and Assessment of the Tax Treatment of Foreign-Source Income in Canada, Australia, France, Germany and the United States
Brian Arnold (Goodman Phillips & Vineberg)
Jinyan Li and *Daniel Sandler* (University of Western Ontario)

☐ **WORKING PAPER 96-2**
Why Tax Corporations?
Richard M. Bird (University of Toronto)

☐ **WORKING PAPER 96-3**
Tax Policy and Job Creation: Specific Employment Incentive Programs
Ben Cherniavsky (Technical Committee Research Analyst)

☐ **WORKING PAPER 96-4**
The Effects of Taxation on U.S. Multinationals and Their Canadian Affiliates
Jason G. Cummins (New York University)

☐ **WORKING PAPER 96-5**
The Integration of Corporate and Personal Taxes in Europe: The Role of Minimum Taxes on Dividend Payments
Michael P. Devereux (Keele University)

☐ **WORKING PAPER 96-6**
International Implications of U.S. Business Tax Reform
Andrew B. Lyon (University of Maryland)

☐ **WORKING PAPER 96-7**
The Economic Effects of Dividend Taxation
Ken J. McKenzie (University of Calgary)
Aileen J. Thompson (Carleton University)

☐ **WORKING PAPER 96-8**
Capital Tax Issues
Peter E. McQuillan and *E. Cal Cochrane* (KPMG, Toronto)

☐ **WORKING PAPER 96-9**
Compliance Issues: Small Business and the Corporate Income Tax System
Plamondon and Associates Inc. (Ottawa)

☐ **WORKING PAPER 96-10**
Study on Transfer Pricing
Robert Turner, C.A. (Ernst & Young, Toronto)

☐ **WORKING PAPER 96-11**
The Interaction of Federal and Provincial Taxes on Businesses
Marianne Vigneault (Bishop's University)
Robin Boadway (Queen's University)

☐ **WORKING PAPER 96-12**
Taxation of Inbound Investment
W.G. Williamson and *R. A. Garland* (Arthur Andersen, Toronto)

Technical Committee on Business Taxation
Completed Research Studies, *(Cont'd)*

☑ **WORKING PAPER 97-1**
The Sensitivity of the Corporate Income Tax to the Statutory Rate
Peter Dungan, Steve Murphy, Thomas A.Wilson (University of Toronto)

☐ **WORKING PAPER 97-2**
The Income Tax Compliance Burden in Canadian Big Business
Brian Erard (Carleton University)

☐ **WORKING PAPER 97-3**
Taxes, the Cost of Capital, and Investment:
A Comparison of Canada and the United States
Kenneth J. McKenzie (University of Calgary)
Aileen J. Thompson (Carleton University)