THE CANADIAN SECTOR OF THE MULTI-COUNTRY MODEL

by

Howard Howe

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Introduction

The quarterly econometric model of Canada described in this paper is based on the prototype model of MCM presented in previous papers and in the forthcoming book, The U.S. Economy in an Interdependent World.1 Few departures from the prototype specification were required to represent the functioning of the Canadian economy. The most critical area for adaptation of the prototype to Canada lay in the financial sector. The Canadian financial system is characterized by close linkage to U.S. financial markets. Consequently, Canadian interest rates have traditionally moved closely with U.S. interest rates. Because of this linkage, the Bank of Canada, in its RDX2 model, chose to model the process of interest rate determination by postulating a central bank reaction function for the short-term interest rate. Thus, the application of the MCM prototype to Canada represents a departure from accepted procedure for an influential group of Canadian modelers and merits further discussion. The first part of this paper reviews the model's financial sector. The second and third parts present dynamic simulation results and selected multiplier responses that characterize the Canadian model.

The Canadian Financial Sector

Aside from the departure from the RDX2 interest-rate reaction function, several features of the Canadian financial system required adaptation in the prototype model:

(1) Canada has a secondary reserve requirement against time and demand deposits that is to be filled by Treasury bill holdings,
(2) The bulk of Canadian foreign exchange reserves are not held by the Bank of Canada,
(3) The reserve requirement is lagged, and
(4) Borrowed reserves are a very small fraction of central bank assets.\(^2\)

**Secondary reserves.**—Most Canadian financial modelers do not seem to think that the secondary reserve requirement has been a binding condition. If it were, however, the requirement would add another component in the demand for Treasury bills. Suppose that the demand for Treasury bills in the absence of a secondary reserve requirement followed a conventional portfolio demand specification where the nonbank demand component is a function of private wealth, income, and rates of return and the bank demand component is a function of deposits (time plus demand), net of the cash reserve requirement and rates of return. Now, if a secondary reserve requirement is imposed, the banks' demand for Treasury bills is the maximum of either the conventional demand for Treasury bills or the secondary reserve ratio times total deposits.

Recall, however, that the MCM does not model the bond market.\(^3\)

Hence, secondary reserves are important only insofar as they might affect the demand for money or other assets (foreign short- or long-term capital inflows and outflows). This indirect effect on the banks' demand for money is probably small. Early tests for this effect by including the secondary reserve requirement in the inverted free reserves equation and the capital flow equations showed no significant effect.

**Exchange Fund Account.**—The bulk of Canadian foreign exchange reserves are held in the Exchange Fund Account (EFA). Therefore, to get a meaningful
measure of net foreign assets in the monetary base equation, it is necessary to work with a balance sheet for the consolidated monetary authorities. (This was done for Japan also.) The consolidated account is generated from the balance sheets of the Bank of Canada (BOC) and the Exchange Fund Account (EFA). For our purposes the balance sheets can be written:

<table>
<thead>
<tr>
<th>Bank of Canada (BOC)</th>
<th>Exchange Fund Account (EFA)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td><strong>Liabilities</strong></td>
</tr>
<tr>
<td>Net Foreign</td>
<td>Currency (CUR)</td>
</tr>
<tr>
<td>Assets (NFABOC)</td>
<td></td>
</tr>
<tr>
<td>Net Government</td>
<td>Total Reserves (RT)</td>
</tr>
<tr>
<td>Position (NGPBOC)</td>
<td></td>
</tr>
<tr>
<td>Borrowed</td>
<td></td>
</tr>
<tr>
<td>Reserves (RB)</td>
<td></td>
</tr>
<tr>
<td>Other Assets (OTH)</td>
<td></td>
</tr>
</tbody>
</table>

The assets of the EFA are combined with those of the BOC to yield total foreign exchange reserves. The liabilities of the EFA are subtracted from the net government position of the BOC (NGPBOC) to obtain NBP of the consolidated monetary authorities (NGP = NGBPBOC - NFAEFA).

<table>
<thead>
<tr>
<th><strong>Assets</strong></th>
<th><strong>Liabilities</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>NFA&lt;sup&gt;4&lt;/sup&gt;</td>
<td>CUR</td>
</tr>
<tr>
<td>NGP</td>
<td>RT</td>
</tr>
<tr>
<td>RB</td>
<td></td>
</tr>
<tr>
<td>OTH</td>
<td></td>
</tr>
</tbody>
</table>
Within the framework of the consolidated monetary authorities, the sources and uses of the unborrowed monetary base are similar to those of the German and Japanese cases.

(1) Sources: \( BU = NFA + NGP + OTH \) (net)

(2) Uses: \( BU = RR + RF + CUR \)

where:

- \( BU \) = unborrowed monetary base;
- \( NFA \) = net foreign assets;
- \( NGP \) = net government position;
- \( OTH \) = other assets (net);
- \( RR \) = required reserves;
- \( RF \) = free reserves; and
- \( CUR \) = currency.

Unlike the German and Japanese cases, vault cash is an eligible component of reserves and is included there. There is no need for the variable \( CURB^{6/6} \), included in the prototype.

Canadian reserve requirements are much simpler than in the German and Japanese cases. There is no distinction by size of bank. Furthermore, the reserve requirement changed only once over the sample period. Unlike the U.S. monetary system, changes in reserve requirements are not used for monetary control. Prior to 1967, the primary reserve requirement or both demand and time deposits was held at 8 percent. After a 3 quarter transition period, the requirements were set to 12 percent for demand deposits and 4 percent for time deposits. This was a statutory change made for institutional purposes rather than monetary control.
Lagged reserve requirements.--Required reserves are actually based on average deposits over the four consecutive Wednesdays ending with the second last Wednesday of the previous month. The current averaging period for meeting reserve requirements is 15 days. Because U.S. reserve requirements are also lagged, this difference with respect to the prototype is one of degree. The reserves computed from end-of-month deposit data do not correspond to the "true" reserves based on deposits during the previous month. Required reserves are reported on a daily average basis for the month. All other items in the monetary base equation are reported on an end-of-month basis.

On a monthly basis, then, bank deposits are not at all tied to primary reserves. On a quarterly basis, however, a large component (roughly two-thirds) of required reserves are contemporaneous with bank deposits. The procedure in the MCM databank constructs mid-quarter averages of bank deposits and then computes required reserves from the statutory requirements. This computed reserve requirement is linked to the mid-quarter average of the reported daily-average required reserves with a bridge equation. The use of actual required reserves gives a better measure of free reserves than would computed required reserves for use in the inverted reserve identity.

Chartered banks.--Reserves and time and demand deposits are obtained from the balance sheet of the chartered banks. In the Canadian case, the balance sheet was constructed according to a slightly disaggregated version of the balance sheet in the prototype model.
Chartered Banks

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Reserves (RR)</td>
<td>Demand Deposits (DD)</td>
</tr>
<tr>
<td>Excess Reserves (RX)</td>
<td>Time Deposits (TD)</td>
</tr>
<tr>
<td>Total Reserves (RT)</td>
<td>Borrowed Reserves (RB)</td>
</tr>
<tr>
<td>less: Required Reserves (-RR)</td>
<td>(Includes purchase and resale agreements)</td>
</tr>
<tr>
<td>Long-term Securities (LTS)</td>
<td></td>
</tr>
<tr>
<td>Short-term Securities (STS)</td>
<td></td>
</tr>
<tr>
<td>Foreign Assets (net) (FA)</td>
<td></td>
</tr>
<tr>
<td>Other Assets (OTHCH)</td>
<td>Net Worth (NWCH)</td>
</tr>
</tbody>
</table>

In this scheme of generating the data, NFA, NGP, RB, CUR, and RT come from the balance sheet of the Consolidated Monetary Authorities. RR, RX, DD, TD, SD are generated from the Chartered Bank balance sheet. It is useful to note that RR is obtained on a different basis from all the other data (daily average for the month). In terms of the balance sheet, assets still equal liabilities exactly because excess reserves are calculated as a residual from total reserves. RT, as all other items in the balance sheet except RR, is available on an end of month basis.
The apparent time pattern of reserve assets over the 15-day averaging period permits RR on a daily-average basis to exceed total reserves on an end-of-month basis. Computation of RX from RT-RR thus leads to negative excess reserves for most observations in the sample. Another difficulty with this procedure for creating data on excess reserves is that all the discrepancy between end-of-month and daily-average measurement of total reserves is picked up in RX. This discrepancy is then passed on to free reserves when RF is calculated as RX-RB. However, a discrepancy of some kind will always be present in RF because RB is also measured on an end-of-month basis.

The final difference between the prototype balance sheets and those for Canada relates to the importance of government securities held by the Chartered Banks under purchase and resale agreements (PRA). Holding eligible securities in a PRA is a legitimate means for a chartered bank to comply with its reserve requirement. In fact, borrowed reserves are very small in Canadian banking, and PRAs exceed borrowed reserves. Thus, in the MCM, RB is defined as borrowed reserves plus PRAs. This procedure requires the assumption that the spread between the purchase and resale price of the security is equivalent to the interest payment on borrowed reserves of the same magnitude at the bank rate (discount rate).

**Monetary Sector.**—From this point on, the structure of the Canadian monetary sector follows closely that laid out for the prototype model.

RRC is computed from statutory reserve requirements as

\[
(3) \quad RRC = a \cdot DD + b \cdot TD
\]
where $a$ and $b$ are the primary reserve requirements. The bridge equation is given by:

(4) $\text{RR} = a + \delta \text{RRC} + \epsilon$

Substituting computed required reserves from (3) into the bridge equation (4) and that result into the uses of the unborrowed base (3) yields

(5) $\text{BU} = \hat{a} + \hat{b} \text{ADD} + \hat{b} \text{BTD} + \hat{c} + \text{RF} + \text{CUR}$

Equation (5) can be expressed in terms of demand deposits.

(6) $\text{DD} = \left[ \text{BU} - \hat{a} - \hat{b} \text{BTD} - \hat{c} - \text{RF} - \text{CUR} \right] / \hat{a}$

Equation (6) is a rearrangement of the uses side of the monetary base equation. Given BU (from the sources side of the base, eq. (1)), reserve requirements $a$ and $b$, and n-1 uses of reserves (RF and CUR), the stock of demand deposits that can be supported by the remaining reserves (RR) is determined.

The specifications of the equations determining the four components of equation (6) are as follows:

(7) $\frac{\text{DD}}{\text{NW}} = \text{DD}(\text{GNP}/\text{NW}, \text{RS}, \text{URS}, (\text{EE}-\text{E})/\text{E})$

Unlike the German case, there are no appreciable government holdings of time deposits. TD is composed of savings deposits (82% in 1969IV) and other notice deposits or "deposit receipts." Deposit receipts are sold in denominations of $C 100,000 or more and are described as temporary repositories of excess balances of corporations, governments and other organizations. These corporate notice deposits seem essentially to be negotiable certificates of
deposit. Since government deposits could not have been more than part of the remaining 18 percent of time deposits in 1969, wealth (NW) is used as a scale variable for the aggregate TD equations. Savings deposits are not handled separately in the Canadian financial sector.

\[
(8) \quad \frac{TD}{NW} = TD \left( \frac{GNPV/NW, RS, URS, (EE-E)/E}{} \right)
\]

The equation for free reserves is of the same form as the prototype.

\[
(9) \quad \frac{RF}{NDD} = RF(RS, RS-RD, URS, \Delta RU, \Delta RR)
\]

where:

\[
NDD = (1 - \beta a) DD, \text{ net demand deposits;}
\]

URS = U.S. short-term interest rate;

RU = BU - CUR and, unborrowed reserves; and

\[
\Delta RR = \Delta a(DD_{-1}) + \Delta b(TD_{-1}), \text{ change in required reserves.}
\]

\[\Delta RR\] is zero except for a transition period of 3 quarters in 1967 when reserve requirements were changed from a uniform 8 percent to 12 percent on DD and 4 percent on TD. The sign pattern in equation (9) is important for determining the eventual sign on the U.S. short-term interest rate in the Canadian interest rate equation. Borrowed reserves including purchase and resale agreements (PRA) are a negative component of free reserves. Borrowed reserves and PRAs will increase with an increase in the domestic or foreign (U.S.) short-term interest rate, so both the domestic and U.S. short-term rates carry a negative sign.
Public holdings of currency are a simple function of consumption (as a proxy for transactions) and the short-term interest rate.

(10) \[ \text{CUR} = \text{CUR} (\text{CV}, \text{RS}) \]

A term-structure equation explains the long-term interest rate.

(11) \[ \text{RL} = \text{RL} (\text{RS}, \text{RS}_{-1}, \ldots, \text{RS}_{-n}) \]

Five behavioral equations (7) - (11) along with (1) and (6) are used to determine BU, DD, TD, RF, CUR, and RL.

**Reduced form interest rate equation.** — In estimating the Canadian monetary sector, equation (9) for free reserves was normalized on the short-term interest rate. In this respect, the MCM monetary sector is similar to that of RDX2. But because RF is tied to the monetary base equations, there is a difference in the signs of arguments in the interest rate equation and, indeed, in the roles the equations perform in their respective models. When inverted, equation (9) takes the form

(12) \[ RS_{\text{MCM}} = f(\text{RS}(-1), \text{RD}, \text{URS}, \text{RF/NDM}, \ldots) \]

The U.S. interest rate enters with a negative sign because the return on U.S. securities represents an opportunity cost of excess reserves in the free reserve equation. Using the same mnemonics, the key conceptual elements of the RDX2 short-term interest rate equation can be written as

(13) \[ RS_{\text{RDX2}} = f(\text{RS}(-1), \text{JRS}, \text{chartered bank loans, private holdings of government securities}) \]
Empirical testing revealed that the Canadian short-term interest rate behaved somewhat differently when the discount rate acted as a penalty rate (RD > RS) than when short-term rates exceeded the discount rate. There are two versions of equation (12) in the MCM, each is switched on during its respective regime. In the penalty-rate regime, the U.S. short-term rate enters the inverted free reserve equation (with a small negative coefficient). In the regime where the discount rate was less that the short-term rate, the U.S. interest rate does not enter the equation at all. The small direct presence of the U.S. interest rate in the MCM equation contrasts sharply with the dominant presence of the U.S. rate in the RDX2 equation. This has important structural ramifications for the functioning of the model. In the MCM, changes in the U.S. interest rate alter the differential between U.S. and Canadian interest rates, cause a capital flow, a change in the level of foreign exchange holdings, thereby affecting the sources of the monetary base and free reserves (on the uses side of the monetary base) and, in this way, cause a change in Canadian interest rates. In the RDX2 approach, the U.S. effect occurs directly via the reduced form equation, thus, circumventing these important channels of financial flow. The three key differences in the two interest rate functions can be summarized as:

(1) The MCM makes use of the discount rate as one of three policy instruments whereas RDX2 does not. Canadian scholars argue that borrowed reserves and PRAs are a very small share of financial flows and constitute an unreliable link to interest rates. We argue that while smallness may cause estimation problems, the link to the monetary base exists. We also argue that the market rate functions as a signal mechanism much as the discount rate in the United States.
(2) The U.S. interest rate appears with a (small) negative sign in the MCM interest rate equation whereas it appears with a large (0.5) positive sign in the RDX2 equation. While the linkages between the U.S. and Canadian financial markets are strong and the total effect of U.S. rates on Canadian rates must be positive (as shown in the multiplier experiments to follow), the MCM equation is a structural representation in that it captures the substitution effect between U.S. and Canadian assets. When U.S. rates increase, free reserves should decline as indicated in equation (9). But for a ceteris paribus interpretation of equation (12), holding free reserves constant would require an expansion of the Canadian monetary base resulting in a decrease in the Canadian short-term interest rate.

(3) Through their linkage to the monetary base equation, free reserves in the MCM transmit the portfolio effects of changes in foreign financial conditions, via capital flows and changes in foreign exchange holdings, to the Canadian short-term interest rate. As far as responsiveness to Canadian policy instruments, the RDX2 interest rate equation responds only indirectly through portfolio holdings (bank loans and private holdings of government securities). Thus, while the MCM may be vulnerable through the small size and volatility of free reserves, the RDX2 structure depends crucially on the ability to model dependably the domestic short- and long-term securities markets. Additionally, while small size and volatility could cause some difficulties in dynamic tracking performance, once the model is aligned on a solution path, the dependability of multipliers depends upon estimation accuracy and the fidelity of the model.
structure. On this count we had a decided preference for the monetary base approach over the reduced-form reaction function approach taken in RDX2. In estimation, the discount rate tends to dominate (and stabilize) the MCM short-term interest rate equation while the U.S. rate performs the same function in the RDX2 equation.

The verdict clearly remains open on these two approaches to interest rate determination in the Canadian economy. The MCM approach represents a conscious risk on estimation and tracking performance (although these are not decidedly inferior to other Canadian results as can be seen in the results of the following section) in order to attempt a structural representation of the interdependence between domestic and international financial flows. It is hoped that this work will stimulate additional efforts on structural modeling of the Canadian financial system.

Reaction functions.---Because the model's sample period spanned both fixed and floating rate regimes, different operating rules for the financial authorities were invoked. During the fixed exchange rate period (1961I to 1970 II), the model allows changes in foreign exchange reserves to be determined from the balance of payments identity. Because uncompensated reserve changes during a fixed-rate regime would cause severe fluctuations in the monetary base, we tested for central bank behavior attempting some degree of sterilization of the foreign flows. Systematic partial offset (-.46) of foreign exchange reserves was observed in the equation for changes in the open market position of the monetary authorities.

During the floating exchange rate regime, a stabilizing reaction of "leaning against the wind" to dampen exchange rate fluctuations was observed.
Expected exchange rate changes were resisted by foreign exchange market intervention. The stock of foreign exchange reserves entered the equation with a negative sign representing an "ability to intervene." Both these functions were operating during the dynamic simulation of and shocks to the model analyzed in the following sections.

**Expected exchange rate.**—Another significant difference from the specification of the prototype model occurs in the treatment of the expected future spot exchange rate (equation 31a of the prototype, see IFDP No. 115, p. 68). For the fixed exchange rate regime, the Canadian equation uses the product of the relative Canadian export price and net foreign assets scaled by the value of imports, just as specified in the prototype model.

For the floating exchange rate regime, however, the Canadian model uses the specification originally sought in the MCM. The expected future spot rate is assumed to equal the actual spot rate observed one quarter ahead plus a random error. Only for Canada did this specification provide good estimation results. In simulation of the model, the value of the spot rate one period ahead is replaced by an estimated value obtained from a regression using past exchange rates and changes in net foreign assets as explanatory variables (see ELEAD in the equation list of the appendix to this paper).

**Analysis of Errors**

The equations of the prototype model, modified in the financial sector and the expected exchange rate equation as described above, were estimated with quarterly Canadian data from the first quarter of 1961 to the fourth quarter of 1975. Ordinary least squares regressions were employed for estimation. Thus, the equation estimates may be subject to simultaneous equation bias.
In-sample tracking.—The Canadian model by itself was simulated dynamically over the eleven-year period between the fourth quarter of 1964 and the fourth quarter of 1975. This simulation period spans both fixed and floating exchange rate regimes. The first column of Table 1 presents the mean percentage errors and the root mean squared percentage errors for key variables in the sample period; the second column presents the same statistics for the five-quarter post-sample period available at the time the model was tested before inclusion in the MCM.

In-sample errors are, by and large, within the range of acceptable error for medium-sized macroeconomic models. The root mean square percentage error (RMSE) for GNP is 2.4 percent over the 45 quarter sample period. This error falls within the bounds for other MCM models which range from 2.4 percent for the U.S. model to 4.4 percent for the German model. It compares favorably with the 1.7 percent in-sample error of the RDX2 model of the Bank of Canada. The domestic absorption deflator tracks very well at a RMSE of 0.6 percent, the lowest of the MCM models. Unemployment rates, being a residual number, normally track with a RMSE in the double-digit range; the Canadian model's RMSE for the unemployment rate is 14.1 percent, the lowest of the MCM models.

The interest rate performs worse than the other domestic variables. While interest rate equations normally track on the high side of other variables, the RMSE of 26 percent is the highest of the errors for MCM interest rates. This RMSE compares unfavorably with the 6.8 percent error observed for the RDX2 model. The tracking properties of the Canadian interest rate could have been improved considerably by linking the rate directly to the U.S. short-term interest rate. But as explained in the previous section on the financial sector, this approach was eschewed in favor of the specification
Table 1

Dynamic Simulation of the Canadian Model in Isolation from the MCM

<table>
<thead>
<tr>
<th>Variables</th>
<th>In-Sample Errors</th>
<th>Post-Sample Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>64:4-75:4</td>
<td>76:1-77:1</td>
</tr>
<tr>
<td>GNP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME(^1)</td>
<td>0.087</td>
<td>0.3787</td>
</tr>
<tr>
<td>RMSE(^2)</td>
<td>2.403</td>
<td>1.403</td>
</tr>
<tr>
<td>P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME</td>
<td>0.161</td>
<td>-0.324</td>
</tr>
<tr>
<td>RMSE</td>
<td>0.633</td>
<td>0.600</td>
</tr>
<tr>
<td>CU</td>
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<tr>
<td>ME</td>
<td>0.428</td>
<td>-0.659</td>
</tr>
<tr>
<td>RMSE</td>
<td>3.980</td>
<td>1.067</td>
</tr>
<tr>
<td>UN</td>
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<tr>
<td>ME</td>
<td>2.705</td>
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<tr>
<td>RMSE</td>
<td>14.130</td>
<td>12.798</td>
</tr>
<tr>
<td>RS</td>
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<tr>
<td>ME</td>
<td>-8.683</td>
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<tr>
<td>RMSE</td>
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<tr>
<td>MG</td>
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<td>ME</td>
<td>-0.554</td>
<td>0.055</td>
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<tr>
<td>RMSE</td>
<td>6.660</td>
<td>3.630</td>
</tr>
<tr>
<td>MGV</td>
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<tr>
<td>RMSE</td>
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<td>PMGUV</td>
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<td>RMSE</td>
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<td>ME</td>
<td>-0.232</td>
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<tr>
<td>RMSE</td>
<td>1.208</td>
<td>7.593</td>
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<td>PXGUV</td>
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<tr>
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<td>RMSE</td>
<td>2.200</td>
<td>10.616</td>
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<tr>
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<tr>
<td>ME</td>
<td>1.044</td>
<td>-10.062</td>
</tr>
<tr>
<td>RMSE</td>
<td>2.512</td>
<td>10.765</td>
</tr>
<tr>
<td>NFAEOQ</td>
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<tr>
<td>ME</td>
<td>39.732</td>
<td>-22.402</td>
</tr>
<tr>
<td>RMSE</td>
<td>57.732</td>
<td>23.713</td>
</tr>
</tbody>
</table>

\(^1\)Mean percentage error.

\(^2\)Root mean squared percentage error.
that linked interest rate determination more directly to the monetary base.

While Canadian exchange rate tracking was good over the sample period with a RMSE of 2.5 percent, the error on the stock of foreign exchange reserves (NFAEOQ) was the highest of all the MCM models at 58 percent. In a simultaneous system it is difficult to establish cause and effect, but the large error on foreign exchange reserves disrupts the monetary base and the interest rate. Correspondingly, large errors in the interest rate cause large errors in capital flows and the change in foreign exchange reserves.

Exports track more closely during the sample period (1.2 percent) than do imports (6.6 percent) largely because foreign activity is exogenous and only the export price and exchange rate are subject to solution error. For imports, the exchange rate and domestic activity are simultaneous. Because the GNP tracking errors (2.4 percent) are larger than those for domestic prices (0.6 percent), imports tend to be thrown off track more than exports.

Post-sample tracking.—Except for the exchange rate and the trade flows affected by it, tracking errors are smaller in the post-sample period than in the sample period. The GNP and interest rate errors decrease to 1.4 percent and 12.8 percent, respectively. The exchange rate error increases to 10.7 percent, and because it affects the relative competitiveness of exports, the errors on exports increase to 7.4 percent. Evidently the individual errors on the exchange rate and GNP are offsetting because the import error declines to 3.6 percent in the post-sample period. Although the post-sample period is relatively short, the goodness of the tracking errors outside the estimation period indicates that the model is a reliable representation of the Canadian economy in the mid-1970s.
Multipliers of the Canadian Model

The multipliers presented in this section were calculated by comparing a solution of the Canadian model that was aligned to history by adding the regression residuals to the estimated equations with a solution using the same regression residuals and a change in the policy instrument. These multipliers solutions were made with the Canadian model in isolation from the rest of the MCM; that is, all foreign variables remained exogenous.

The single-model multipliers presented here differ from those of the MCM version of the model in one crucial aspect. The single model results were obtained with an aggregate export equation used before the MCM bilateral trade system was completed. This is a significant difference in the case of the Canadian model because the export price elasticities in the two trade systems differed significantly. The aggregate export equation had an export price elasticity of -0.73, whereas the trade-weighted average of the bilateral price elasticities was -1.08. With the lower export price elasticity, these multipliers using the aggregate export equation are larger than those of the final MCM version using the bilateral trade equations.

In that the multipliers depend on the magnitudes of activity and prices existing in the period for which the model is solved, it is useful to recall the economic environment between 1973 and 1975. In late 1974 Canada and the rest of the world economy entered a recession. The general effect of this environment on the multiplier paths studied here is a downward bias in the initial real effects and an upward bias in the initial price effects of an economic stimulus.
Government spending.---Table 2 presents key multipliers for a sustained increase in real government purchases of $C 1 billion. The real GNP multiplier starts from 1.013 and increases to 1.428 by the end of the two-year period. The price level also increases steadily over the two-year period to a maximum of 28 percentage points higher than its historical value.

The effect of the increase in government spending on the unemployment rate peaks at a reduction of .192 percentage points three quarters after the fiscal stimulus begins. Thereafter, the unemployment rate remains below that of the control baseline, but the difference oscillates slightly before diminishing in the eleventh period. The early peak is due to the productivity effects of the increase in investment. In the early periods, the rise in investment affects the capital stock only slightly, most of the increased output must come from added labor. As the stimulus continues, the capital stock becomes larger than otherwise and productivity increases. Additionally, the increase in economic activity draws new entrants into the labor force and puts upward pressure on the unemployment rate. These countervailing effects turn back the path of the decline in the unemployment rate and cause its oscillation.

The added activity creates increased loan demand. Since monetary policy remains unchanged with the fiscal stimulus, the added loan demand leads to a steady increase in the short-term interest rate. By the end of 11 quarters, the interest rate is 1.3 percentage points above that of the control path.

The stimulus to activity draws in a large and increasing flow of imports. Table 3 presents the historical levels for the selected multiplier responses reported in this section. With a base level of imports (in current dollar terms) of $C 47.6 billion, the increase of $C 1.9 billion amounts to a 4 percent increase in the value of imports after 11 periods.
Table 2

Effects of a $C 1 billion Increase in
Real Government Purchases of Goods and Services
(1972 dollars)

<table>
<thead>
<tr>
<th></th>
<th>1973</th>
<th>1974</th>
<th>1975</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>GNP</td>
<td>1.013</td>
<td>1.066</td>
<td>1.106</td>
</tr>
<tr>
<td>p^2</td>
<td>.001</td>
<td>.002</td>
<td>.004</td>
</tr>
<tr>
<td>UN^3</td>
<td>.136</td>
<td>-.192</td>
<td>-.192</td>
</tr>
<tr>
<td>RS^3</td>
<td>.115</td>
<td>.258</td>
<td>.384</td>
</tr>
<tr>
<td>NGSNIVS^1</td>
<td>.336</td>
<td>.483</td>
<td>.628</td>
</tr>
<tr>
<td>E^4</td>
<td>-.001</td>
<td>-.005</td>
<td>-.009</td>
</tr>
</tbody>
</table>

1 billions of Canadian dollars, annual rate.
2 1972 = 1.00
3 Percentage points.
4 U.S. dollars per Canadian dollar, 1972 = 1.0.
5 This drop in the interest rate effect is spurious. It occurs historically at a point where the interest rate equation experiences a behavioral shift between discount rate regimes. See discussion of the two interest rate equations above in the financial sector of this paper. The 50-odd basis point drop is related to the first quarter of 1975 and not to the eighth period after the fiscal stimulus.
Table 3

Historical Values for Key Variables in Canadian Multiplier Experiments

<table>
<thead>
<tr>
<th></th>
<th>1973</th>
<th></th>
<th>1974</th>
<th></th>
<th>1975</th>
<th></th>
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<td>3</td>
<td>4</td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>GDP</td>
<td>112.0</td>
<td>113.1</td>
<td>116.1</td>
<td></td>
<td>117.8</td>
<td>117.4</td>
</tr>
<tr>
<td>f²</td>
<td>1.067</td>
<td>1.089</td>
<td>1.118</td>
<td></td>
<td>1.152</td>
<td>1.200</td>
</tr>
<tr>
<td>UN³</td>
<td>5.45</td>
<td>5.38</td>
<td>5.57</td>
<td></td>
<td>5.30</td>
<td>5.23</td>
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<tr>
<td>RS⁴</td>
<td>6.27</td>
<td>8.20</td>
<td>9.43</td>
<td></td>
<td>9.20</td>
<td>11.00</td>
</tr>
<tr>
<td>RN1</td>
<td>31.6</td>
<td>29.3</td>
<td>34.8</td>
<td></td>
<td>35.4</td>
<td>41.6</td>
</tr>
<tr>
<td>b⁴</td>
<td>.991</td>
<td>.987</td>
<td>.991</td>
<td></td>
<td>1.011</td>
<td>1.026</td>
</tr>
</tbody>
</table>

1 billions of Canadian dollars, annual rate.

2 1972 = 1.00

3 Percentage points.

4 U.S. dollars per Canadian dollar, 1972 = 1.0.
Under the fiscal stimulus, the capital inflow resulting from portfolio rebalancing in response to the widening of the Canadian interest rate differential is not sufficient to offset the currency outflows resulting from the increase in imports. Consequently, the Canadian dollar depreciates steadily over the period, reaching a peak of 3.5 percentage points 10 quarters after introducing the stimulus.

**Taxes.**—Table 4 presents the multipliers for a $1 billion (current Canadian dollars) increase in personal income taxes. The multipliers are all smaller (in absolute magnitude) than those for the increase in government spending because the tax increase of $C 1 billion in current dollars is less than $C 1 billion in constant dollars and because the increase in tax revenues affects GNP indirectly by changing disposable income. The patterns on the GNP and price paths are similar (with opposite sign) to those of the government spending increase. The unemployment rate effect, however, peaks in the sixth quarter after the stimulus rather than the third. This is most likely the result of smaller productivity effects than in the case of the larger fiscal stimulus.

Interest rates decline because of the slackening in loan demand. The narrowing interest differential and $C 1.2 billion decrease in imports lead to an appreciation of the Canadian dollar. As the fiscal restraint is about 1/3 the magnitude of the fiscal stimulus (measured by the change in GNP), so is the appreciation of the Canadian dollar about 2/3 the size of the depreciation under the stimulus.

**Monetary policy.**—The contractionary effects of a tightening in Canadian monetary policy are shown in Table 5 with a one percentage point increase in the discount rate. GNP eventually declines by one half billion Canadian dollars
Table 4

Effects of a $C 1 billion Increase
in Personal Tax Revenues (current dollars)

<table>
<thead>
<tr>
<th></th>
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</thead>
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<tr>
<td>GNP$^1$</td>
<td>-.207</td>
<td>-.347</td>
<td>-.489</td>
<td>-.612</td>
<td>-.724</td>
<td>-.748</td>
<td>-.825</td>
<td>-.881</td>
<td>-.925</td>
<td>-.936</td>
<td>-.971</td>
<td></td>
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<tr>
<td>$x^2$</td>
<td>0.000</td>
<td>-.001</td>
<td>-.001</td>
<td>-.002</td>
<td>-.004</td>
<td>-.005</td>
<td>-.007</td>
<td>-.010</td>
<td>-.013</td>
<td>-.015</td>
<td>-.017</td>
<td></td>
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<tr>
<td>UN$^3$</td>
<td>.028</td>
<td>.058</td>
<td>.096</td>
<td>.114</td>
<td>.129</td>
<td>.133</td>
<td>.129</td>
<td>.116</td>
<td>.114</td>
<td>.111</td>
<td>.092</td>
<td></td>
</tr>
<tr>
<td>$RS^4$</td>
<td>-.037</td>
<td>-.097</td>
<td>-.172</td>
<td>-.262</td>
<td>-.381</td>
<td>-.482</td>
<td>-.589</td>
<td>-.234$^5$</td>
<td>-.260$^5$</td>
<td>-.352$^5$</td>
<td>-.853</td>
<td></td>
</tr>
<tr>
<td>MGSNIVS$^1$</td>
<td>-.085</td>
<td>-.170</td>
<td>-.268</td>
<td>-.398</td>
<td>-.541</td>
<td>-.709</td>
<td>-.842</td>
<td>-1.001</td>
<td>-1.140</td>
<td>-1.225</td>
<td>-1.262</td>
<td></td>
</tr>
<tr>
<td>$E^4$</td>
<td>.001</td>
<td>.003</td>
<td>.004</td>
<td>.006</td>
<td>.008</td>
<td>.011</td>
<td>.014</td>
<td>.020</td>
<td>.028</td>
<td>.023</td>
<td>.021</td>
<td></td>
</tr>
</tbody>
</table>

1 billions of Canadian dollars, annual rate.
2 $1972 = 1.0$.
3 Percentage points.
4 U.S. dollars per Canadian dollar, $1972 = 1.0$.
5 This drop in the interest rate effect is spurious. It occurs historically at a point where the interest rate equation experiences a behavioral shift between discount rate regimes. See discussion of the two interest rate equations above in the financial sector of this paper. The 50-odd basis point drop is related to the first quarter of 1975 and not to the eighth period after the fiscal stimulus.
Table 5

Effects of a One Percentage Point Increase in the Canadian Discount Rate (Bank Rate)

<table>
<thead>
<tr>
<th></th>
<th>1973</th>
<th></th>
<th>1974</th>
<th></th>
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<td>4</td>
<td>1</td>
</tr>
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<td>CRN1</td>
<td>-.090</td>
<td>-.130</td>
<td>-.163</td>
<td>-.217</td>
<td>-.266</td>
</tr>
<tr>
<td>F2</td>
<td>-.001</td>
<td>-.001</td>
<td>-.002</td>
<td>-.002</td>
<td>-.002</td>
</tr>
<tr>
<td>jn3</td>
<td>.010</td>
<td>.031</td>
<td>.046</td>
<td>.051</td>
<td>.048</td>
</tr>
<tr>
<td>Rs4</td>
<td>.835</td>
<td>.907</td>
<td>.840</td>
<td>.805</td>
<td>.798</td>
</tr>
<tr>
<td>MGNIVS1</td>
<td>-.048</td>
<td>-.072</td>
<td>-.077</td>
<td>-.104</td>
<td>-.171</td>
</tr>
<tr>
<td>E4</td>
<td>.006</td>
<td>.007</td>
<td>.005</td>
<td>.003</td>
<td>.003</td>
</tr>
</tbody>
</table>

1. billions of Canadian dollars, annual rate.
2. 1972 = 1.0
3. Percentage points.
5. In this experiment, the discount did not exceed the short-term rate until the last quarter of 1975, so the switch of interest rate equations occurred here rather than in the first quarter. Like the previous multiplier responses, the drop in the interest rate response is the result of switching between interest rate equations and not the number of periods after the introduction of the shock.
eleven periods after the increase in the discount rate. In response to this decline in activity, the domestic price level falls slowly at first, eventually declining six tenths of one percent below its base level at the end of 11 quarters. Unemployment increases by one-half percentage point four quarters after the monetary contraction begins and then fluctuates slightly about that change for the remainder of the period.

The short-term interest rate increases 83 basis points initially, and then by 90 basis points in the second quarter. As activity and loan demand slow, the increase in the short-term interest rate drops back to the 80 basis point range for the remainder of the period. In response to both the slowing of imports and capital inflows responding to the widening of the Canadian-foreign interest rate differential, the Canadian dollar appreciates by roughly 10 percent at the end of two years.

**Foreign interest rates.**—The final experiment presented for the floating exchange rate period tests the effects of a 100 basis point increase in the U.S. short-term rate accompanied by a 70 basis point increase in the Eurodollar rate. Table 6 presents the multiplier responses indicating that the narrowing of the Canadian-foreign interest rate differential leads initially to a 0.7 percent depreciation of the Canadian dollar. As a result of the depreciation the import price in local currency increases and real imports decrease. The average import price elasticity is less than one, however, (the import price elasticities for the United States and the rest of the world are 0.6 and 0.3, respectively) so the value of imports increases by 0.3 percent in the initial period. As the size of the depreciation diminishes over time, so does the increase in the value of imports.
Table 6

Effects of an Increase in Foreign Interest Rates (100 basis points in the U.S. Short-term rate and 70 basis points in the Eurodollar rate).

<table>
<thead>
<tr>
<th></th>
<th>1973</th>
<th>1974</th>
<th>1975</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>GNP$^1$</td>
<td>.007</td>
<td>.030</td>
<td>.045</td>
</tr>
<tr>
<td>P$^2$</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
</tr>
<tr>
<td>UN$^3$</td>
<td>.001</td>
<td>-.014</td>
<td>-.025</td>
</tr>
<tr>
<td>Rs$^4$</td>
<td>.054</td>
<td>.114</td>
<td>.169</td>
</tr>
<tr>
<td>MGSNIVS$^1$</td>
<td>.127</td>
<td>.122</td>
<td>.078</td>
</tr>
<tr>
<td>E$^4$</td>
<td>-.006</td>
<td>-.006</td>
<td>-.003</td>
</tr>
</tbody>
</table>

1 billions of Canadian dollars, annual rate.
2 1972 = 1.0.
3 Percentage points.
4 U.S. dollars per Canadian dollar, 1972 = 1.0.
5 In this experiment, the discount did not exceed the short-term rate until the last quarter of 1975, so the switch of interest rate equations occurred here rather than in the first quarter. Like the previous multiplier responses, the drop in the interest rate response is the result of switching between interest rate equations and not the number of periods after the introduction of the shock.
Export volume increases as a result of the depreciation and acts as a stimulus to GNP. The domestic price level increases slightly in response to the increase in domestic activity.

The depreciation is caused by the narrowing of the Canadian-foreign interest rate differential. The resulting portfolio readjustment results in capital outflows from Canada. These outflows reduce the monetary base. The intervention reaction function which resists the depreciation also results in a reduction in the monetary base. The reduction in the base, in turn, results in a small increase in the Canadian interest rate which peaks at 17 basis points three quarters after the increase in foreign interest rates.

Revaluation of the Canadian dollar.—The final experiment presented in this section explores the effects of a 10 percent revaluation of the Canadian dollar. The experiment was performed during the fixed exchange rate period to illustrate the properties of the Canadian model operating as a fixed exchange rate system.\(^{10}\) The exchange rate index had the value of .920 (1972 = 1.0) in the first quarter of 1967, so the exchange rate was increased by .092 for the duration of the experiment.

The contractionary effects are best traced through the trade response first. By raising the relative price of Canadian exports and reducing the relative price of imports, the trade balance in real terms is reduced. As indicated in the last two rows of Table 7, the responses on exports and imports are initially similar in magnitude. But by the fourth period after the shock, the decline in exports is about twice the size of the increase in imports. The resulting increase in the trade deficit is reinforced by a decrease in capital inflows.
Table 7

Effects of a 10 percent Revaluation of the Canadian Dollar

<table>
<thead>
<tr>
<th></th>
<th>1967</th>
<th>1968</th>
<th>1969</th>
</tr>
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<tr>
<td></td>
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<td>2</td>
<td>3</td>
</tr>
<tr>
<td>CNP</td>
<td>-.009</td>
<td>-.107</td>
<td>-.205</td>
</tr>
<tr>
<td>F</td>
<td>-.006</td>
<td>-.012</td>
<td>-.017</td>
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<tr>
<td>UN</td>
<td>-.126</td>
<td>.056</td>
<td>.145</td>
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<td>RS</td>
<td>-.103</td>
<td>.346</td>
<td>.642</td>
</tr>
<tr>
<td>MOSNIVS</td>
<td>-.781</td>
<td>-.757</td>
<td>-.743</td>
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<tr>
<td>E</td>
<td>.092</td>
<td>.092</td>
<td>.092</td>
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<td>DNPFA</td>
<td>-.108</td>
<td>-.781</td>
<td>-.103</td>
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<td>M</td>
<td>.312</td>
<td>.520</td>
<td>.512</td>
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<tr>
<td>RG</td>
<td>.015</td>
<td>-.481</td>
<td>-.019</td>
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</table>

1 billions of Canadian dollars, annual rate.
2 1972 = 1.0.
3 Percentage points.
4 U.S. dollars per Canadian dollar, 1972 = 1.0.
5 In this experiment, the discount did not exceed the short-term rate until the last quarter of 1975, so the switch of interest rate equations occurred here rather than in the first quarter. Like the previous multiplier responses, the drop in the interest rate response is the result of switching between interest rate equations and not the number of periods after the introduction of the shock.
The expected exchange rate function during a fixed exchange rate regime in the Canadian model is an inverse function of the Canadian export price. With an exogenous revaluation of the currency, the relative export price increases and agents' expectations of a future devaluation increase. With these expectations, capital inflows decrease and contribute to the decline in exchange rate reserves.

In response to the contraction in the monetary base resulting from the decline in the stock of reserves, the interest rate increases by 94 basis points at the end of the first year. Since the effect on the monetary base is cumulative, the three-year continuation of an increased trade deficit and decreased capital inflows eventually lead to an increase in the short-term interest rate on the order of 200 basis points.

The increases in both the trade deficit and the interest rate reinforce each other in reducing the level of GNP. The effect is small initially and increases to the order of $C 0.6 billion at the end of three years. The domestic price level declines accordingly. Corresponding to the decline in activity, the unemployment rate increases, eventually by 0.4 percentage points. The initial decline in the unemployment rate is the result of an initial decline in the real wage resulting from a larger decrease in nominal GNP than in the money wage.
Footnotes

*/ The work described in this paper was carried out while I was an Economist in the International Finance Division. I am very grateful to John Boschen and Joseph Formoso for their important contributions to the construction and testing of the Canadian model. The views expressed in this paper are mine and do not necessarily represent the views of the Federal Reserve System.


2/ For a useful presentation of Canadian central banking and the financial system see D. E. Bond and R. A. Sherer The Economics of the Canadian Financial System: Theory, Policy and Institutions Prentice Hall Canada Scarborough: Ontario 1972, especially chaps. 16-18.

3/ Refer to the arguments in IFDP No. 98 (pp. 32-37) for the justification behind the substitution of the balance of payments conditions for the bond market.

4/ NFA (which excludes valuation adjustments and SDR allocations) is constructed by accumulating CDNFA (D50712 - D50710) :rom 19731V benchmark. The benchmark is B3800 (total reserves) converted to $C by CE x 1.00937. The 19731V benchmark is chosen for consistency with the stocks of international claims and liabilities. The fourth quarter of 1973 was the latest date for Canada's balance of international indebtedness (Cat. 67-202, Table 1, pp. 72-73) at the time of constructing the MCM database.

5/ Borrowed reserves, RB, consist of advances to chartered and savings banks plus bankers acceptance plus GOC securities held under repurchase agreements (B209). This last item is netted out from the BOC holdings of own advances to chartered banks, B658, appears as ADV.

6/ Currency held by banks (B252) counts as a reserve asset. Total reserves are B608 = B252 + B255. Comparison of B603 for Jan. 75 end-of-month (3370) with B819, actual reserves of chartered banks, for daily average for second half of Jan. 75 (3571) verifies this. There is no need to handle vault cash separately.

7/ The two versions have the effect of giving different elasticities over different time periods. This problem shows up in the multiplier responses of Tables 2 through 7.

8/ Purchase of foreign exchange reserves to resist an expected appreciation of the Canadian dollar will be lower, as the stock of foreign exchange reserves is higher. Note that this intervention function also behaves as if it were specified as a "target level of reserves" function.

10/ The MCM models can be operated as both fixed and floating exchange rate systems. When fixed, the exchange rate is declared exogenous and the change in reserves is declared endogenous. When solved as a floating rate system, the exchange rate is declared endogenous and the change in reserve is declared exogenous or explained behaviorally with and additional intervention function.

11/ See equation 31a and related discussion in IFDP No. 115, pp. 12, 68.
Appendix

The Equations of the Canadian Sector of the Multi-Country Model

I. List of behavioral equations.................A-1
II. Behavioral equations.........................A-5
III. Identities.....................................A-63
IV. Sources and definitions of variables.....A-69
### LIST OF BEHAVIORAL EQUATIONS

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<th>Section</th>
<th>Equation Description</th>
<th>Page</th>
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<tbody>
<tr>
<td>A. Domestic expenditure sector</td>
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<tr>
<td>Disposable income bridge</td>
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<td>A-5</td>
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<td>Consumption function</td>
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<td>Capital consumption allowance</td>
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<td>B. Government sector</td>
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<td>C. Current account</td>
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<td>Exports of goods: bridge equation (customs clearance basis to balance of payments basis)</td>
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<td>Imports of goods: bridge equation (customs clearance basis to balance of payment basis)</td>
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<td>A-16</td>
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<td>Bilateral import demand functions:</td>
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<td>Imports from Germany</td>
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<tr>
<td>Imports from Japan</td>
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<tr>
<td>Imports from the rest-of-the-world</td>
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<td>A-19</td>
</tr>
<tr>
<td>Imports from the United Kingdom</td>
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<td>A-20</td>
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<tr>
<td>Imports from the United States</td>
<td></td>
<td>A-21</td>
</tr>
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</table>
Bilateral bridge equation:

Imports from Germany
Imports from Japan
Imports from the rest-of-the-world
Imports from the United Kingdom
Imports from the United States
Exports of goods (volume)
Exports of other services
Imports of other services

Exports of goods and services: bridge equation
(balance of payments basis to national income accounts basis)

Imports of goods and services: bridge equation
(balance of payments basis to national income accounts basis)

Transfer receipts
Transfer payments
Investment income receipts
Investment income payments

D. Price determination and capacity utilization

Domestic price (absorption deflator)
Export unit value
Import unit value
Service deflator, exports
Service deflator, imports
Capacity utilization
E. Labor Market

Wages
Wage Bill
Employment
Labor force participation

F. Domestic asset demand and interest rate determination

Demand deposits
Savings deposits
Notice deposits
Currency
Required reserves

Short-term interest rate
When short-term rate exceeds the discount rate
When the discount rate exceeds short-term rate

Long-term interest rate

G. Capital Movements, official reserves, forward and led exchange rates

Errors and omissions
Change in short-term liabilities
Change in short-term claims
Change in long-term liabilities
Change in long-term claims
Forward exchange rate
Led exchange rate
G. Capital Movements, official reserves, forward and led exchange rates (continued)

Reaction function for change in net foreign assets

Reaction function for change in net government position
DISPOSABLE INCOME BRIDGE

\[
\text{YDVNSA} = -1.311 + 2.655 \text{ Q1} + 1.259 \text{ Q2} + 1.116 \text{ Q3} + 0.955 \text{ YDPVNSA}
\]

\(t\) values in parentheses:

\[
(4.1) \quad (8.8) \quad (4.2) \quad (3.7) \quad (230.6)
\]

\[
R^2 = 0.9989 \quad \text{SEE} = 0.818 \quad \text{DW} = 1.87
\]

Period 61:1 to 75:4
CONSUMPTION

\[ C = -10.873 + 0.484 \, C_{-1} + 0.387 \, \text{YDV}/P + 0.119 \, \text{NW}_{-1} / P \]

\( (5.4) \quad (6.6) \quad (7.0) \quad (6.2) \)

\[ R^2 = 0.9987 \quad \text{SEE} = 0.387 \quad \text{DW} = 1.72 \]

Period 61:1 to 75:4
PRIVATE FIXED INVESTMENT

\[
IFP = -5.275 + 0.083 \ K_{P-1} + \sum_{i=0}^{5} a_i \Delta(RL_{i-1}) + \sum_{i=0}^{11} b_i \Delta(GNP_{i-1}) - G_{i-1}
\]

\[
R^2 = 0.760 \quad SE = 0.375 \quad DW = 1.5 \quad \rho = 0.919
\]

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<td>0.119</td>
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<td>0.185</td>
<td>0.222</td>
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<td>(3.1)</td>
<td>(3.3)</td>
<td>(3.3)</td>
<td>(3.3)</td>
<td>(3.2)</td>
<td>(3.1)</td>
<td>(3.3)</td>
</tr>
</tbody>
</table>
INVENTORY INVESTMENT

\[
II = -1.719 + 0.493 \sum_{i=1}^{4} \left( \frac{C_{i-1} + IFP_{i-1} + IFG_{i-1} + XG_{i-1}}{4} \right) / 0.7
\]

\[
-0.865 \sum_{i=1}^{4} \left( \frac{MG_{i-1}}{4} + 0.551 MG - 0.404 \left( C + IFP + IFG + XG \right) \right)
\]

\[
R^2 = 0.258 \quad \text{SEE} = 0.683 \quad DW = 2.23 \quad \rho = 0.491
\]

Period 61:1 to 75:4

\[\text{lagged stock}\]
CAPITAL CONSUMPTION ALLOWANCE

\[ CCAV = -8.570 + 0.073 Q2 - 0.270 Q3 + 0.229 Q4 + 0.016 K_{P-1} \]
\[ + 15.402 P_{-1} + 0.038 (CNFVNSA - TV - CVNSA) \]

\[ R^2 = 0.996 \quad SEE = 0.226 \quad DW = 0.54 \]

Period 61:1 to 75:4
TAXES -- PERSONAL

\[ TPERV = -4.489 + 0.604 Q1 + 0.217 Q2 + 0.110 Q3 + 0.321 WBNSA \]
\[ \quad (15.2) \quad (2.6) \quad (0.9) \quad (0.5) \quad (52.6) \]

\[ - 0.013 WBNSA * P * QTAAXI \]
\[ \quad (3.9) \]

\[ R^2 = 0.991 \quad SEE = 0.627 \quad DW = 1.61 \]

Period 61:1 to 75:4
TAXES -- NONRESIDENT

\[ \text{TNRESV} = 0.087 - 0.086 \, Q1 - 0.043 \, Q2 - 0.163 \, Q3 + 0.003 \, \text{GNPVNSA} \]
\[ (5.0) \quad (5.3) \quad (2.7) \quad (10.1) \quad (18.0) \]

\[ \hat{R}^2 = 0.878 \quad \text{SEE} = 0.044 \quad \text{DW} = 2.83 \]

Period 61:1 to 75:4
TAXES - CORPORATE

\[ \text{TCORPV} = -0.320 + 0.480 \, Q1 + 0.451 \, Q2 - 1.242 \, Q3 \]
\[ (1.4) \quad (2.6) \quad (2.6) \quad (6.7) \]
\[ + 0.180 \, (\text{GNPvNSA - WBNSA - CCAV}) - 0.025 \, \text{TIME} \]
\[ (12.7) \quad (2.5) \]

\[ R^2 = 0.9368 \quad \text{SEE} = 0.468 \quad \text{DW} = 1.56 \]

Period 61:1 to 75:4
TAXES - INDIRECT

$TINDV = 0.471 + 0.697 Q1 - 0.371 Q2 - 0.866 Q3 + 0.134 GNPVNSA$

\begin{align*}
(1.8) & \quad (2.9) & \quad (1.6) & \quad (3.6) & \quad (59.3)
\end{align*}

$\bar{R}^2 = 0.983 \quad SEE = 0.653 \quad DW = 1.16$

Period 61:1 to 75:4
GOVERNMENT TRANSFERS

\[
\text{TRANV} = -1.119 - 1.738 \text{Q2} - 2.764 \text{Q3} - 2.033 \text{Q4} + 0.152 (\text{GNPVNSA} - \text{XGV})
\]
\[
(1.7) \quad (5.6) \quad (7.3) \quad (6.4) \quad (7.5)
\]
\[
+ 0.283 \text{XGV} + 2.965 (\text{UN} \times \text{LF/100}) - 46.473 \Delta (\text{LOG(P)}) - 0.085 \text{TIME}
\]
\[
(4.2) \quad (2.1) \quad (2.0) \quad (4.6)
\]

\[
\bar{R}^2 = 0.982 \quad \text{SEE} = 0.732 \quad \text{DW} = 1.57
\]

Period 61:1 to 75:4
EXPORTS OF GOODS: BRIDGE EQUATION (Customs clearance to balance of payments basis)

\[ XGV \times ER = 0.679 - 0.205 Q1 - 0.024 Q2 - 0.172 Q3 + 0.950 XCTV \]

\[ \begin{align*} 
(6.9) & \quad (2.0) & \quad (0.2) & \quad (1.7) & \quad (244.5) 
\end{align*} \]

\[ R^2 = 0.999 \quad \text{SEE} = 0.282 \quad \text{DW} = 1.27 \]

Period 61:1 to 75:4
IMPORTS OF GOODS: BRIDGE EQUATION (Customs clearance to balance of payments basis)

\[ MGV \times ER = 0.133 + 0.942 \frac{MCTV}{1.1} \]

(3.0) (366.8)

\[ R^2 = 0.999 \quad SEE = 0.184 \quad DW = 0.94 \]

Period 61:1 to 75:4
BILATERAL IMPORT DEMAND FUNCTION: IMPORTS FROM GERMANY

\[ \log\left( \frac{X_{GCV}}{(GPXGU * GE)} \right) = -8.268 - 0.164 Q1 - 0.046 Q2 - 0.273 Q3 \]
\[ \quad + 1.652 \log(\frac{GNPVNSA}{PGNP}) + 0.898 \log(P) - 1.021 \log(GPXGU * GE) \]
\[ \quad + 1.805 \log(E) \]
\[ \quad R^2 = 0.941 \quad \text{SEE} = 0.100 \quad \text{DW} = 2.04 \]

Period 61:1 to 75:4
BILATERAL IMPORT DEMAND FUNCTION: IMPORTS FROM JAPAN

\[
\log \left( \frac{XJCV}{JPXGUV \times JE} \right) = -10.502 + 0.052 Q1 + 0.043 Q2 - 0.130 Q3 \\
\quad + 2.199 \log \left( \frac{GNPVNSA}{PGNP} \right) + 1.248 \log \left( \frac{P}{JPXGUV \times JE/E} \right)
\]

\[
\hat{R}^2 = 0.615 \quad \text{SEE} = 0.111 \quad \text{DW} = 1.86 \quad \rho = 0.853
\]

Period 61:1 to 75:4
BILATERAL IMPORT DEMAND FUNCTION: IMPORTS FROM THE REST-OF-THE-WORLD

\[
\text{LOG(MCRV/ROWPXG)} = -5.610 - 0.088 Q_1 + 0.026 Q_2 - 0.134 Q_3
\]
\[
(25.6) \quad (2.9) \quad (0.9) \quad (4.4)
\]

\[
+ 1.529 \ \text{LOG(GNFVNSA/PGNP)} + 0.290 \ \text{LOG(P/ROWPXG/E)}
\]
\[
(30.8) \quad (4.0)
\]

\[\bar{R}^2 = 0.949, \ \text{SEE} = 0.083, \ \text{DW} = 1.57\]

Period 61:1 to 75:4
BILATERAL IMPORT DEMAND FUNCTION: IMPORTS FROM THE U.K.

\[
\log(\frac{XECV}{EPXGUV \times EE}) = -0.734 - 0.128 Q1 + 0.039 Q2 - 0.093 Q3
\]
\[
+ 0.153 \log(\frac{GNFVNSA/PGNP}{E}) - 0.141 EDV41 - 0.150 EDV50
\]
\[
+ 0.043 EDV30 + 0.064 EDV49 - 0.125 EDV5 + \sum_{i=0}^{4} a_i
\]
\[
- (0.7) (0.7) (1.4) (1.7)
\]

\[
\log(\frac{P_i}{(EPXGUV_i \times EE_i \times E_i)})
\]

\[
R^2 = 0.604 \quad \text{SEE} = 0.089 \quad \text{DW} = 2.02 \quad \rho = 0.329
\]

Period 61:1 to 75:4

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<td>0.460</td>
<td>0.309</td>
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<td>(3.4)</td>
<td>(2.5)</td>
<td>(2.2)</td>
<td>(4.8)</td>
</tr>
</tbody>
</table>
BILATERAL IMPORT DEMAND FUNCTION: IMPORTS FROM THE U.S.

\[
\log(\text{XICV}/\text{UPXGUV}) = -4.237 + 0.024 Q1 + 0.084 Q2 - 0.218 Q3 \\
(16.1) \quad (1.6) \quad (5.5) \quad (15.5)
\]

\[+ 1.460 \log(\text{GNPVNSA}/\text{PGNP}) + \sum_{i=0}^{2} a_i \log(\text{P}_{-i}/(\text{UPXGUV}_{-i}/\text{E}_{-i})) \]
\[= 0.017 \text{ QAUTST} \]
\[= 25.5 \quad (2.9) \]

\[r^2 = 0.944 \quad \text{SEE} = 0.047 \quad \text{DW} = 2.35 \quad \rho = 0.568 \]

Period 61:1 to 75:4

\[
\begin{array}{cccc}
 i & 0 & 1 & 2 & \text{SUM} \\
 a_i & 0.301 & 0.201 & 0.100 & 0.603 \\
(2.7) & (2.7) & (2.7) & (2.7)
\end{array}
\]
**BILATERAL BRIDGE EQUATION: IMPORTS FROM GERMANY**

\[
MCGV = -0.004 + 0.974 \times GCV + 0.172 \times GCV^{(2.3)} - 1
\]

\[
R^2 = 0.971 \quad SEE = 0.042 \quad DW = 1.95
\]

Period 61:1 to 75:4
BILATERAL BRIDGE EQUATION: IMPORTS FROM JAPAN

MCJV = 0.004 + 0.518 XJCV + 0.564 XJCV-1
(0.4) (8.6) (9.2)

$R^2 = 0.987 \quad \text{SEE} = 0.057 \quad \text{DW} = 3.27$

Period 61:1 to 75:4
BILATERAL BRIDGE EQUATION: IMPORTS FROM THE REST-OF-THE-WORLD

\[ MCRV = 0.209 + 0.643 \text{XRCV} + 0.271 \text{XRCV}^{-1} \]
\[ (3.8) \quad (10.5) \quad (4.3) \]

\[ R^2 = 0.991 \quad \text{SEE} = 0.263 \quad \text{DW} = 1.39 \]

Period 61:1 to 75:4
BILATERAL BRIDGE EQUATION: IMPORTS FROM THE U.K.

\[ MCEV = -0.003 + 0.941 \times ECV + 0.155 \times ECV_{-1} \]
\[ (0.1) \quad (19.1) \quad (3.1) \]

\[ R^2 = 0.967 \quad SEE = 0.047 \quad DW = 1.94 \]

Period 61:1 to 75:4
BILATERAL BRIDGE EQUATION: IMPORTS FROM THE U.S.

\[ MGUV = -0.411 + 1.182 XUCV + 0.018 XUCV_{-1} \]
\[ (4.7) \quad (39.8) \quad (0.6) \]

\[ R^2 = 0.997 \quad SEE = 0.337 \quad DW = 1.32 \]

Period 61:1 to 75:4
EXPORT OF GOODS\(^{1/}\)

\[
\text{LOG}(XG) = -2.662 - 0.102 Q1 + 0.002 Q2 - 0.036 Q3 + 0.930 \text{LOG} (\text{WMGV/ROWPGG}) \\
\begin{array}{ccc}
(5.5) & (6.8) & (0.1) \\
\end{array} \begin{array}{c}
(2.5) \\
(10.1)
\end{array}
\]

\[
\sum_{i=0}^{2} a_i \text{LOG}(\text{PXGUV}_{-i}/\text{UPXGUV}_{-i}) + \sum_{i=0}^{3} b_i \text{LOG}(E_{-i-1}) + 0.054 \text{ QSCALE} \\
\begin{array}{c}
(1.5)
\end{array}
\]

\[
+ 0.006 \text{ QAUTST} \\
(1.0)
\]

\[
\bar{R}^2 = 0.9661 \quad \text{SEE} = 0.045 \quad \text{DW} = 1.77 \quad \rho = 0.418
\]

Period 61:1 to 75:4

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<td>(1.3)</td>
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<td>(b_i)</td>
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<td>-0.322</td>
<td>-0.215</td>
<td>-0.197</td>
<td>1.075</td>
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</table>

\(^{1/}\) This equation is used only when the Canadian model is simulated in isolation from the other models of the MCM.
EXPORTS OF OTHER SERVICES

\[
\log(xsov/pxs) = -1.095 + 0.387 q2 + 0.527 q3 - 0.028 q4 + \\
(2.1) (11.6) (17.5) (0.5)
\]

\[+ 0.500 \log(xsov_{-1}/pxs_{-1}) + 0.202 \log(fgnp) + 0.060 qexpo \]
\[(3.6) (2.3) (1.4)\]

\[+ 0.034 qauto + 0.197 \log(fp/pxs)\]
\[(2.0) (1.1)\]

\[r^2 = 0.9681 \quad \text{SEE} = 0.061 \quad \text{DW} = 2.34\]

Period 61:1 to 75:4
IMPORTS OF OTHER SERVICES

\[
\begin{align*}
\log(\text{MSOV/PMS}) &= -1.471 + 0.132 \text{ Q2} + 0.083 \text{ Q3} - 0.081 \text{ Q4} \\
&\quad + 0.617 \log(\text{MSOV}_{-1}/\text{PMS}_{-1}) + 0.450 \log(\text{GNP}) + 0.388 \log(\text{P/PMS}) \\
&\quad (3.8) \quad (8.5) \quad (4.3) \quad (4.0) \\
R^2 &= 0.9794. \quad \text{SEE} = 0.042 \quad \text{DW} = 1.97
\end{align*}
\]

Period 61:1 to 75:4
EXPORTS OF GOODS AND SERVICES: BRIDGE EQUATION (balance of payments basis to National Income Accounts basis)

\[ X_{CSNIVS} = -0.003 + 1.000 \ (X_{GV} + X_{SOV} + X_{SYV}) \]
\[ (0.2) \ (1578.4) \]

\[ \bar{R}^2 = 0.999 \quad SEE = 0.051 \quad DW = 3.08 \]

Period 61:1 to 75:4
IMPORTS OF GOODS AND SERVICES: BRIDGE EQUATION (balance of payments basis to National Income Accounts basis)

\[ MGSNIVS = -0.002 + 1.000 (MGV + MSOV + MSYV) \]
\[ (0.2) \quad (2263.9) \]

\[ R^2 = 0.999 \quad \text{SEE} = 0.038 \quad \text{DW} = 2.17 \]

Period 61:1 to 75:4
TRANSFER RECEIPTS

\[
\text{XTRANV} = 0.009 + 0.137 \text{Q2} + 0.099 \text{Q3} + 0.131 \text{Q4} + 0.001 \text{FYDVNSA}
\]

\[
(0.3) \quad (5.9) \quad (3.8) \quad (5.6) \quad (21.2)
\]

\[
R^2 = 0.9014 \quad \text{SEE} = 0.077 \quad \text{DW} = 2.08 \quad \rho = 0.404
\]

Period 61:1 to 75:4
TRANSFER PAYMENTS

\[ M_{\text{TRANV}} = 0.183 + 0.007 \ Y_{\text{DVNSA}} \]

\( (8.2) \quad (18.4) \)

\[ R^2 = 0.8515 \quad \text{SEE} = 0.073 \quad DW = 1.87 \]

Period 61:1 to 75:4
INVESTMENT INCOME RECEIPTS

\[ XSYV = 0.003 \text{ FC} + 0.003 Q2 \times \text{ FC} - 0.001 Q3 \times \text{ FC} \]
\begin{align*}
(0.9) & \quad (2.0) & \quad (0.8) \\
+ 0.006 Q4 \times \text{ FC} + 0.004 (E_{-1}/E) \times \text{ NFAEOQ}_{-1} \times \text{ FRSC} \\
(4.2) & \quad (2.1) \\
+ 0.008 (E_{-1}/E) \times \text{ URL} \times \text{ LTDC}_{-1} \\
(3.9) \\
\end{align*}

\[ \overline{R^2} = 0.7934 \quad \text{SEE} = 0.091 \quad \text{DW} = 1.9 \quad \rho = 0.315 \]

Period 61:1 to 75:4
INVESTMENT INCOME PAYMENTS

\[ MSYV = 0.057 \times FL - 0.0002 \times Q2 \times FL - 0.002 \times Q3 \times FL + 0.011 \times Q4 \times FL \]

\[ + 0.026 \times (RS \times (-STL_{-1}) + RL \times (-LTPL_{-1})) - 0.032 \times RL \times (-LTDL_{-1}) \]

\[ R^2 = 0.9178 \quad SEE = 0.155 \quad DW = 1.95 \quad \rho = 0.415 \]

Period 61:1 to 75:4
DOMESTIC PRICE

\[
\log(P) = -0.185 + 0.732 \log(P_{-1}) + 0.122 \log(W) + 0.096 \log(PMSGNI) + 0.0004 \text{ CU} + 0.017 \log(PPC)
\]

\[
(4.5) \quad (10.2) \quad (3.9) \quad (3.1)
\]

\[
\hat{R}^2 = 0.999 \quad \text{SEE} = 4.09 \times 10^{-3} \quad \text{DW} = 2.30
\]

Period 61:1 to 75:4
EXPORT UNIT VALUE

\[ PXGUV = 0.213 - 0.005 \text{ TIME} + 0.002 \text{ CUSTCU} 0.486 \text{ LOG(PCOMP)} \times (1-KFIX) \]
\[
(2.4) \quad (3.6) \quad (2.0) \quad (8.3)
\]
\[ + 1.038 \text{ LOG(P)} - 0.252 \text{ LOG(P)} \times (1-KFIX) \]
\[
(7.2) \quad (4.6)
\]

\[ R^2 = 0.967 \quad \text{SEE} = 0.012 \quad \text{DW} = 1.76 \quad \rho = 0.746 \]

Period 61:1 to 75:4
IMPORT UNIT VALUE

\[
\log(\text{PMGUV}) + \log(E) = -0.027 + 0.370 \log(\text{FPXGUVD}) + 0.369 \log(\text{FPXGUVD} - 1)
\]

(4.0) \quad (4.3) \quad (4.2)

\[
\frac{-\hat{R}^2}{R^2} = 0.951 \quad \text{SEE} = 0.011 \quad \text{DW} = 1.77 \quad \rho = 0.798
\]

Period 61:1 to 75:4
SERVICE DEFLATOR, EXPORTS

\[ \log(pxs) = -0.017 + 1.111 \log(p) \]
\[ (2.7) \quad (41.9) \]

\[ R^2 = 0.9675 \quad \text{SEE} = 0.041 \quad \text{DW} = 2.15 \]

Period 61:1 to 75:4
SERVICE DEFLATOR, IMPORTS

\[
\text{LOG}(P_{MS}) = 0.496 \text{ LOG}(P_{MS-1}) + 0.550 \text{ LOG}(PP) \\
(5.2) \\
(5.3)
\]

\[
\hat{R}^2 = 0.9856 \quad \text{SEE} = 0.023 \quad DW = 2.05
\]

Period 61:1 to 75:4
CAPACITY UTILIZATION

\[ \log(GNF/LF) - 0.28 \times \log(KP/LF) = 1.286 + 0.003 \text{ TIME} + 0.584 \log(CU/100) \]

\[ (110.6) \quad (20.0) \quad (10.4) \]

\[ R^2 = 0.933 \quad \text{SEE} = 0.008 \quad DW = 2.03 \quad \rho = 0.637 \]

Period 61:1 to 75:4
WAGES

\[(W_{-4} - W_{-4})/W_{-4} = -0.001 + 0.069 \text{ QUI} + 0.0003 \text{ TIME} - 0.008 \text{ QCNTRL} \]
\[(0.2) \quad (2.4) \quad (1.4) \quad (0.9) \]

\[+ 0.210 \left( \sum_{i=0}^{4} \left( P_{i} - P_{i-4}/P_{i-4} \right)/4 - 0.0001 \text{ UN}_{-1} - 0.012 \text{ UN}_{-1}*\text{QUI} \right) \]
\[(2.2) \quad (0.1) \quad (2.7) \]

\[+ 0.737 \left( W_{-1} - W_{-5}/W_{-5} \right) \]
\[(6.1) \]

\[\bar{R}^2 = 0.9663 \quad \text{SEE} = 0.007 \quad \text{DW} = 2.19 \]

Period 62:2 to 75:4
WAGE BILL

$$WB = -10.667 + 1.019 \text{ LF} \times (1 - \text{UN}/100) \times W \times 2 + 0.104 \text{ CU}$$

(4.1) \hspace{1cm} (168.7) \hspace{1cm} (3.7)

$$R^2 = 0.998 \hspace{1cm} \text{SEE} = 0.438 \hspace{1cm} \text{DW} = 1.83 \hspace{1cm} \rho = 0.586$$

Period 61:1 to 75:4
EMployment

\[ \log(1 - \text{UN/100}) + \log(\text{LF}) = 0.675 + 0.005 \times \text{TIME} + \]
\[ (3.7) \quad (11.4) \]

\[ \sum_{i=0}^{4} a_i \log(\frac{\text{GNP}_i}{W_i}) \]

\[ R^2 = 0.9826 \quad \text{SEE} = 0.005 \quad DW = 1.62 \quad \rho = 0.768 \]

Period 62:1 to 75:4

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LABOR FORCE PARTICIPATION

\[
\text{LOG}(\text{LF/POP15}) = -0.709 + 0.279 \ \text{LOG}(W_{-1}/P_{-1}) - 0.014 \ \text{LOG}(UN_{-1}) - 0.001 \ \text{NW}_{-2} / P_{-1}
\]

(8.8) (5.9) (1.4) (1.3)

\[
\bar{R}^2 = 0.4371 \quad \text{SEE} = 0.004 \quad \text{DW} = 1.68 \quad \rho = 0.906
\]

Period 62:1 to 75:4
DEMAND DEPOSITS

\[ \frac{DD}{NWNSA} = -0.001 - 0.007 Q2 - 0.009 Q3 - 0.001 Q4 - 2.2E-04 \text{ TIME} \]
\[ (0.3) \quad (6.0) \quad (4.4) \quad (0.8) \quad (2.0) \]
\[ + 0.698 \frac{DD}{NWNSA} + 0.072 \frac{GNPVNSA}{NWNSA} - 0.001 \text{ RS} \]
\[ (8.0) \quad (3.6) \quad (4.5) \]

\[ R^2 = 0.950 \quad \text{SEE} = 0.002 \quad \text{DW} = 1.21 \]

Period 61:1 to 75:4
SAVING DEPOSITS

\[
\frac{SD}{NWNSA} = -0.014 - 0.007 Q2 - 0.002 Q3 - 0.016 Q4 + 0.320 \frac{CVNSA}{NWNSA}
\]

\[
(3.3) \quad (5.2) \quad (1.6) \quad (10.3) \quad (19.3)
\]

\[-0.002 KFIX \times DEFIXED + \sum_{i=0}^{7} a_i \cdot RS_i
\]

\[
(5.6)
\]

\[
R^2 = 0.981 \quad \text{SEE} = 0.004 \quad \text{DW} = 0.65
\]

Period 61:1 to 75:4

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SUM 3.0E-03

(5.4)
NOTICE DEPOSITS

\[ \text{ND/NWNSA} = -0.044 - 0.004 \text{ Q2} - 0.011 \text{ Q3} - 0.006 \text{ Q4} + 0.129 \frac{\text{GNPVNSA}}{\text{NWNSA}} \]
\[ (15.3) \quad (3.1) \quad (7.7) \quad (4.1) \quad (31.2) \]

\[ + 8.0E-04 (\text{RS - URS}) - 9.8E-04 \text{ KFIX} \times \text{ DEFIXE2} \]
\[ (1.3) \quad (3.2) \]

\[ R^2 = 0.957 \quad \text{SEE} = 0.004 \quad \text{DW} = 0.52 \]

Period 61:1 to 75:4
CURRENCY

\[ \text{CUR/NWNSA} = 0.004 - 0.002 Q2 - 0.004 Q3 - 0.002 Q4 - 1.5E-04 \text{ TIME} \]
\[ (4.0) \quad (4.8) \quad (7.7) \quad (5.0) \quad (4.4) \]

\[ + 0.047 \text{ GNPVNSA/NWNSA} - 3.3E-04 \text{ RS} \]
\[ (9.4) \quad (4.0) \]

\[ R^2 = 0.941 \quad \text{SEE} = 7.5E-04 \quad \text{DW} = 0.80 \]

Period 61:1 to 75:4
REQUIRED RESERVES

\[ RR = 0.083 + 0.908 (A \times DD + B \times TD)/100 \]

\[ (7.0) \quad (158.6) \]

\[ R^2 = 0.998 \quad SEE \quad 0.035 \quad DW = 1.41 \]

Period 61:1 to 75:4
SHORT-TERM INTEREST RATE: WHEN SHORT-TERM RATE EXCEEDS THE DISCOUNT RATE

\[ RSLD = -1.190 - 27.949 \frac{RF}{NDD} + 12.057 \Delta \frac{(RU)}{NDD} - 67.746 \frac{DRR}{NDD} - 1.090 RD + 0.270 RS_{-1} - 0.0217 DEFLOAT \star (1 - KFIX) \]
\[
\begin{array}{llll}
(2.4) & (2.0) & (1.2) & (2.7) \\
(5.6) & (2.4) & (1.0) \\
(1.6) & (3.1) \\
\end{array}
\]

\[ R^2 = .9525 \quad \text{SEE} = 0.469 \quad DW = 1.00 \]

Period 61:1 to 62:1, 63:1, 63:3 to 67:4, 68:3 to 70:3, 72:2 to 74:4, 75:4
SHORT TERM INTEREST RATE: WHEN DISCOUNT RATE EXCEEDS SHORT-TERM RATE

\[ R_{SHD} = -5.558 \text{RF/NDD} - 0.143 \text{URS} - 38.880 \text{DRR/NDD} + 1.034 \text{RD} \]
\[ (0.5) \quad (1.0) \quad (1.1) \quad (8.7) \]

\[ -0.048 \text{DEFLOAT} \times (1 - \text{KFIX}) \]
\[ (1.7) \]

\[ R^2 = 0.934 \quad \text{SEE} = 0.383 \quad \text{DW} = 1.70 \]

Period: 62:2 to 62:4, 63:2, 68:1 to 68:2, 70:4 to 72:1,
75:1 to 75:3
LONG-TERM INTEREST RATE

$$RL = 1.735 + \sum_{i=0}^{15} a_i \cdot RS_{-i} + \sum_{i=0}^{5} b_i \cdot \Delta(\text{LOG}(P_{-i}))$$

$$R^2 = 0.743 \quad \text{SEE} = 0.289 \quad \text{DW} = 1.58 \quad p = 0.667$$

Period 61:1 to 75:4

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<td>(0.5)</td>
<td>(0.3)</td>
<td>(1.8)</td>
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</table>
ERRORS AND OMISSIONS

\[
EANDO = -1.123 + 1.531 \, Q2 + 2.192 \, Q3 + 0.930 \, Q4 - 0.338 \, \Delta (NWNUSA) \\
\quad (4.0) \quad (4.4) \quad (4.6) \quad (2.6) \quad (3.6)
\]

- 0.528 \, (\Delta (XGV) - \Delta (MGV)) - 0.229 \, (XGV + XSOV + XSYV + XTRANV) \\
\quad (3.1) \quad (2.4)

- MGV - MSOV - MSYV - MTRANV) - 1.662 \, QNEP + 1.235 \, QSMITH \\
\quad (1.8) \quad (1.3)

\[ R^2 = 0.3805 \quad SEE = 0.898 \quad DW = 2.48 \]

Period 61:1 to 75:4
CHANGE IN SHORT-TERM LIABILITIES

\[ \text{DSTL} = -0.387 - 0.943 \text{Q2} - 0.324 \text{Q3} - 0.466 \text{Q4} + 0.091 \Delta(\text{MGV}) + 0.406 \Delta(\text{QCRISIS}) - 0.115 \Delta(\text{URS}) + 0.265 \Delta(\text{MGV}) \times \text{KFIX} - 0.446 \Delta(\text{QETF2}) - 0.914 \Delta(\text{QRFID}) + 0.307 \Delta(\text{QEREG69}) + \sum_{i=0}^{5} a_i \Delta(\text{UNW}_{-i}) + \sum_{i=0}^{3} b_i \Delta(\text{ER}_{-i}) + 0.850 \Delta(\text{QSMITH}) \]

\[ R^2 = 0.4256 \quad \text{SEE} = 0.424 \quad \text{DW} = 2.45 \]

Period 61:1 to 75:4

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</table>
CHANGE IN SHORT-TERM CLAIMS

$- \Delta STC = -0.534 - 0.160 Q2 + 0.952 Q3 + 0.423 Q4 - 0.483 \Delta (RS)$

$+ 0.549 \Delta FRSC + 0.757 QEREG69 + 0.035 \Delta (\text{DEFLOAT}) \times (1-K\text{FIX})$

$+ 0.157 \Delta (XGV) + 0.129 DLTPL - 1.172 QFRID + 0.282 QIET1$

$+ 0.124 QIET2 - 1.493 QNEF$

$R^2 = 0.404 \quad \text{SEE} = 0.771 \quad \text{DW} = 2.18$

Period 61:1 to 75:4
CHANGE IN LONG-TERM LIABILITIES

\[ \text{DLTPL} = -8.439 - 0.327 Q2 - 0.203 Q3 + 0.304 Q4 + 0.155 QMIDEA \]
\[ (1.3) \quad (0.9) \quad (0.5) \quad (0.8) \quad (0.2) \]

+ 0.590 \( \Delta(\text{RL - URL}) \) - 1.037 QIET1 - 1.261 QIET2
\[ (1.0) \quad (1.7) \quad (2.8) \]

+ 0.009 QZEUROF + 1.019 QEREG69 - 0.579 QLOBO + 0.791 QEIETB
\[ (1.5) \quad (2.3) \quad (0.8) \quad (0.8) \]

5 \[ \sum_{i=0}^{4} a_i \Delta(\text{UNW}_{-i}) + \sum_{i=0}^{4} b_i 1/\text{ER}_{-i} \] - 1.369 QSMITH
\[ (1.3) \]

\[ R^2 = 0.4442 \quad \text{SEE} = 1.001 \quad \text{DW} = 1.31 \]

Period 61:1 to 75:4

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<td>(0.8)</td>
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</table>
CHANGE IN LONG-TERM CLAIMS

- DLTPC = 0.072 - 0.117 Q2 + 0.020 Q3 + 0.098 Q4 + 0.098 Q2 \times KFIX
  \begin{align*}
  & \quad \text{(0.7)} \quad \text{(1.6)} \quad \text{(0.3)} \quad \text{(1.4)} \quad \text{(1.1)} \\
&- 0.005 \ Q3 \times KFIX - 0.106 \ Q4 \times KFIX + 0.191 \ \Delta(\text{URL}) - \ \Delta(\text{RL}) \\
  & \quad \text{(0.1)} \quad \text{(1.2)} \quad \text{(2.3)}
\end{align*}

+ 0.002 \ (1 - KFIX) \times \Delta(\text{DEFLOAT}) - 0.167 \ \text{QFRID}
  \begin{align*}
  & \quad \text{(0.5)} \quad \text{(1.1)}
\end{align*}

\overline{R^2} = 0.082 \quad \text{SEE} = 0.174 \quad \text{DW} = 1.84 \quad \rho = 0.774

Period 61:1 to 75:4
FORWARD EXCHANGE RATE

\[ EF = 0.022 + 8.142E-05 \, Q2 + 1.108E-04 \, Q3 - 3.449E-04 \, Q4 + 0.002 \, E \times \text{FRSL} \]

\[ (2.8) \quad (0.3) \quad (0.4) \quad (1.1) \quad (16.2) \]

\[ - 0.002 \, E \times \text{RS} + 0.977 \, E - 4.407E-04 \, KFIX \times \text{DEFIXED} \times E \]

\[ (13.1) \quad (118.5) \quad (2.9) \]

\[ + 8.006E-05 \, (1 - KFIX) \times \text{DEFLOAT} \times E \]

\[ (2.6) \]

\[ R^2 = 0.9995 \quad \text{SEE} = 8.18E-04 \quad \text{DW} = 1.18 \]

Period 61:1 to 75:4
LED EXCHANGE RATE

\[ E\text{EAD} = 0.588 - 0.241 K\text{FIX} + \sum_{i=0}^{2} a_i E_{i-1} + \sum_{i=0}^{2} b_i E_{i-1} \]
\[ (4.6) \quad (0.6) \quad (0.6) \]
\[ \quad * K\text{FIX} + \sum_{i=0}^{2} c_i D\text{NFA}_{-i} + \sum_{i=0}^{2} d_i D\text{NFA}_{-i} * K\text{FIX} \]
\[ + \sum_{i=0}^{1} e_i N\text{GP}_{-i} + \sum_{i=0}^{1} f_i N\text{GP}_{-i} * K\text{FIX} \]
\[ \bar{R}^2 = 0.923 \quad \text{SEE} = 0.010 \quad \text{DW} = 1.33 \]

Period 61:1 to 75:4

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NET FOREIGN ASSETS: FLOATING EXCHANGE RATE PERIOD

\[ DNFAFL = 1.219 \ (1 - KFIX) + 0.114 \ (E/E_{-1}-1) \ast (1 - KFIX) \]
\[ (0.7) \quad (3.8) \]

\[-0.228 \ (NF\text{AEQ}_{-1} + NF\text{AEQ}_{-2}) \ast .5 \ast (1 - KFIX) \]
\[ (0.7) \]

\[ R^2 = 0.5011 \quad SEE = 0.650 \quad DW = 1.72 \]

Period 70:3 to 75:4
CHANGE IN NET GOVERNMENT POSITION: FIXED EXCHANGE RATE PERIOD

\[
\text{DNGPFX} = -0.119 \, \text{KFIX} - 0.457 \, \text{DNFA} \ast \text{KFIX} + 0.173 \, \Delta(\text{GNP}) \ast \text{KFIX} \\
\quad \quad \quad \quad (0.9) \quad \quad (7.0) \quad \quad (1.5)
\]

\[
- 0.247 \, \Delta(\text{URS} - \text{RS}) \ast \text{KFIX} \\
\quad \quad \quad \quad (1.4)
\]

\[
\hat{R}^2 = 0.5671 \quad \text{SEE} = 0.444 \quad \text{DW} = 1.60
\]

Period 61:1 to 70:2
LIST OF IDENTITIES

GNP identities

1. $\text{GNP} = C + \text{IFP} + \text{IFG} + \text{II} + G + XGSNI - \text{MGSNI} + \text{RES}$
2. $\text{GNPV} = CV + \text{IFPV} + \text{IFGV} + \text{IIV} + \text{GV} + XGSNIV - \text{MGSNIV} + \text{RESV}$
3. $\text{GNPVNSA} = \text{GNPV} / \text{SAFGNPV}$
4. $\text{FCCHGNP} = \Delta (\log(\text{GNP})) * 400$

Components of GNP

5. $G = GV / P$
6. $CV = C * P$
7. $\text{IFPV} = \text{IFP} * P$
8. $\text{IFGV} = \text{IFG} * P$
9. $\text{IIV} = \text{II} * P$
10. $\text{MGSNIV} = \text{SAFMNIV} * \text{MGSNIVS}$
11. $\text{XGSNIV} = \text{SAFXNIV} * \text{XGSNIVS}$
12. $\text{CVNSA} = CV / \text{SAFCV}$
13. $\text{IFGVNSA} = \text{IFGV} / \text{SAFIIFGV}$
14. $\text{IFPVNSA} = \text{IFPV} / \text{SAFIIFPV}$

Disposable income proxy

15. $\text{YDPVNSA} = \text{GNPVNSA} - TV + \text{TRANV} - \text{CCAV}$
16. $\text{YDV} = \text{YDPVNSA} * \text{SAFYDV}$

Capital stock

17. $\text{KG} = (1 - \text{SCRG} / 4) * \text{KG}_{-1} + \text{IFG} / 4$
18. $\text{KP} = (1 - \text{SCRP} / 4) * \text{KP}_{-1} + \text{IFP} / 4$
Private net worth proxy

19. $DNWNSA = YDPVNSA - CVNSA + XTRANV - MTRANV - RESNSA$
20. $NWNSA = NWNSA_{-1} + DNWNSA / 4$
21. $DNW = DNWNSA * SAFDNW$
22. $NW = NW_{-1} + DNW / 4$

Exports of goods and services

23. $XGSNINS = XG + (XSOV + XSYV) / FXS$
24. $XGSNI = SAFXNI * XGSNINS$

Imports of goods and services

25. $MGSNINS = MG + (MSOV + MSYV) / PMS$
26. $MGSNI = SAFMNI * MGSNINS$

Merchandise exports, balance of payments basis

27. $XGV = XG * PXGUV$

Merchandise exports, customs clearance basis (U.S.$)\textsuperscript{1}

28. $XCTV = XCVJ + XCGV + XCEV + XCUV + XCRV + XCVJUNK$

Merchandise imports, balance of payments basis

29. $MGV = GM * PMGUV$

Merchandise imports, customs clearance basis (U.S.$)\textsuperscript{1}

30. $MCTV = MCVJ + MCCV + MCEV + MCVU + MCRV$

Total tax revenue

31. $TV = TPERV + TNRESV + TCORPV + TINDV$

Wage Bill

32. $WBNSA = WB / SAFWB$

\textsuperscript{1}Applied only to linked version of the model.
Trade balance

33. TB = XGV - MGV

Total world exports, excluding Canada

34. WTV = XGTV + XJTV + XUTV + XETV + XRTV

Canadian exports to trading partners

35. XUJEGV = XCUV + XCVJ + XCEV + XCGV

Canadian imports to trading partners

36. MUJEGV = XUCV + XJCV + XECV + XGCV

Weighted foreign averages of competitors price, capacity utilization
price of exports, gross national product, domestic deflator, and
disposable income

37. PCOMP = (GE * GPXGUUV)XGTV/WTV * (JE * JPXGUUV)XJTV/WTV
    * (EE * EPXGUUV)XETV/WTV * UPXGUUVXUTV/WTV
    * ROWPXGXRTV/WTV/E

38. CUSTCU = UCUXCUV/XUJEGV * JCUXCJV/XUJEGV
    ECUXCEV/XUJEGV * GCUXCGV/XUJEGV

39. FPXGUVD = UPXGUVMCUV/MCTV * (JPXGUUV * JE)MCTV/MCTV
    * (EPXGUUV * EE)MCEV/MCTV * (GPXGUUV * GE)MCGV/MCTV
    * ROWPXGMCRTV/MCTV

40. FGNP = UGNPXCUV/XUJEGV * JGNPXCVJ/XUJEGV
    * EGDPXCEV/XUJEGV * GGNPXCGV/XUJEGV
41. \[ FP = UF_{XUCV/MUJEGV} \times (JP \times JE)_{XJCV/MUJEGV} \]
   \[ \times (EP \times EE)_{XECV/MUJEGV} \times (GP \times GE)_{XGCV/MUJEGV} \]

42. \[ FYDVNSA = UYDV_{XCUV/XUJEGV} \times JYDVNSA_{XCJV/XUJEGV} \]
   \[ \times EYDVNSA_{XCEV/XUJEGV} \times CYDVNSA_{XCGV/XUJEGV} \]

**Percentage change in domestic deflator**

43. \[ PCHP = \Delta \log(P) \times 400 \]

**Percentage change in wages**

44. \[ PCHW = \Delta \log(W) \times 400 \]

**GNP deflator**

45. \[ PCNP = GNPV / GNP \]

**Deflator for imports of goods and services**

46. \[ PMGSNI = MGSNIV / MGSNI \]

**Net foreign assets**

47. \[ DNFA = XGV + XSYV + XSOV + XTRANV - MGV - MSYV - MSOV - MTRANV + DSTL + DLTPL + DSTC + DLTPC + DLTDL + DLTDLC + EANDO + NGKA \]

48. \[ NFAEOQ = NFAEOQ_{-1} + DNFA / 4 \]

49. \[ NFAFED = (NFAEOQ - NFAEOQR) \times ER \]

**Net government position of the monetary authority**

50. \[ DNGP = DNGPFX \times XFIX + DNGPFL \times (1 - KFIX) \]

51. \[ NGP = NGP_{-1} + DNGP / 4 \]
Short-term liabilities and claims, stocks

52. STL = STL\_1 - DSTL / 4
53. STC = STC\_1 - DSTC / 4

Long-term direct liabilities and claims, stocks

54. LTDL = LTDL\_1 - DLTLDL / 4
55. LTDC = LTDC\_1 - DLTLDC / 4

Long-term portfolio liabilities and claims, stocks

56. LTPL = LTPL\_1 - DLTPL / 4
57. LTPC = LTPC\_1 - DLTPC / 4

Net government capital account, stock

58. NGK = NGK\_1 - NGKA / 4

Stock of financial liabilities and claims by foreigners

59. FL = - (STL + LTPL + LTDL)
60. FC = STC + LTPC + LTDC + NFAEOQ + NGK

Foreign average short-term interest rate

61. FRSC = .268 * URS + .732 * RED
62. FRSL = .219 * URS + .781 * RED

Proxy for expected exchange rate

63. DEFLOAT = (E / ELEAD - 1) * 400
64. DEFIXED = MGV\_1 / (NFAEOQ\_1 + NFAEOQ\_2) * 2 *
PXGUV\_1 / PCOMP\_1
65. DEFIXE2 = MGV\_1 / (NFAEOQ\_1 + NFAEOQ\_2) * 2

Change in reserve requirement

66. DRR = A(A) * (DD\_1 - TD\_1) / 100
Net demand deposit

67. \( NDD = (1 - 0.9078 \times A / 100) \times DD \)

Unborrowed monetary base, sources and uses

68. \( BU = (\text{NFAEOQ}_{-1} + \text{NFAEOQ}) \times 0.5 + SDRVAL + NGP + OTH \)

69. \( BU = RR + RF + CUR \)

Unborrowed reserves

70. \( RU = BU - CUR \)

Time deposits

71. \( TD = SD + ND \)

Short-term interest rate

72. \( RS = RSHD \times QRD + RSLD \times (1 - QRD) \)

Spot exchange rate

73. \( ER = E \times 1.00937 \)

Official reserves changes and exchange rate

74. \( E = EFX \times KFIX + EFL \times (1 - KFIX) \)

75. \( DNFA = DNFAFX \times KFIX + DNFAFL \times (1 - KFIX) \)

76. \( O = EFL \times KFIX + DNFAFX \times (1 - KFIX) \)
DEFINITION AND SOURCES OF VARIABLES

All national product and income account variables are expressed at annual rates and are seasonally adjusted (unless indicated by the mnemonic "NSA"). All balance of payments variables are expressed at annual rates and are not seasonally adjusted (unless indicated by the mnemonic "SA"). The prefix "SAF" indicates a seasonal adjustment factor used to translate variables from an "NSA" to an "SA" basis or vice-versa. All monetary stock items are measured as mid-quarter averages and are not seasonally adjusted. Where monetary stocks are measured at end of quarter, the suffix "EOQ" is employed.

The letter "V" appended to a variable name indicates measurement in billions of Canadian dollars. When the "V" is absent, the variable is generally expressed in constant 1972 Canadian dollars. Exceptions to this role are financial variables, such as capital account items and components of the monetary sector, which are all in nominal terms.

Interest rates are in per cent per annum; and price variables are indexes based at 1.0 in 1972. Exchange rates and interest rates are averages of daily rates. The symbol "x" indicates an exogenous variable. The "*" indicates a variable endogenously determined within the multi-country model, but exogenous (or not included in the isolated Canadian model).
The following abbreviations are used:

STATCAN  Statistics Canada
BOC      Bank of Canada
DOT      Direction of Trade (IMF)
FRB      Federal Reserve Board
WHARTON  Wharton Econometric Forecasting Associates
IFS      International Financial Statistics
reserve requirements on demand deposits (STATCAN)
reserve requirements on time deposits (STATCAN)
unborrowed reserves (RR + RF + CUR)
consumption expenditure (CV/P)
total capital consumption allowance (STATCAN)
capacity utilization rate -- total manufactures (WHARTON)
currency held by nonbank public (STATCAN)
foreign weighted average of capacity utilization\(^1\)
consumption expenditure (STATCAN)
consumption expenditure, not seasonally adjusted (STATCAN)
demand deposits held by residents (BOC)
proxy for expected exchange rate change during the fixed-rate regime (before 70:2); the ratio of imports to foreign exchange reserves times the ratio of Canadian export price to competitors' export price index
proxy for expected exchange rate change during the fixed-rate regime (before 70:2); the ratio of imports to foreign exchange reserves
proxy for expected exchange rate change during the floating rate period (after 70:2); percentage change between current and led exchange rates
change in long-term direct claims on foreigners (STATCAN)
change in long-term direct liabilities to foreigners (STATCAN)
change in long-term protfolio claims on foreigners (STATCAN)

\(^1\)Trade weighted average for Germany, Japan, the United Kingdom and the United States.
DLTPL  change in long-term portfolio liabilities to foreigners (STATCAN)
DNFA  change in net foreign assets of the central bank (STATCAN)
DNFAFL  DNFA * (1-KFIX)
DNFAFX  DNFA * KFIX
DNGP  change in net government position of the consolidated monetary authorities
DNW
DNWNSA  change in private net worth (STATCAN)
DRR  change in required reserves
DSTC  change in short-term claims on foreigners (STATCAN)
DSTL  change in short-term liabilities to foreigners (STATCAN)
E  Canadian spot exchange rate index, US$/C$, (ER/1.009)
EANDO  errors and omissions (STATCAN)
ECU  U.K. capacity utilization index (WHARTON)
EDV30  U.K. dummy for shift in automobile imports, 7001 = 1
EDV41  U.K. dock strike dummy, 7203 = 1
EDV49  U.K. dummy for anticipation of floating of sterling, 7202 = 1
EDV5  U.K. dock strike dummy, 1 from 6701 to 6704 (LONDON BUSINESS SCHOOL)
EDV50  U.K. dock strike dummy, 7002 = 1
EE  spot exchange rate index, U.S.$/£ (FRB)
EF  Canadian forward exchange rate index, U.S.$/C$ (EFR/1.008)
EFL  E * (1-KFIX)
EFX  E * KFIX
ECDP  U.K. gross domestic product, output estimates
ELEAD  Canadian led spot exchange rate index (E_{t+1})
EP  U.K. absorption deflator (index, 1972=1.0)
EPXGUV  U.K. export unit value index (1972=1.0)
ER  Canadian exchange rate, U.S.$/C$ (FEDERAL RESERVE BULLETIN)
EYDVNSA  U.K. disposable income proxy
FC  stock of financial claims on foreigners (cumulated value of DFC)
FGNP  foreign weighted average of gross national product\(^1\)
FL  stock of financial liabilities to foreigners (cumulated value of DFL)
FP  foreign weighted average of prices\(^1\)
FPXGUV  foreign weighted average of price of exports\(^2\)
FRSC  weighted average of U.S. rate and Eurodollar short-term rates. (Weights based on external claims and liabilities, respectively
FRSL
FYDVNSA  foreign weighted average of disposable income\(^1\)
G  government expenditure on goods and services (GVP)

\(^1\)Trade weighted average for Japan, Germany, the United Kingdom, and the United States.
\(^2\)Weights are percentages of Canadian imports from Germany, Japan, R.O.W., the United Kingdom and the United States.
* GCU  German capacity utilization rate
* GE   German spot exchange rate index, $/DM (FRB)
* GGNP German gross national product
  GNP  
  GNPV gross national product (STATCAN)
* GP   German absorption deflator
* GPXGUV German export unit value index
GV  government expenditure on goods and services, current value (STATCAN)
* GYDVNSA German disposable income proxy
  IFG  government gross fixed capital formation (IFGV/P)
  IFGV  
  IFGVNSA government gross fixed capital formation (STATCAN)
  IFFP private fixed investment, housing plus plant and equipment (IFPV/P)
  IFFPV  
  IFFVNSA private fixed investment, housing plus plant and equipment (STATCAN)
II   inventory investment (IIV/P)
IIV  inventory investment, current value (STATCAN)
  INTSHK dummy variable for simulating changes in foreign exchange intervention, normal value is zero.
* JCU  Japanese capacity utilization index, ratio of industrial production index to production capacity index (BANK OF JAPAN)
* JE   spot exchange rate index, U.S.$/YEN, (FRB)
* JGNP  Japanese gross national product (BANK OF JAPAN)
* JP    Japanese deflator for aggregate expenditure
* JPXGU  Japanese unit value of merchandise exports, Yen (IFS)
* JYDVNSA Japanese disposable income proxy
x KFIX  dummy to reflect a fixed exchange rate regime (1 in 6202 to 7002)
KG    government gross fixed capital stock (cumulated value of IFG, less scrappage)
KP    private gross fixed capital stock (cumulated value of IFP less scrappage)
LF    labor force (STATCAN)
LTDC  stock of long-term direct claims on foreigners (cumulated value of DLTDC)
LTDL  stock of long-term direct liabilities to foreigners (cumulated value of DLTDL)
LTPC  stock of long-term portfolio claims on foreigners (cumulated value of DLTPC)
LTPL  stock of long-term liabilities to foreigners (cumulated value of DLTPL)
MCEV  merchandise imports from the U.K., c.i.f. (DOT)
MCGV  merchandise imports from Germany, c.i.f. (DOT)
MCJV  merchandise imports from Japan, c.i.f. (DOT)
MCRV  merchandise imports from R.O.W., c.i.f. (DOT)
MCTV  merchandise imports, c.i.f. customs clearance basis (DOT)
MCUV  merchandise imports from the U.S., c.i.f. (DOT)
MG    import of goods (STATCAN)
MGSNI  import of goods and services, national income accounts basis (STATCAN)
MGSNINS import of goods and services, national income accounts basis, not seasonally adjusted (STATCAN)
MGSNIV import of goods and services, national income accounts basis, current value (STATCAN)
MGSNIVS import of goods and services, national income accounts basis, not seasonally adjusted (STATCAN)
MGV    import of goods, current value (STATCAN)
MSOV   service account payments, except investment income (STATCAN)
MSYV   investment income payments, current value (STATCAN)
MTRANV BOP transfer payments, current value (STATCAN)
MUJEGV Canadian imports from Japan, Germany, the United Kingdom and the United States
ND    notice deposits (BOC)
NDD    net demand deposits, (1-A) * DD
NFAEQO stock of net foreign assets of the monetary authorities, end of quarter (cumulated value of DNFA)
NFAEOQR non-dollar component of stock of net foreign assets of the monetary authorities, end of quarter
NFAFED net foreign assets, foreign exchange in U.S. dollars, end of quarter
NGK  stock of government assets -- excluding foreign private holding of government which are included in LTPL (cumulated value of NGKA)

NGKA  net government capital account (STATCAN)

NGP  net government position of the consolidated monetary authorities (BOC)

NW
NWNSA  stock of private net worth (cumulated value of DNW)

OTH  other assets of the Bank of Canada (BOC)

P  implicit deflator for domestic absorption \(((CV + IFGV + IFPV + IIV + GV)/(C + IFG + IFP + II + G))\)

PCHGNP  percentage change in gross national product

PCHP  percentage change in domestic price level

PCHW  percentage change in wages

PCOMP  foreign weighted average of the price of exports\(^1\)

PGNP  implicit deflator for GNP (GNPV/GNP)

PMGSNI  implicit deflator for imports of goods and services, national income accounts basis (MGSNIV/MGSNI)

PMGUV  unit value of merchandise imports (STATCAN)

PMS  implicit deflator of import services \(((MGSNIVS - MGV)/(MGSNINS - MG))\)

POP15  Canadian population 15 years of age and older (STATCAN)

\(^1\) Trade weighted average for Germany, Japan, the United Kingdom and the United States.
x  PPC    dollar export price index of cereals, 1972=100 (United Nations Monthly Bulletin of Statistics)
PXGUV  unit value of merchandise exports (STATCAN)
PXS    implicit deflator of export services \( ((XGSNIVS - XGV) / (XGNSIVS - XG)) \)
QAUTO  dummy to reflect Canadian-U.S. auto agreement
x  QAUTST  dummy to reflect U.S. auto strike
x  QBACTS  dummy for enactment of bank acts of 1967
x  QCNTRL  dummy to reflect Canadian wage and price controls
x  QCRISIS  dummy for exchange rate crises in 1962 and 1968
x  QEITB    dummy for deferral of new bond issues in the U.S.
x  QERE69  dummy for divergence of weighted foreign rate from true foreign rate
x  QEXPO  dummy to reflect effects of Expo 67
x  QFRID  dummy to reflect end of quarter occurring on a Friday
x  QIE1    dummy to reflect interest equalization tax
x  QIE2    dummy to reflect interest equalization tax
x  QLOBO  dummy for exchange rate uncertainty and federal policy discouraging foreign borrowing
x  QMIDEA  dummy for Suez Canal closing
x  QNEP  dummy for new economic program in U.S.
x  QRD    dummy for periods when the discount rate is greater than the short term interest rate
x QSCALE  dummy to reflect economies of scale in Canadian auto
manufacture
x QSMITH  dummy to reflect the Smithsonian agreement
x QTAXI  dummy for indexation of tax structure to Canadian price
level
x QUI  dummy for revision of the unemployment act
x QZEUROF  dummy to account for federal borrowing in Deutsche marks
x Q1, Q2, Q3, Q4  seasonal dummies
x RD  discount rate (BOC)
* RED  three month Eurodollar deposit rate (FRB)
x RES, RESNSA  residual error of estimate - from GNP component
x RESV  residual error of estimate (STATCAN)
RF  free reserves, excess reserves less borrowed reserves
RL  long-term interest rate Government of Canada Bonds --
     10 years and over (BOC)
* ROWPMG  ROW import price index
* ROWPXG  ROW export price index
RR  required reserves (BOC)
RS  short-term interest rate, 90 day finance company
     paper (BOC)
RSLD  short-term interest rate (when discount rate is lower than
     short-term interest rate)
RSIH

short-term interest rate (when discount rate is higher than short term interest rate)

RU

unborrowed reserves, total reserves less borrowed reserves

x SCRG

discard rate for gross government fixed capital stock

x SCRP

discard rate for gross private fixed capital stock

SD

savings deposits (BOC)

x SDRVAL

SDR allocations and valuation adjustment (NFAT - NFA)

STC

stock of private short-term claims on foreigners

(cumulated value of DSTC)

STL

Canadian stock private short-term liabilities on foreigners

(cumulated value of DSTL)

TB

trade balance (XGV - MGV)

TCORPV

direct taxes on corporate and government business enterprises (STATCAN)

TD

time deposits held by residents (BOC)

x TIME

linear time trend

TINDV

indirect taxes (STATCAN)

TNRESV

direct taxes on non-residents (STATCAN)

TPERV

direct taxes, personal (STATCAN)

TRANV

government transfers (STATCAN)

TV

government tax revenue (STATCAN)

* UCU

U.S. capacity utilization index

* UGNP

U.S. gross national product

UN

unemployment rate (STATCAN)
* UNW  U.S. private net worth proxy (cumulated value of private savings)

* UP  U.S. deflator for aggregate expenditure

* UPXGUV  U.S. export unit value (Department of Commerce, Survey of Current Business)

* URL  U.S. long-term interest rate

* URS  U.S. Treasury Bill rate (FRB)

* UYDV  U.S. disposable income proxy

W  wage rate in manufacturing (STATCAN)

WB'  wage bill (STATCAN)

* WMGV  merchandise imports, balance of payments basis

WTV  total exports of world excluding Canada

* XCEV  merchandise exports to the U.K., c.i.f. (DOT)

* XCGV  merchandise exports to Germany, c.i.f. (DOT)

XCJUNK  slack variable to insulate bilateral export variables when Canadian model is shocked in isolation (normal value = 0)

* XCJV  merchandise exports to Japan, c.i.f. (DOT)

* XCRV  merchandise exports to R.O.W., c.i.f. (DOT)

XCTV  total Canadian merchandise exports, c.i.f., customs clearance basis (DOT)

* XCUV  merchandise exports to the U.S., c.i.f. (DOT)

XECV  U.K. exports to Canada, f.o.b. (DOT)

* XETV  total U.K. merchandise exports
XG  export of goods (STATCAN)
XGCV  German exports to Canada, f.o.b. (DOT)
XGSNI  exports of goods and services, national income account basis (STATCAN)
XGSNINS  export of goods and services, national income accounts basis, not seasonally adjusted (STATCAN)
XGSNIV  exports of goods and services, national income accounts basis, current value (STATCAN)
XGSNIVS  export of goods and services, national income accounts basis, not seasonally adjusted (STATCAN)
* XGTIV  total German merchandise exports
XGV  exports of goods (STATCAN)
* XJCV  Japanese exports to Canada, f.o.b. (DOT)
* XJTV  total Japanese merchandise exports
XRCV  R.O.W. exports to Canada, f.o.b. (DOT)
* XRTV  total R.O.W. merchandise exports
XSOV  service account receipts, excluding investment income (STATCAN)
XUCV  U.S. exports to Canada, f.o.b. (DOT)
* XUTV  total U.S. merchandise exports
XSYV  investment income receipts (STATCAN)
XTRANV  transfer receipts (STATCAN)
XUJEGV  Canadian exports from Germany, Japan, the United Kingdom and the United States
YDPVNSA  proxy for disposable income (GNPVNSA - TV + TRANV - CCAV)

YDV  disposable income (STATCAN)

YDVNSA