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# **Deficit Reduction**

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*What Pain, What Gain?*

*edited by*

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## **Government Deficits, Debt, and the Business Cycle**

***Tamim Bayoumi  
and Douglas Laxton***

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Countries that failed to reduce government debt during the expansion of the late 1980s lost control over an important policy instrument during the recession. Their fiscal policy had to be directed almost exclusively to debt control when the economy weakened and the tax base collapsed. Using a small macro model of the Canadian economy, we attempt to estimate how much this may have exacerbated the recent business cycle in Canada. In addition, we consider the issue of credibility. Generally, deficit reduction strategies that are less credible tend to be associated with more short-term pain. Indeed, in our model a perfectly credible deficit reduction results in an increase in output in the short run as long as the monetary authorities target a domestic measure of inflation that is relatively insensitive to jumps in the exchange rate. While such an outcome may be very difficult to achieve in practice, our findings underscore the potential importance of credibility and coordination.

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Canada is currently recovering from one of the largest economic downturns it has experienced in the postwar era. The heady days of the late 1980s, when output rose significantly above potential, have been followed by the downturn of the early 1990s, in which output has moved equally notably below potential. These large cyclical movements in real output have been accompanied by a significant rise in federal debt, measured as a proportion of output, despite repeated attempts by the federal government to stabilize the fiscal position.

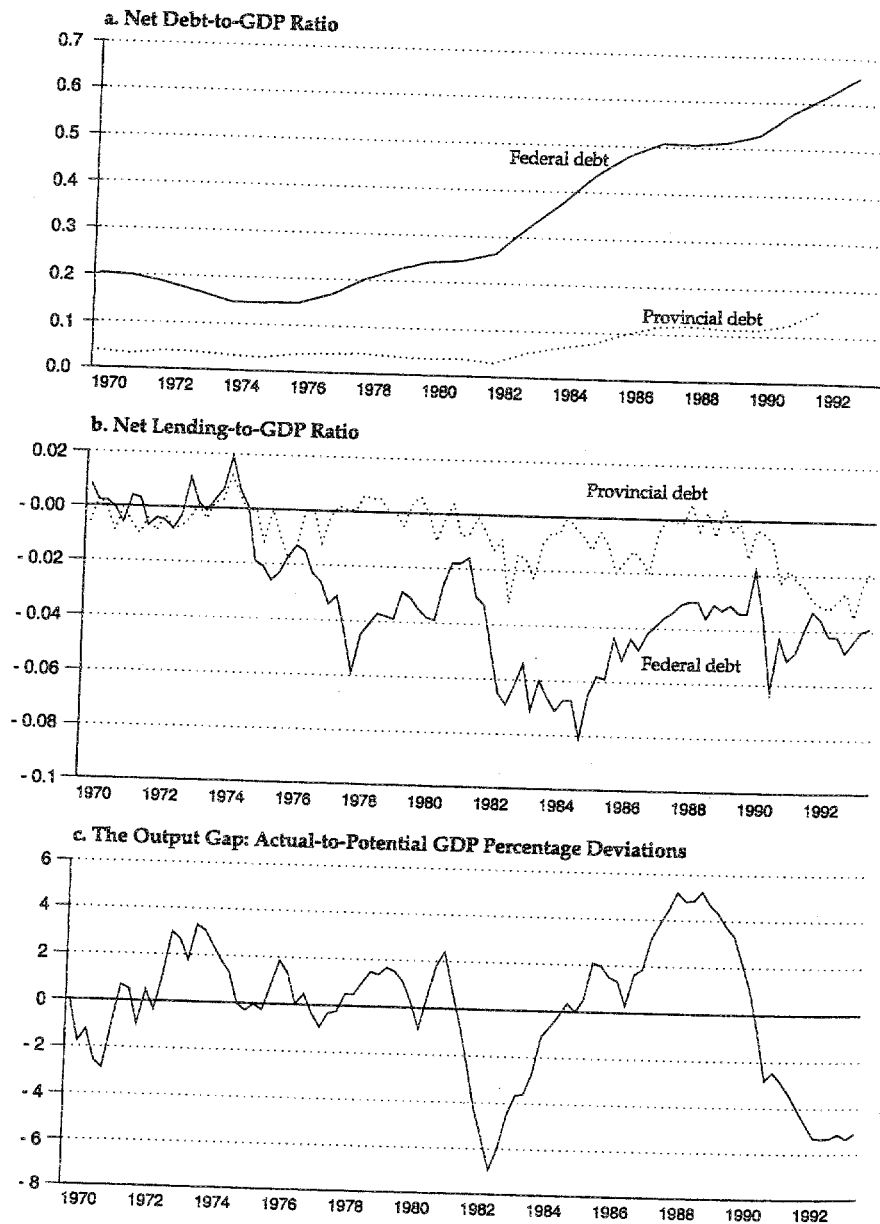
These two trends — the large cyclical movements in real output and the deterioration in the federal debt position since the mid-1980s — form the background to this paper, which explores several inter-related issues. We start with the impact on the current situation of the failure to consolidate federal government fiscal policy in the late 1980s, when output rose well above potential. This failure to consolidate during the upswing of the cycle reduced the fiscal flexibility of the federal government during the downswing, thereby contributing to the severity of the downturn and (arguably) to high levels of long-term interest rates. Currently, the high level of government debt leaves policymakers with the problem of how to balance the long-term requirement for fiscal retrenchment with the short-term cyclical position of the economy.

These issues are examined using simulations from MULTIMOD, a macroeconomic model developed at the International Monetary Fund (IMF). MULTIMOD seems particularly well suited for this task because it incorporates private sector expectations about future policy into its solution. Thus, the results depend both upon the announced path of fiscal policy and upon private sector expectations about the actual outcome. This duality enables us to explore how the economic effects of fiscal policy are interrelated with the credibility of the announced policy. This consideration, in turn, leads, in the second half of the paper, to a discussion about how fiscal credibility can be strengthened.

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This paper does not necessarily represent the views of the International Monetary Fund, with which both authors are affiliated.

Figure 1: *Net Debt, Deficits, and the Output Gap, Canada, 1970-93*



## Recent Trends in Fiscal Policy

Figure 1 illustrates trends in federal and provincial fiscal policy since 1970. The three panels show the paths of federal and provincial government net debt, net lending, and an estimate of the output gap, all measured as a proportion of GDP, with the output gap being included in order to illustrate the impact of the economic cycle on fiscal behavior.

Both federal and provincial government deficits were relatively small and stable up to about 1975. Such fluctuations as there were generally followed the economic cycle, and the underlying debt-to-GDP ratio fell steadily from its peak after World War II. After 1975, however, the level of federal deficits and debt started to rise. As can be seen in panel (c) of the figure, this trend does not appear to be connected to cyclical factors; rather, it reflects an autonomous change in behavior. After some improvements in the late 1970s and early 1980s, the 1982–83 recession led to a further and rapid deterioration of the federal deficit. Although actual output growth was systematically above potential output growth between 1984 and 1988, the federal fiscal position remained in substantial deficit. The net-debt-to-GDP ratio rose rapidly during the mid-1980s, and even at the end of the decade, during a prolonged economic boom, the debt ratio was only stabilized, not reduced.

Despite its severity and length, the current economic downturn has been associated with a relatively small deterioration in the federal fiscal deficit, a phenomenon presumably reflecting, in part, the unwillingness of the federal government to allow its relatively weak initial fiscal position to deteriorate much further. The current downturn does appear, however, to have been associated with a prolonged deterioration in the aggregate fiscal position of provincial governments; the fall-off is of a type not seen in the past and has been accompanied by a significant rise in provincial debt.

Some simple regressions illustrate these trends in the data. Table 1 reports the results from the following regression, estimated over the first quarter of 1970 through the first quarter of 1993:



**Table 1: The Impact of Federal Debt on Countercyclical Behavior**

$$\Delta NL/Y = \alpha + (\beta + \Psi FDEBT) \Delta y$$

	Constant	Output Growth	Output Growth Adjusted for the Level of Federal Debt
Change in federal net lending as a ratio to GDP	-0.0006 (0.0009)	0.48** (0.13)	-0.61* (0.30)
Change in provincial net lending as a ratio to GDP	-0.0001 (0.0007)		0.37* (0.18)

Note: Estimation period is 1970 (Q1) to 1993 (Q1). Regressions using local government net lending are not reported because the coefficients are insignificant. The adjustment for the level of federal debt involves multiplying the growth of output by a variable that is proportional to the federal-debt-to-GDP ratio transformed to equal 0 in 1974 (Q1) (the minimum value of the series) and 1 in 1993 (Q1). One or two asterisks show, respectively, that the coefficient is significant at the 5 percent or 1 percent significance level.

$$\Delta (DEF/Y) = \alpha + (\beta + \Psi FDEBT) \Delta y + \varepsilon_t$$

where  $DEF/Y$  is the fiscal deficit of the federal or provincial governments, measured as a proportion of  $GDP$ ,  $y$  is the logarithm of real output, and  $FDEBT$  is a measure of the net-federal-debt-to-GDP ratio that is equal to 0 in the first quarter of 1974 (the lowest value of the debt ratio) and 1 in the first quarter of 1993 (the highest value of the debt ratio).<sup>1</sup>

The regression measures the degree to which the fiscal deficit,  $DEF/Y$ , varies with the cycle  $y$ , and how this response depends upon

<sup>1</sup> Since both the dependent variable and real output are measured in first differences, this model can be thought of as one in which the level of the deficit depends on the state of the cycle and on permanent changes in behavior modeled by an error that is a random walk (Bayoumi 1992).

the level of debt of the federal government. The coefficient  $\beta$  shows how sensitive the deficit is to changes in real output (and hence the level of stabilization being provided) at low debt levels by the government, while the coefficient  $\psi$  shows the influence of the rising level of federal debt upon this relationship. Since the debt series has been transformed to be 0 in 1974 and 1 by 1993,  $\beta$  represents the sensitivity of the fiscal deficit to cyclical factors in the early 1970s, while  $\psi$  represents the change in behavior caused by the accumulated increase in debt over 1970s, 1980s, and early 1990s.

The results indicate that the federal government provided significant automatic stabilizers in the early 1970s, with each percentage point movement in the output gap producing a 0.48 percentage point movement in the federal deficit, measured as a ratio of output. Over time, however, the rise in federal debt has steadily reduced the sensitivity of the deficit to change in real output. Indeed, since the sum of the  $\beta$  and  $\psi$  coefficients is negative, the results imply that by the end of the period the federal government had switched from a countercyclical policy to a procyclical policy. More generally, this regression illustrates the decline in the ability of the federal government to respond to cyclical developments because of the high — and rising — level of outstanding debt.

The results for provincial governments, also reported in Table 1, illustrate the rise in provincial fiscal stabilization that appears to have accompanied the reduction in federal stabilization.<sup>2</sup> Provinces provided no significant stabilization in the 1970s (when estimated, the coefficient is small and insignificant), but the decline in federal stabilization resulting from increasing levels of federal debt appears to have been accompanied by a rise in the sensitivity of the aggregate provincial governments' deficit to the cycle. This increase offsets some, but not all, of the fall in federal stabilization. Although the recent rise in provincial debt is not included in the regression, one must assume that it will start to curtail the ability of provincial governments to operate countercyclical policy in a manner similar

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<sup>2</sup> Results were also estimated for local governments. They appear to play little or no role in aggregate stabilization.

to the way that the rise in federal debt reduced the role of the federal government in this activity.

## The Model

The fiscal issues associated with very high current levels of federal debt, as well as the interaction between these high levels of debt with the very limited degree of federal fiscal stabilization over the economic downturn in the early 1990s, are studied here using simulations from MULTIMOD, a world macroeconomic model developed at the IMF. MULTIMOD can best be described as a sticky price model with a well-defined supply side and rational expectations in both goods and financial markets. The forward-looking aspect of the model is an important feature. Policy changes announced today but to be implemented sometime in the future can have an immediate effect on the economy through forward-looking variables, such as exchange rates, interest rates, output prices, and wealth.

Since our simulations focus on fiscal issues, it may be useful to briefly describe the fiscal sector of MULTIMOD. Like many other areas in MULTIMOD, the fiscal sector has a relatively simple overall structure but considerable detail in the intertemporal aspects of policy. General government revenues and expenditures are divided into two categories: government consumption (basically wages and purchases of goods and services) and tax revenues net of transfers. Real government consumption is exogenous, while the tax rate (net of transfers) adjusts so as to move debt toward a desired long-run ratio to output. Taxes (again net of transfers) enter the forward-looking wealth variables for the private sector; at that point, they are subdivided between taxes on labor (which affect consumption) and taxes on capital (which affect the value of the capital stock and, hence, investment). These forward-looking relationships imply that private sector wealth is dependent upon the entire path of taxes. The model is not, however, Ricardian, in the sense that changes in the path of taxes affect private sector behavior, because part of consumption is assumed to depend on current income rather than on wealth (in other words, some individuals

are assumed to be liquidity constrained)<sup>3</sup> and because the rate of discount of private wealth is higher than the real interest rate.<sup>4</sup>

One of the strengths of MULTIMOD is that since its underlying structure is not complicated, it is relatively easy to adapt the model for different purposes. The simulations reported below were carried out on a version that included a number of modifications designed to take account of some of the issues particularly relevant to the current paper.

The first modification was simulating the Canadian part of the model on its own. The standard version of MULTIMOD includes ten country groupings.<sup>5</sup> Given our focus on domestic Canadian policy and the very small weight of the Canadian economy in the world, it did not seem important to model the rest of the world in the detail that would have been implied by running all of the country groupings in MULTIMOD. This does not mean that external considerations are not important in the results (indeed, the response of the exchange rate and trade volumes are central to many of the scenarios); rather, it implies an assumption of no endogenous feedback from the rest of the world to the Canadian economy.

Two of the important structural equations within the Canadian model were also modified. The relationship between inflation and output is clearly important for the analysis of fiscal stabilization. Generally, recent macroeconomic models employ a linear Phillips curve, in which the relationship between changes in output and inflation is unaffected by the cyclical position of the economy. The

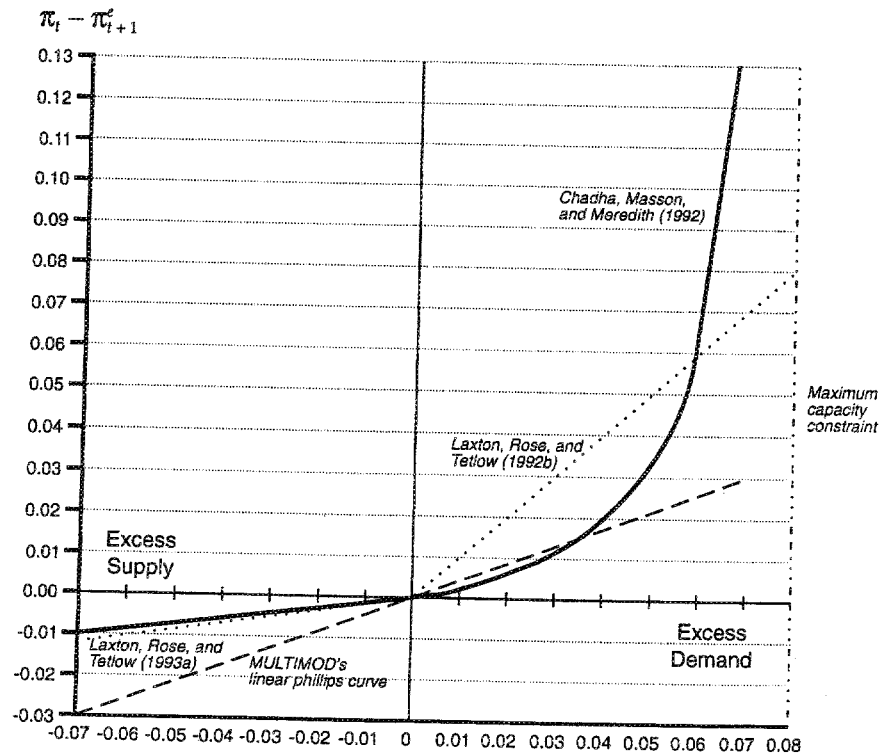
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3 This paper uses a consumption function different from that reported in Masson, Symansky and Meredith (1990). They assume that, although some consumers are affected by changes in income in the short run, consumption depends solely on wealth in the long run. Such a dichotomy appears out of keeping with the belief that a substantial proportion of consumption is associated with individuals who are liquidity constrained. Accordingly, the consumption function in MULTIMOD was modified to include income in the long-run solution.

4 The Blanchard-Weil effect (see Blanchard 1985; Weil 1989).

5 Separate models for each of the seven major industrial countries, plus one for the small industrial countries, one for net creditor developing countries, and one for net debtor developing countries.

Figure 2: Various Phillips Curves



implication is that the effects of fiscal policy will be independent of the state of demand conditions. A more traditional view of the inflation-output process posits that the effects of fiscal policy will depend on the state of the business cycle. According to this view, an expansionary fiscal policy will have greater effects on output and less upward pressure on prices when many resources are idle than when output is close to capacity and there is already a significant amount of overtime work. The implication is a nonlinear Phillips curve, in which the inflationary impact of changes in output depends

on the state of the cycle.<sup>6</sup> Accordingly, in the simulations, the standard Phillips curve was replaced by a nonlinear curve.

This issue is not new. Past empirical work on the development of MULTIMOD explicitly considers Phillips curves with short-run capacity constraints. For example, Chadha, Masson, and Meredith (1992) use data from the Group of Seven (G-7) countries to investigate nonlinearities in the inflation-output process. Their specification indicates that the choice between the estimated linear and nonlinear Phillips curves was statistically marginal (in the sense that the coefficient restrictions implied by the linear curve were rejected at a 2.5 percent confidence value but not rejected at a 5.0 percent confidence value). Given the method used to generate the output gaps, however, one may wish to reconsider their evidence. Indeed, as Laxton, Rose, and Tetlow (1993b) demonstrate, the methods that have been used in the past to measure potential output can result in false rejections of the nonlinear model.<sup>7</sup> In an another

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<sup>6</sup> Ball and Mankiw (1994) provide a survey of some recent theoretical work on the microfoundations of sticky price models. This literature considers both time-contingent and state-contingent pricing rules. The state-contingent models are capable of generating asymmetries in the inflation-output process in the sense that prices are sticky in response to large negative shocks but positive shocks trigger much faster adjustments. In these models, however, the degree of asymmetry is driven completely by expected trend inflation. Indeed, in a world in which expected trend inflation is expected to be zero, the asymmetry disappears. This property is driven by an assumption that firms incur a fixed cost to changing prices. As long as inflation is positive, some firms may wait for it to reduce their relative price, instead of incurring the cost of reducing their nominal price. Although this model is capable of explaining why the output-inflation tradeoff worsens at high inflation rates, Ball and Mankiw recognize that the literature on state-dependent pricing has been constrained to a large extent by problems of analytical tractability.

<sup>7</sup> The intuition behind these false rejections is obvious after a moment of reflection. Potential output series are usually constructed from penalty functions that rely upon a mean-squared-error criterion. For example, the objective function in the filter proposed by Hodrick and Prescott (1980) penalizes squared deviations from trend subject to a curvature restriction. If the world is truly asymmetric, in the sense that positive gaps have larger effects on inflation than negative gaps, then the use of this criterion will result in too many estimates of excess-demand gaps, and the excess-demand gaps that are estimated will tend to be too large. The important lesson here is that any convincing statistical rejection of the nonlinear model has to place both models on an equal footing by constructing gaps that are consistent with the structure of the model.

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study with Canadian data, Laxton, Rose, and Tetlow (1993a) provide evidence that historical movements in Canadian inflation have been slower and significantly smaller in response to excess supply gaps than would be suggested by a linear version of the Phillips curve.<sup>8</sup>

Figure 2 illustrates the nonlinear relationship between the output gap and inflation implied by the Phillips curve reported by Chadha, Masson, and Meredith (1992). For comparison purposes, the figure also includes the standard linear Phillips curve used in most MULTIMOD applications and the functional form reported by Laxton, Rose, and Tetlow (1992b). For small deviations of output from potential, the differences among the models' behavior are minor. During periods of large excess supply, such as the early 1980s and 1990s, however, the nonlinear model produces significantly less movement in inflation. Laxton, Rose, and Tetlow provide a similar view of the inflation process, except their model for Canada predicts significantly more inflationary pressure in the region between 0 and 6 percent excess demand. For this paper, we decided to rely on the equation generated by the G-7 data set, because the estimation strategy is probably less sensitive to small-sample problems.

An equally important issue for Canadian fiscal policy is the relationship between government debt and interest rates. The standard version of MULTIMOD assumes that all government assets are perfect substitutes and hence that the future path of exchange rates is determined solely by relative interest rates with no consideration of risk premiums.<sup>9</sup> There is, however, some fairly convincing recent evidence that high levels of government debt are indeed associated with high interest rates. In particular, Bayoumi, Goldstein and

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<sup>8</sup> The most elaborate theoretical model with state-dependent pricing is still probably that of Tsiddon (1991). In it, inflation responds faster and more to positive shocks than to negative shocks. Again, since this model is based on menu cost pricing, this asymmetry will disappear if expected inflation is zero.

<sup>9</sup> This issue is also not new. For examples of papers that have focused on it, see Alesina 1988; Alesina and Tabellini 1989; Alesina, Prati, and Tabellini 1990; Alesina et al. 1992; Bhandari, Haque, and Turnovsky 1989; Giavazzi and Pagano 1990a; Grossman and J. Van Huyck 1988; and Roubini and Sachs 1989.

Woglom (1994) find a significant relationship between debt and interest rates using a panel data set of interest rates and debt across US states, as do Bayoumi and Eichengreen (1994).<sup>10</sup> Work using international data has been less successful in identifying such relationships. This failure may well reflect the complications involved in dealing with economies that have separate currencies and hence different inflation expectations, as well as the difficulty of identifying underlying assets that are similar enough to provide a useful standard for comparison — problems that are as true for comparisons between the United States and Canada as between other areas.

The results of Bayoumi, Goldstein, and Woglom (1994) and Bayoumi and Eichengreen (1994) provide a reasonably convincing case for the intuition that interest rates do depend upon levels of debt. Given the large differences between the circumstances of US states and those of the Canadian federal government, it is difficult to translate these authors' empirical results directly. US state governments have much more limited tax room (because of the existence of the federal government), face more mobile factors of production, and have less control over monetary policy than their federal counterpart in Canada. To provide some idea of possible effects of rising debt, however, the semi-elasticity of interest rates to increases in the debt-to-GDP ratio estimated in Bayoumi, Goldstein, and Woglom was translated into the Canadian equivalent. The estimated semi-elasticity for an average level of debt for US states implies that a one-percentage-point rise in the federal-debt-to-GDP ratio would produce a one-basis-point rise in interest rates. (Given the manifest uncertainties involved in this calculation, this result should, however, be regarded as a ballpark figure.)

Accordingly, in the main simulations, the interest parity condition, which determines the exchange rate, was altered to include a risk premium implying that each one percentage point increase of

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<sup>10</sup> Both studies use a unique survey in which participants in the market for state bonds were asked to estimate the underlying spreads on similar bonds across states.



the GDP-to-debt ratio raises the steady-state real interest rate by one basis point. In short, the main results assume that the fiscal authorities force an upward-sloping supply schedule.

Some of the model's monetary and fiscal responses were also adapted to the current Canadian situation. We assumed monetary policy to depend upon a target for inflation measured by the GNP deflator.<sup>11</sup> If GNP inflation is one percentage point above its target value, it is assumed that the central bank will raise short-term interest rates by 100 basis points. This response is sufficiently vigorous to keep inflation generally within a fairly narrow range.

Finally, we made a relatively minor change to the fiscal sector. Tax rates, which are endogenous in the standard version of MULTIMOD so as to move debt toward its desired value, were made exogenous over the period of the simulation (but endogenous subsequently), a change that simplified the analysis considerably. Hence, taxes are assumed to be unaffected by the reduction in government spending over the medium term.

### Fiscal Retrenchment in the 1980s

The effect of a fiscal retrenchment over the 1987-89 period is examined through two MULTIMOD simulations, one of which assumes that such an announced package is credible and the other that it is not. The hypothetical fiscal package itself, which is the same in both scenarios, involves a reduction of government spending of 2 percent

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<sup>11</sup> In early 1991, the Government of Canada and the Bank of Canada jointly announced explicit inflation targets expressed in terms of the consumer price index (CPI). Although most of the simulation results reported in this paper focus on the GNP deflator, we also consider an alternative closer to CPI targeting: the absorption deflator. This factor was chosen because it is MULTIMOD's closest analogue to a consumption deflator. For the results reported in this paper, the critical issue centers on the sensitivity of the price index to changes in the exchange rate. Imported goods represent between 20 and 25 percent of the Canadian CPI basket of goods and services. This order of magnitude is approximately the same as that of the import component of the absorption deflator (since a relatively low import share in government goods and services partially offsets a very large share of imported investment goods).

of GDP (relative to the baseline) in 1987, a further 2 percent of GDP in 1988, and another 1 percent of GDP in 1989 — for a permanent reduction of spending equal to 5 percent of GDP. Half the cuts come through reductions in general government consumption and half through reductions in transfers to the private sector.<sup>12</sup> Since monetary policy is assumed to target the baseline rate of inflation, the exercise can be viewed as investigating the macroeconomic effects of an alternative fiscal-monetary policy mix that is geared to achieving a rate of inflation equal to the baseline rate.

The difference between the two scenarios involves the degree of public confidence at the beginning in the ability of the government to implement the full program. In the "credible" scenario, the private sector believes, at the time of the announcement, that the fiscal retrenchment will be carried out in the manner announced by the government. In the "noncredible" scenario, by contrast, the private sector assumes that the retrenchment will be only temporary, in the sense that the public expects the fiscal cuts that have already been implemented will be reversed in the future; thus, in 1987, people assume that from 1988 onward government spending will revert to the values in the baseline. Similarly, in 1988, they assume that the 4 percent cuts achieved to date will be reversed from 1989 onward, and in 1989, they assume that the cuts achieved to this point will be reversed in 1990. Only in 1990, a year after the final cuts are actually implemented, do people believe that the cuts will be maintained into the future.

Clearly, the assumptions about expectations in both scenarios are very specific. It is unlikely that the public would initially believe that all future cuts would be implemented as planned, but it is equally unlikely that they would believe that no lasting cuts in government spending would be achieved. Hence, the two scenarios can probably be seen as extreme cases, with actual behavior likely to lie somewhere between the projections.

The main results are shown in Tables 2 and 3. Focusing initially on the noncredible scenario, one can see that the reduction in de-

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<sup>12</sup> Equivalently, these reductions in transfers could be thought of as increases in taxes.

**Table 2: Noncredible Deficit Reduction Starting in 1987**  
(monetary authorities target the GNP deflator)

	1987	1988	1989	1990	1991	1992	1993	1994
Real GDP ( % $\Delta$ )	-0.6	-0.8	-0.5	0.9	1.4	1.5	1.3	1.1
Potential output ( % $\Delta$ )	0.0	0.1	0.1	0.3	0.4	0.6	0.6	0.7
Output gap ( <i>abs.</i> $\Delta$ )	-0.6	-0.9	-0.6	0.6	0.9	0.9	0.7	0.4
Contribution to GDP ( <i>abs.</i> $\Delta$ )								
Government spending	-1.0	-1.9	-2.4	-2.4	-2.5	-2.5	-2.5	-2.5
Consumption and investment	-0.3	-0.5	-0.1	0.6	1.2	1.5	1.6	1.7
Net exports	0.7	1.5	2.0	2.7	2.6	2.5	2.3	1.9
Interest rate ( <i>abs.</i> $\Delta$ )								
Short term	-0.2	-1.0	-1.9	-2.2	-2.2	-2.0	-1.7	-1.5
Long term	-0.2	-0.8	-1.5	-1.9	-1.7	-1.5	-1.4	-1.3
Exchange rate ( % $\Delta$ )	-0.6	-2.0	-4.1	-9.5	-7.8	-6.0	-4.4	-3.1
Debt/GDP ( <i>abs.</i> $\Delta$ )	-1.5	-4.6	-8.9	-14.4	-20.5	-26.6	-32.3	-37.3
Absorption inflation ( <i>abs.</i> $\Delta$ )	-0.1	-0.3	-0.2	1.1	-0.2	-0.1	0.0	-0.1
GNP inflation ( <i>abs.</i> $\Delta$ )	-0.2	-0.8	-0.8	-0.1	-0.1	0.2	0.2	0.2

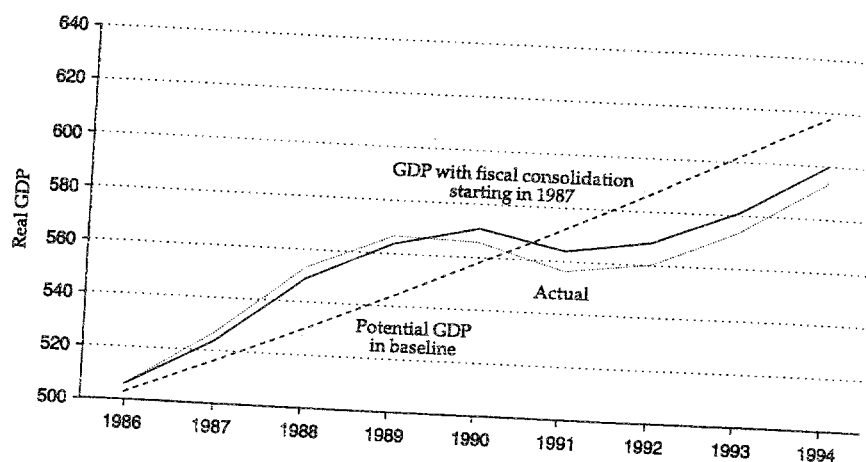
mand caused by the fiscal retrenchment leads to a gradual depreciation of the exchange rate as expectations about the level of future interest rate are lowered. This reduction in the exchange rate causes a significant boost to real net exports, which offsets to some extent the reductions in domestic demand caused by cuts in government consumption spending. There is, however, still a significant fall in the level of real output over the first three years of the simulation (cumulatively, 1.9 percent). After the second year, however, there is a steady improvement in real activity, as the private sector responds to the rise in wealth and the fall in real interest rates caused by lower government demand. Real exports continue to provide a boost to output throughout the simulation period, with the effect peaking in 1990. By 1994, eight years after the start of the fiscal package, real

**Table 3: Credible Deficit Reduction Starting in 1987**  
(monetary authorities target the GNP deflator)

	1987	1988	1989	1990	1991	1992	1993	1994
Real GDP ( % $\Delta$ )	0.2	0.0	-0.1	0.1	0.2	0.4	0.6	0.7
Potential output ( % $\Delta$ )	0.0	0.0	0.0	0.2	0.2	0.2	0.4	0.5
Output gap ( <i>abs.</i> $\Delta$ )	0.2	0.0	-0.2	-0.1	0.0	0.2	0.2	0.2
Contribution to GDP ( <i>abs.</i> $\Delta$ )								
Government spending	-1.0	-1.9	-2.4	-2.5	-2.6	-2.6	-2.6	-2.6
Consumption and investment	-0.3	-0.5	-0.4	-0.2	0.0	0.4	0.6	0.8
Net exports	1.5	2.4	2.8	2.7	2.7	2.7	2.6	2.4
Interest rate ( <i>abs.</i> $\Delta$ )								
Short term	0.1	0.0	-0.3	-0.6	-0.8	-1.0	-1.1	-1.2
Long term	-0.3	-0.6	-0.8	-0.9	-1.1	-1.1	-1.2	-1.3
Exchange rate ( % $\Delta$ )	-7.1	-7.2	-7.2	-7.0	-6.6	-6.1	-5.5	-4.8
Debt/GDP ( <i>abs.</i> $\Delta$ )	-1.9	-5.2	-9.4	-14.3	-20.0	-25.7	-31.1	-35.9
Absorption inflation ( <i>abs.</i> $\Delta$ )	1.5	0.1	-0.1	-0.1	-0.2	-0.1	-0.1	-0.1
GNP inflation ( <i>abs.</i> $\Delta$ )	0.3	-0.2	-0.3	-0.2	-0.3	-0.2	-0.1	-0.1

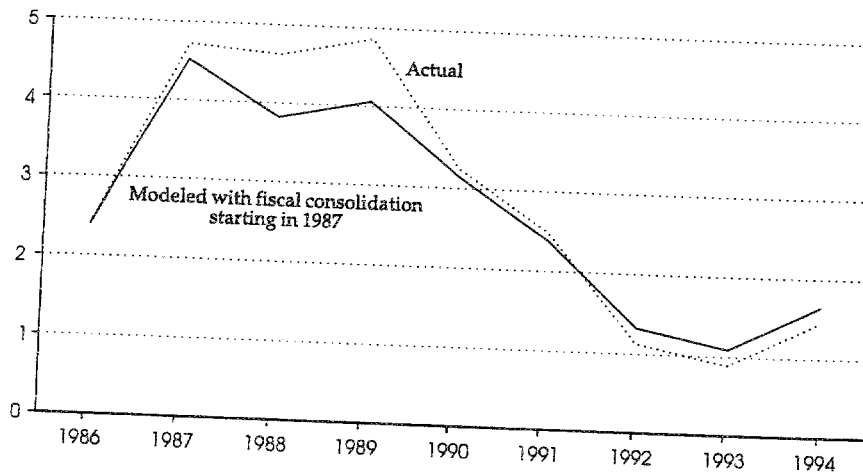
GDP is 1.1 percent above the baseline. Furthermore, most of this increase in output is caused by an increase in the capital stock; potential output is 0.7 percent higher than the baseline by 1994. At the same time, the level of general government debt is reduced by more than a third of GDP, implying that the 1994 debt-to-GDP ratio is about the same as the 1987 level. This fiscal package would have provided more room for fiscal flexibility and, in all likelihood, lower interest rates than actually occurred.

The overall profile of the credible scenario is much like that of the noncredible scenario — in particular, the long-term reduction in government debt is very similar — yet the two differ in important respects. The assumption of perfect credibility actually results in an increase in output in the short run. Since the public is assumed to be

Figure 3: *Real GDP in the Noncredible Scenario*

confident about the permanence of the spending cuts, future interest rates are anticipated to fall more in the fully credible case. As a result, the depreciation of the exchange rate occurs much faster, and there is a larger improvement in real net exports. In this scenario, short-term interest rates rise by ten basis points in the first year because there is a small, positive inflationary impulse on the GNP deflator.

The most interesting aspect of these results is the impact of credibility on the interaction between fiscal and monetary policy. If the monetary authority adopts an inflation target, a fiscal retrenchment leads to a switch in the policy mix. The crucial difference between the credible and noncredible scenarios is in the role of the exchange rate in this process. Lower credibility reduces the short-term impact of the policy on the exchange rate, which both increases the short-term output losses associated with a fiscal retrenchment and makes the eventual recovery in real output more dependent on domestic consumption and investment. The greater importance of domestic demand in the recovery reflects the larger reductions in domestic interest rates in the noncredible scenario, reductions made possible by the slower response of the exchange rate and hence real

**Figure 4: GNP Inflation in the Noncredible Scenario**

net exports. In these simulations, less fiscal credibility is associated with smaller reductions in the exchange rate and larger losses in output.

The results from these scenarios suggest that a fiscal retrenchment in the late 1980s could have provided significant long-term benefits to the Canadian economy and at the same time lowered the cyclical deviations of output. Figures 3 and 4 depict the effects on real GDP and GNP inflation in the noncredible scenario. The reduction in cyclical deviation in output does not come from any specific countercyclical policy; rather, it reflects the timing of the fiscal retrenchment during a period of excess demand. Of course, to the extent that a credible program of fiscal consolidation is already in place by the start of the downturn in the 1990s, the increased fiscal flexibility provided by the lower underlying level of debt would make it possible to provide somewhat larger fiscal automatic stabilizers than were actually provided. Such stabilizers would tend to reduce the level of cyclical variance in output still further.

It is also interesting to see the extent to which the two major changes made to the model — namely, the nonlinear Phillips curve and the upward sloping supply curve for debt — affect the results.

Since the retrenchment occurs during a period of excess demand, reductions in government spending have relatively small short-term effects on output and relatively large impacts on prices. Moreover, the nonlinear Phillips curve tends to boost the recovery in output in the 1990s, since by this time the economy has moved into a period of excess supply. In brief, the nonlinear Phillips curve tends both to lower the short-term output losses from the retrenchment and to boost the medium-term output gains. Some idea of the size of these effects, particularly with respect to the short-term losses in output, is provided by the simulations discussed below, in which the same program of retrenchment is implemented starting in 1995, rather than 1987. Since 1995 is in a period of excess supply, the nonlinearity of the curve tends to magnify the short-term output losses while reducing the impact on inflation.

The upward-sloping schedule for government debt relates the level of interest rates to the government debt ratio. Since the stock of government debt is a stock variable, this effect cumulates slowly through time. By 1994, government debt is projected to be some 37 percent of GDP lower than in the baseline case, implying a reduction of 35 basis points in the steady-state rate of interest. Simulations in which this effect was excluded indicate that without the upward-sloping supply curve, real GDP in 1994 would be about 0.9 percent above the baseline case, rather than rising 1.1 percent as it did in the main case scenario. In other words, about one fifth of the long-term gain in output is attributable to the assumption of an upward-sloping supply curve for debt.

### **Fiscal Retrenchment in 1995**

The impact of a fiscal retrenchment starting in 1987 can be compared to the impact of a similar retrenchment in 1995.<sup>13</sup> Since the fiscal packages are the same — a spending cut of 5 percent of GDP over

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<sup>13</sup> Of course, the package is highly stylized and does not correspond to any packages that have actually been proposed.

three years — the differences in the simulations reflect the different economic circumstances of 1987 and 1995.

Of these differences, the most important is the very different cyclical position of the economy. As can be seen from Figure 1, the economy was operating with a significant level of excess demand in the late 1980s. By contrast, in 1995 the economy is assumed to be still significantly below potential. This assumption has two consequences. The nonlinearity in the Phillips curve implies that a fiscal retrenchment has a larger impact on real output and a smaller impact on inflation than in the earlier period; hence, the output costs of a noncredible retrenchment will be higher. If the fiscal package is perfectly credible, however, the positive effects on output will be larger in the short run when the economy is characterized by excess supply than when it is initially characterized by excess demand. In other words, the potential benefits from increased credibility may be significantly greater at the current juncture of Canadian business cycle.

These effects can be seen in the simulation results reported in Tables 4 and 5. The results for the noncredible scenario show larger and more persistent output losses than in its earlier counterpart. Indeed, in this scenario, the cumulative output loss over the first four years is 2.8 percent, compared to a 1.9 percent cumulative output loss over three years in the noncredible scenario starting in 1987. In the credible scenario, output again rises in the short run, as the perceived benefits from current and future cuts in government spending outweigh the costs of lower government spending.

To investigate the importance of the monetary policy assumptions for the results, the credible scenario was rerun using the assumption that monetary policy is directed at stabilizing the absorption deflator rather than the GNP deflator. Since the absorption deflator is much more sensitive to jumps in the exchange rate than is the GNP deflator, monetary policy in this case is effectively working against depreciation in the exchange rate.

The results from this scenario, reported in Table 6, indicate that the switch in the target inflation rate has a significant effect on the results. Even in the credible scenario, output remains below the base-



**Table 4: Noncredible Deficit Reduction Starting in 1995**  
(monetary authorities target the GNP deflator)

	1995	1996	1997	1998	1999	2000	2001	2002
Real GDP ( % $\Delta$ )	-0.5	-1.0	-1.2	-0.1	0.3	0.5	1.5	0.5
Potential output ( % $\Delta$ )	0.0	0.0	0.0	0.2	0.2	0.3	0.3	0.4
Output gap ( <i>abs.</i> $\Delta$ )	-0.5	-1.0	-1.2	0.1	0.1	0.2	0.2	0.1
Contribution to GDP ( <i>abs.</i> $\Delta$ )								
Government spending	-1.0	-2.1	-2.6	-2.5	-2.5	-2.5	-2.4	-2.4
Consumption and investment	-0.3	-0.0	-0.5	0.0	0.5	0.8	1.0	1.3
Net exports	0.9	1.6	1.9	2.5	2.4	2.2	2.0	1.7
Interest rate ( <i>abs.</i> $\Delta$ )								
Short term	-0.1	-0.3	-0.6	-0.9	-1.1	-1.1	-1.1	-1.0
Long term	-0.1	-0.4	-0.7	-1.0	-1.1	-1.1	-1.1	-1.2
Exchange rate ( % $\Delta$ )	-0.4	-0.9	-1.4	-6.4	-5.7	-4.9	-4.1	-3.3
Debt/GDP ( <i>abs.</i> $\Delta$ )	-1.5	-4.6	-8.8	-13.8	-18.5	-23.1	-27.6	-31.9
Absorption inflation ( <i>abs.</i> $\Delta$ )	0.1	0.0	-0.1	1.0	-0.2	-0.2	-0.1	-0.1
GNP inflation ( <i>abs.</i> $\Delta$ )	-0.1	-0.2	-0.3	-0.2	-0.2	0.0	0.0	0.0

-line through 1999, a full five years after the start of the fiscal retrenchment. As well as continuing longer, the output losses are also significantly larger than in the equivalent earlier scenario, with real output losses of more than 0.5 percent of GDP in 1996 and 1997. The higher output losses reflect both direct and indirect effects. The direct effect comes through the larger impact of changes in nominal demand on real output. The indirect effects stem from the smaller effect of the reduction in nominal domestic demand on prices, which means that interest rates are higher and the exchange rate depreciation is smaller than in the earlier scenario. Indeed, given that nominal short-term interest rates do not fall below baseline values until 1998

**Table 5: Credible Deficit Reduction Starting in 1995**  
(monetary authorities target the GNP deflator)

	1995	1996	1997	1998	1999	2000	2001	2002
Real GDP ( % $\Delta$ )	0.4	0.1	-0.1	-0.1	0.0	0.2	0.3	0.3
Potential output ( % $\Delta$ )	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.3
Output gap ( <i>abs.</i> $\Delta$ )	0.4	0.0	-0.2	-0.2	-0.1	0.0	0.0	0.0
Contribution to GDP ( <i>abs.</i> $\Delta$ )								
Government spending	-1.0	-2.1	-2.6	-2.5	-2.5	-2.5	-2.5	-2.4
Consumption and investment	-0.3	-0.6	-0.6	-0.4	-0.2	0.0	0.2	0.5
Net exports	1.7	2.7	3.0	2.9	2.8	2.6	2.5	2.3
Interest rate ( <i>abs.</i> $\Delta$ )								
Short term	0.0	0.0	-0.1	-0.2	-0.4	-0.6	-0.7	-0.9
Long term	-0.1	-0.3	-0.4	-0.6	-0.7	-0.8	-1.0	-1.1
Exchange rate ( % $\Delta$ )	-5.5	-5.6	-5.6	-5.6	-5.5	-5.3	-5.0	-4.6
Debt/GDP ( <i>abs.</i> $\Delta$ )	-2.0	-5.4	-9.6	-14.0	-18.5	-22.8	-27.1	-31.4
Absorption inflation ( <i>abs.</i> $\Delta$ )	1.4	0.1	0.0	-0.1	-0.1	-0.1	-0.2	-0.2
GNP inflation ( <i>abs.</i> $\Delta$ )	0.1	0.0	-0.1	-0.2	-0.2	-0.2	-0.2	-0.1

and that GNP inflation remains persistently below control, it is clear that the stance of monetary policy has effectively tightened despite a significant depreciation in the real exchange rate.

We also considered several alternative scenarios in which the monetary authorities attempt to maintain tighter control over the absorption deflator. In these scenarios, interest rates rise more in the short run but decline faster over the medium term. As a consequence, there are larger output losses in the very short run and absorption inflation returns to control faster.

**Table 6: Credible Deficit Reduction Starting in 1995**  
(monetary authorities target the absorption deflator)

	1995	1996	1997	1998	1999	2000	2001	2002
Real GDP ( % $\Delta$ )	-0.2	-0.6	-0.7	-0.4	-0.1	0.2	0.4	0.5
Potential output ( % $\Delta$ )	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3
Output gap ( <i>abs.</i> $\Delta$ )	-0.1	-0.5	-0.6	-0.4	-0.1	0.1	0.2	0.2
Contribution to GDP ( <i>abs.</i> $\Delta$ )								
Government spending	-1.1	-2.1	-2.6	-2.6	-2.5	-2.5	-2.5	-2.5
Consumption and investment	-0.5	-1.0	-1.0	-0.6	-0.3	0.0	0.3	0.6
Net exports	1.5	2.5	2.9	2.8	2.8	2.7	2.5	2.4
Interest rate ( <i>abs.</i> $\Delta$ )								
Short term	0.6	0.5	0.3	-0.1	-0.4	-0.6	-0.8	-0.9
Long term	-0.2	-0.1	-0.3	-0.5	-0.7	-0.8	-0.9	-1.0
Exchange rate ( % $\Delta$ )	-2.9	-3.5	-4.0	-4.3	-4.3	-4.2	-3.8	-3.3
Debt/GDP ( <i>abs.</i> $\Delta$ )	-1.6	-4.4	-8.3	-12.5	-16.8	-21.2	-25.5	-29.9
Absorption inflation ( <i>abs.</i> $\Delta$ )	0.6	-0.1	-0.3	-0.3	-0.3	-0.3	-0.2	-0.1
GNP inflation ( <i>abs.</i> $\Delta$ )	-0.1	-0.4	-0.5	-0.6	-0.5	-0.3	-0.2	0.0

### Gaining Credibility for Fiscal Policy

The simulation results reported in this paper imply that it may be possible to cut the fiscal deficit while avoiding large losses in real output. An important element in such a program is that the fiscal policy being proposed is regarded as credible by the general public. Indeed, taken seriously, our simulations demonstrate that a phased cut in government spending can be accomplished with virtually no loss in output if the cut is credible and monetary policy accommodates the first-round impacts of the depreciation in the exchange rate.

Although this result is notable, it is not unique to MULTIMOD. Most forward-looking macroeconomic models can provide similar

results, the intuition being that the anticipated benefits from future spending cuts are larger than the costs from current cuts. Nor is this suggestion of purely academic interest. The results in Giavazzi and Pagano (1990b) suggest that the large fiscal retrenchments in Ireland and Denmark in the 1980s may have led to expansions in output.

This issue is not new; indeed, it has produced a significant literature.<sup>14</sup> One way of achieving credibility may be to institute a front-loaded fiscal program. A program in which many of the measures are already implemented, it is argued, is less likely to veer off track than a program in which most of the difficult measures are consigned to a distant, and possibly illusory, horizon. Instituting a front-loaded program can have its own problems, however. It can be difficult to institute changes in policy rapidly, either because of existing commitments or because the apparatus required to change the system is not in place. Furthermore, the types of programs that can be changed quickly may not be those that would provide the most lasting economic benefits. For example, the Canadian unemployment insurance system is often believed to be both expensive and economically inefficient; yet any reform of the system is clearly a long-term proposition. Finally, as the earlier simulations indicate, if credibility is not gained, the short-term costs to output of a front-loaded program are potentially large.

Another way that has been suggested for gaining credibility — one experimented with extensively in the 1980s by various governments including the Canadian federal government — is to present a medium-term fiscal framework. Adherence to a medium-term framework depends upon having correct economic forecasts and implementing difficult measures as envisaged. A good example of such a system is the funding of the Canada Pension Plan (CPP), for which projections of costs and implied contribution rates are published up to the year 2100. This clear connection between costs and contribution rates has made relatively uncontroversial the recent rises in the contribution rate resulting from the aging of the population.

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<sup>14</sup> Surveyed in Persson and Tabellini (1990).

A coherent fiscal framework does not necessarily ensure credibility, however. Difficult decisions can still be put off, ambitious economic forecasts can still be used, and unspecified future actions can still be promised. A fiscal framework approach is, therefore, most likely to work if the results are tied to specific plans that have already been, or are in the process of being, implemented but whose main benefits are in the future.\*

A third avenue for gaining credibility is through statutory limits on fiscal behavior. Every US state except Vermont has laws reducing its fiscal options by limiting either the level of debt that can be issued or its budgetary policies ("balanced budget amendments"). These limits come in a great variety of forms. For example, some states merely require the governor to submit a balanced budget to the legislature; others require him or her to sign a balanced budget. Some of these rules are written into the state constitution; others are imposed by statute.<sup>15</sup> More recently, self-legislated constraints on the US federal government have also had significant effects on behavior (for example, ratification of the North American Free Trade Agreement required Congress to find other expenditure cuts or revenue increases to offset the forgone tariff revenues).

These rules are not perfect. The New York City financial crisis of the 1970s occurred while the city was subject to a balanced budget amendment. Nonetheless, there is now a considerable amount of evidence that such rules can reduce both interest rates and debt.<sup>16</sup> Yet, these gains come at a cost. US states with relatively strong fiscal rules also have relatively weak countercyclical policies (Bayoumi and Eichengreen 1993). In short, fiscal rules appear to affect perception only when they are strong enough to limit both cyclical and discretionary increases in the deficit; the gains from greater credibility through legislation have to be weighed against the costs of reduced flexibility.

<sup>15</sup> Details can be obtained from ACIR (1991).

<sup>16</sup> Bayoumi, Goldstein, and Woglom (1994) estimate that such controls can lower debt costs for the average state by 50 basis points. Eichengreen (1992) gives separate evidence that fiscal controls lower both debt and interest rates and provides an explanation of why these results differ from the more negative results reported in von Hagen (1990).

In short, there appears to be no magic way of gaining credibility. Front-loaded programs and strong frameworks can help; however, they are only as good as the underlying commitment to fundamental reform. Similarly, fiscal rules may be useful, particularly for lower levels of government; however, such rules can also reduce fiscal flexibility.

## **Conclusions**

This paper presents simulations of the effects of a fiscal retrenchment in two different economic environments, one characterized by high employment and the other by underemployment of resources. The results suggest that the failure to reduce government debt during the expansion of the 1980s exacerbated the business cycle in Canada. Indeed, the most notable feature of the fiscal situation in Canada has been the steady rise in the federal-debt-to-GDP ratio over the past 20 years. This increase in indebtedness appears to have had a significant impact on the ability of the federal government to carry out countercyclical policy, an effect that is particularly important over the current economic downturn.

The paper also suggests that the results of a deficit reduction package depend upon both the announced measures' credibility with the public and the state of the business cycle. The more credible the package and the greater the level of excess demand, the lower the likely short-term output losses from a fiscal retrenchment package and hence the faster the medium- and long-term gains from the package become manifest. Given that the influence of credibility appears to be particularly important in situations of excess supply, policymakers would do well to consider ways to ensure that the public perceives any fiscal retrenchment as credible.

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## **A Comment on "Government Deficits, Debt, and the Business Cycle"**

***John F. Helliwell***

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Tamim Bayoumi and Douglas Laxton have written a first-rate paper, making intelligent use of a well-established model to produce important empirical estimates of the possible effects of a monetary and fiscal package designed to reduce Canadian government deficits and debts. Both the strategy and the structure of this paper are very appropriate to the study of the problem of reducing deficits and debts. It is relatively easy to reach the general conclusion that deficits and debts should be reduced, but without an explicit empirical model, it is hard to make informed choices about when the process should be started, how fast it should proceed, and how far it should go. By making use of pooled international data to estimate its key relationships, the MULTIMOD model has a better chance than purely national models to embody correctly some of the key aspects of macroeconomic behavior.

What are the main issues raised by the paper, and how can MULTIMOD or some alternative model be used to address them?

First, and perhaps foremost, there is the issue of credibility. A credible package of current and future fiscal restructuring sharply reduces the loss of real output and employment as the expenditure cuts take place. The reason is fairly straightforward. In a model with forward-looking expectations, lower future levels of government spending reduce expected future interest rates, which in turn reduce current long-term interest rates and the value of the domestic cur-

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rency, both of which help to increase investment and net exports in a timely way to replace the government spending.

Second, there are the issues of timing, which become even more relevant if the short-term tradeoff between inflation and output depends importantly on the extent of unemployed capacity. If it does, there are even stronger arguments to institute fiscal retrenchment when the economy is booming, rather than in recession, since during a boom it will be possible to achieve greater deficit reduction for any given increase in the unemployment rate.

Third, there is the issue of the extent to which the costs of being indebted rise with the level of indebtedness. If the costs of government borrowing rise significantly with the extent of the government debt, then the marginal costs of debt can greatly exceed the average costs, and there is a strong case to be made for large and early reductions in government spending.

### *Quantifying the Issues*

Bayoumi and Laxton's application of MULTIMOD confronts and attempts to quantify all three of these important issues. In all three cases, they either alter the structure of the model or consider alternative mechanisms in order to obtain at least some rough estimates of likely empirical significance.

To address the issue of the credibility of the fiscal package, the authors have done one set of simulations in which the whole three-year phased reduction of spending is announced and believed from the outset and another in which the public expects the fiscal package to evaporate in the following year during each of the first three years. As the authors note, these are limiting assumptions, which they hope will span the most likely cases. Unfortunately, they are not able to show what the effects would be if expectations were not fully forward-looking in the model as a whole. Thus, the multiplier effects of the noncredible fiscal package are small, as is generally the case with temporary changes within a model with single-valued model-consistent expectations. In the credible case, the multiplier effects of the fiscal cuts are even smaller and sometimes negative, since the

eventual effects of the smaller government debts are foreseen and lead to significant immediate reductions in long-term interest rates and the value of the Canadian dollar.<sup>1</sup>

So the MULTIMOD results show small effects on real gross domestic product (GDP) whether the fiscal cuts are credible or not. We should read these results with some caution, however, since if expectations were slower to predict the future and hence more responsive to current incomes and spending, the debt reduction strategies could have substantial negative output effects in the short run. To be more specific, the MULTIMOD multipliers, at least as offset by monetary expansion, are significantly less than those in most other models, even some with forward-looking expectations; thus, MULTIMOD may be providing an exceptionally optimistic view of fiscal retrenchment (just as the Economic Council of Canada's CANDIDE and the Informetrica model are optimistic about the effects of increases in spending).

Even in the noncredible case, in which the budget measures have the greatest impact on GDP, fiscal cuts totalling 5 percent of GDP reduce GDP in the third year, when the package is in full effect, by only 0.5 percent. In the second year, when the cuts total 4 percent of GDP, the reduction in GDP is only 0.8 percent. The peak multiplier effects are in the first year, when cuts equaling 2 percent of GDP reduce GDP by 0.6 percent. Even at this peak, the fiscal multiplier is less than one-third.

To some extent, this very low value may be because half the budget package is in tax increases or cuts in transfers, which have very small effects in MULTIMOD. Moreover, the results reported are

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<sup>1</sup> This result raises a puzzle that may have bothered others looking at the soft landings forward-looking models imply for expected fiscal retrenchments. These happy endings come about because there is a sharp drop in the value of the Canadian dollar. Yet we are used to reading in the daily newspapers that the value of the Canadian dollar has recently been falling because investors fear that fiscal policy will not be as tight as they would like. If credibly tight and unacceptably loose fiscal policies drive down the Canadian dollar, what will ever make it rise? The answer to this puzzle presumably lies in expectations about how the debt will be financed, but the conundrum makes one wonder nonetheless.

from fiscal cuts plus a monetary policy rule that provides a substantial amount of stimulus to offset the disinflationary effects of the fiscal cuts. It is not possible to use the results of such packages to compare properties of different models unless those models use the same monetary policy rules. (After the conference, Bayoumi and Laxton planned simulations to cast more light on this issue by combining the fiscal cuts with monetary policies more like those used in other model comparison exercises.)

Putting aside this substantial question about the very small multipliers, I must admit that the experiments show, as have earlier experiments with MULTIMOD, INTERMOD, and the Taylor model, that credible future fiscal retrenchment provides a soft — or at least softer — landing. The problem, of course, is that it is easy to promise but hard to deliver cuts in spending and transfers — so hard that governments themselves are starting to be wary of promising future policies and results, which may be received with so much skepticism as to make the promises counterproductive.

To deal with the timing question, Bayoumi and Laxton compare the results of fiscal retrenchment in 1987, a period of relatively full capacity utilization in MULTIMOD, with 1995, a year with substantial excess capacity. Here they find a different pattern of GDP effects — smaller in the first year<sup>2</sup> and larger in the second and third years, in the noncredible case. In the credible case, the positive effects are even larger in 1995 than in 1987, presumably because there are smaller crowding-out effects in 1995. Overall, the differences between the two cases are quite small, allowing us to conclude that models without the allowances for nonlinearities imposed in MULTIMOD will not give results that are substantially different. This experiment was very much worth doing and is no less valuable for showing that the allowance for nonlinearities does not dramatically alter the results.

On the third issue, the effects of debt ratios on credit ratings and borrowing costs, there is no ready source of results linking debt ratios

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2 Why? Could the reason be different monetary offsets in the two cases?

to interest rates at the national level, so the authors use evidence based on differences in debt ratios across US states. It is not clear whether they are modeling the behavior of investors or of rating agencies, but in either event there should be doubts about using results from US states, which are often limited by law in the deficits they are permitted and, in any event, do not have the power to print money to finance spending.

Yet even in the absence of national data, the experiment was well worth doing. It shows that even the very large changes in the national debt-to-GDP ratio obtained from the MULTIMOD fiscal package have relatively small effects on interest rates — the authors' rule of thumb is only one basis point on the interest rate for each percentage point change in the debt-to-GDP ratio.

### Questions

I do have some specific questions about Bayoumi and Laxton's work.

- How important is the split between reductions in transfers and reductions in government spending? The reported experiments assume an even split; it would be useful if the multiplier effects of the two sorts of changes were shown separately so we could see which of them is more responsible for the very low multiplier effects of the fiscal package.
- How much of the income support is from the operation of the monetary policy rule? It should be possible to compare the results with those obtained from the same fiscal measures combined with simpler monetary strategies, such as maintaining monetary quantities unchanged. Even reporting the money supply effects of the current monetary policy rule would help to interpret the results.
- What tests have been done of alternative specifications of the equations estimating the impact of the debt on the cyclical properties of government net lending? I would guess that the

interactive form used in the authors' Table 1, without any specific theoretical rationale, would be dominated, both theoretically and empirically, by a specification in which the change in output growth and the change of the debt-to-GDP ratio appeared separately in an equation explaining the change in net lending, or, more transparently, if net lending itself were explained by output growth and the stock of debt with all the variables expressed as fractions of GDP.

Overall, I applaud the structure of the paper and the underlying model, but I need more convincing before I believe that the short-term GDP effects of fiscal retrenchment are as painless as the authors suggest.

In conclusion, I suggest it would be useful to compare the kinds of results Bayoumi and Laxton obtain from MULTIMOD with those of the sort outlined by Frank Barry and Michael Devereaux. The key distinction between the two model types is that although one version of the Barry-Devereaux model that was discussed at the conference permits real wage rigidity, it makes no allowance for price stickiness or for the related pro-cyclical behavior of total factor productivity, given the quasi-fixity of labor as well as capital inputs. Thus, that model and others like it eliminate the major part of the cyclical variation of aggregate output, since the cycles of output are much more marked than those of any package of measured factor inputs. MULTIMOD and most other empirically based models do permit output to move more than factor inputs in the short-run, in response to changes in aggregate demand, and hence are more likely to show output dropping in response to fiscal tightening. That the MULTIMOD results sometimes do not show this response is a result of some combination of monetary expansion, possible underestimation of the expenditure effects of fiscal cuts (especially reductions in transfer payments), and the presumed farsightedness of consumers and investors. Any belt-tightening minister of finance thinking about re-election must hope that MULTIMOD has it right. In any event, the paper presents valuable evidence in an interesting way.