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**The Impact of Foreign Direct Investment on
Job Creation and Economic Growth:
Evidence from the WEFA Canada Macro Economic Model**

by

Ross S. Preston and Haider M. Saiyed
(prepared for Industry Canada and Foreign Affairs and International Trade)

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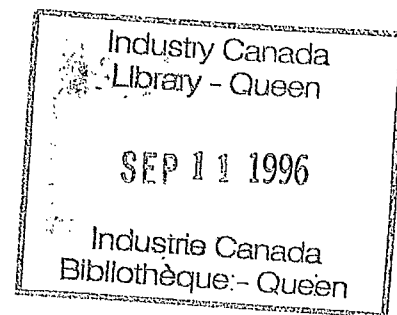
The Impact of Foreign Direct Investment on Job Creation and Economic Growth:

Evidence from the WEFA Canada Macro Economic Model

by

Ross S. Preston and Haider M. Saiyed

(under contract to Industry Canada and Foreign Affairs and International Trade)



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Executive Summary

The Impact of Foreign Direct Investment on Job Creation and Economic Growth in Canada

prepared by
WEFA Canada for Industry Canada and Foreign Affairs and International Trade
by
R.S. Preston and H.M. Saiyed

Introduction

The objectives of this study are to develop, test and implement a methodology which will enable an assessment of the direct and indirect effects of Foreign Direct Investment (FDI) on the Canadian economy with special emphasis on investment, exports, imports, total factor productivity (TFP), job creation and real economic growth.

The results reported in this study were obtained by: (1) introducing the change in the real stock of FDI as a right hand side variable into a set of annualized regression equations derived from the investment, export and import, and production sectors of the WEFA Canada Macro Economic Model; (2) using the estimated annualized equations from (1) which capture the direct effects through the presence of statistically significant positive elasticities, to quantify the direct impact of a sustained one billion dollar real change in the stock of FDI on investment, exports and imports and TFP; and, (3) using the direct impacts obtained in (2) as a guide to adjust the investment, export and imports, and production equations contained in the WEFA Canada Macro Economic Model, to determine the indirect effects of a one billion dollar change in the real stock of FDI on jobs, growth and other indicators of economic performance.

In addition, analytical techniques employ the annual homologue of the quarterly model equations and the quarterly model to compute the standard multiplier - the garden variety investment/trade multiplier - as distinct from the *supercharged* FDI/investment/trade multiplier, a new concept which emerges from the analysis. The former falls in the range of 1.5 to 1.6 and the latter in a range of 4.3 to 8.4.

The difference in the range between the two multiplier concepts (garden variety and *supercharged*) is explained by: (1) a *dynamic effect* at work in the trade sector - the change in FDI stock effects growth rates in the trade sector directly; and, (2) a *matching effect* at work in the investment sector - domestic savings partner with foreign savings.

The wider range related to the *supercharged* multiplier is associated with the impact of FDI on machinery trade. This sector was found to have much higher export elasticities than import elasticities in relation to FDI. The lower bound of the *supercharged multiplier* relates to a case which excludes the *dynamic effects* of machinery trade from the analysis of direct effects, the upper bound estimate relates to a case in which the *dynamic effects* of machinery trade are included.

Supply/demand analysis of the results suggest that the upper bound is not unreasonable, given the shift in supply caused by a sustained one billion dollar real increase in the change in the stock of FDI and the unused incremental supply which occurs when machinery trade is excluded from the analysis. However, the large differences between the export and import elasticities obtained for machinery suggests prudence in moving too far above the lower bound without a detailed sector analysis of machinery trade, an undertaking that is beyond the scope of this study.

These results suggest that a substantial increase in growth at the margin can result from additional FDI and support the notion that additions to productive capital (potential) whose origin is FDI, being on the leading edge of technology/management skill and so on, are *supercharged* - that is, they are highly productive. This is consistent with the cross section results reported in previous Industry Canada studies which suggest that outward looking firms have higher rates of return on assets.

Summary of Findings - Direct Effects (Executive Summary Table 1)

- **Investment** - Considering only the direct (single equation static and dynamic) effects of FDI and not those effects associated with the system as a whole, a one billion dollar real increase in the stock of FDI produces double (2 to 1) the amount of domestic investment in the medium-run. This we call the *matching effect* as it suggests that domestic savings partners with foreign savings in the medium-run.
- **Exports** - The ratio of the direct impact to the sustained change in the real stock of FDI on imports is about 5.3 to 1 in the medium-run for the upper boundary (which includes machinery exports) and 1.3 to 1 for the lower boundary (which excludes machinery exports). At the upper bound, nearly 70 percent of this direct effect stems from equations in which the addition of the FDI variable itself is statistically significant. Thus, the marginal contributors (those equations with t-test less than 2, but with positive effects) account for only about 30 percent of the direct effects. Nevertheless, the upper bound elasticity is the result of the effect of one equation - that associated with machinery exports.
- **Imports** - The ratio of the direct impact to the sustained change in the real stock of FDI on imports is about 1.8 to 1, when machinery imports are included, and 1.3 to 1 when they are excluded. As is the case for exports, the direct effects related to imports are based on elasticities that have the right sign and a high percentage of the effects at the upper boundary are associated with equations that have passed a null hypothesis test.
- **Trade** - The export and import direct effects bound the direct (net) trade impact in a range between 3.5 (5.3 - 1.8) and 0 (1.3 - 1.3). The upper end of the range is supported by the fact that the export and import equations employed to derive the estimate of 3.5 are statistically significant. This upper bound estimate is derived from equations where the specific structure causing the effects have passed a null hypothesis test. In short, we are confident that these effects are not "accidental," but rather "structural." We call this the *dynamic* trade effect. The *dynamic* trade effects combined with the *investment matching* effects brings the combined direct (net) impact to a range that falls between 5.5 (3.5 + 2) and 2 (0 + 2). This range bounds the direct effects and is the origin of the *supercharged* multiplier (as outlined below).
- **Total Factor Productivity** - We also uncovered a small direct effect related to the impact of FDI on TFP. This small but positive TFP effect impacts the efficiency of production directly, thus raising the productivity of both labour and capital. We associate this effect with the ideas of

Paul Romer who claims that *newness* has the effect of directly increasing TFP. We interpret the FDI variable as we have used it in our analysis as capturing this sort of impact and we suggest that it is a useful proxy index for the Romer notion of *newness*.

Summary of Findings - The Multiplier (Executive Summary Table 2)

- **The *supercharged* impact of FDI** - Combining the indirect effects with the normal garden variety multiplier (see Summary Table 2) associated with the structure of the quarterly model produces a much larger multiplier than normally emerges from impact analysis. As a result we call this the *supercharged* multiplier for the sort of FDI shock under study. It ranges between 8.4 (5.5 x 1.54) and 4.3 (2.0 x 2.2). It stems from the *matching effect* isolated on the investment side and the *dynamic effect* isolated on the trade side.

Summary of Findings - Indirect Effects (Executive Summary Table 3)

- **Jobs** - Depending on the exchange rate regime in play, an upper bound reading of the analysis suggests that between 104,000 and 114,000 jobs will be created from a sustained 1 billion dollar increase in the change in the real stock of FDI. If exchange rate appreciation is avoided the high-end estimate is more likely. Under a flexible exchange rate regime the lower bound estimate which excludes the direct effect associated with trade in machinery produces 65,000 new jobs. Thus even under a conservative assessment the impact on jobs is substantial in the medium-run falling somewhere between 65,000 and 114,000. Until the issue of the *dynamic* effect related to machinery trade is resolved (by further study) prudence should lead one to use the lower bound estimate derived from a *supercharged multiplier* of about 4.3 to guide policy.
- **Growth** - Again, depending on the exchange rate regime in play, the upper bound estimate obtained from the analysis suggests that additional cumulative real growth of about 1.3 percentage points will result on the demand side and 1.5 percentage points will result on the supply side. The analysis indicates that ignoring the direct trade impacts of machinery results in unused export capacity. The lower bound estimate of a .62 percentage point increase in demand coupled with a 1.23 percentage point increase in supply leaves room for extra growth whose origin would be the (upper) bound *dynamic* effect from machinery trade. This points in the direction of the upper bound as not unreasonable from the point of view of supply/demand analysis.
- **Balances** - Again, regardless of the exchange rate regime in play, the upper bound case suggests that the personal saving rate and the dollar volume of after tax business profits would increase, that government deficits would decline and that productive private sector capital stock would expand. Thus wealth creation of this sort leads to more domestic savings and less total foreign borrowing. This is an important point. At first blush it appears to be an oxymoron. But, funneling foreign savings directly to the capital base rather than directly to the consumption base is what explains this apparent contradiction. The direct effect of government borrowing has supported and continues to support the consumption base mainly via transfer payments to persons; but the direct effect of Foreign Direct Investment through an increased flow of FDI has in the past and will in the future support the wealth creating base by way of a larger and more up-to-date stock of physical capital and an increased degree of competitiveness. The impact on balances derived from excluding the trade effects from machinery can be interpreted as a lower bound to the impacts just discussed. In these circumstances the above balances in some cases deteriorate (the current account), do not change (the federal balance) or show only marginal

improvement (the real trade balance). In addition, positive improvements in after tax profits, the personal savings rate and growth in real disposable income remain.

- **Inflation and Costs** - Again, depending on the exchange rate regime in play (flexible versus fixed), an unqualified reading suggests that the expansion of supply that accompanies the increase in demand allows the real effects to dominate. Wages would increase more than prices in either case. In the case where the exchange rate is inflexible more inflation and higher interest rates creep into the system. In general, the more demand pressure entering the system the more inflation creeps into the results.
- **Interest Rates** - A key result is apparent by comparing the fixed with the flexible exchange rate case. Under a flexible exchange rate regime less inflation and lower interest rates would prevail, but fewer jobs would be created. In a fixed rate regime, more jobs would be created, but more inflation would creep into the system. This of course is a standard result but it provides important policy guidance in circumstances where openness coupled to a focus on investment/trade is a key policy objective. Although we have obtained this result from a comparison of upper bound results, this outcome would carry over to the lower bound case which excludes trade in machinery (if run under a fixed regime).

Caveats related to trade in machinery

This study presents a range of impacts related to the effect of FDI on economic performance in Canada. The lower boundary of this range is associated with an analysis of direct effects that excludes trade in machinery and suggests that 65,000 jobs would be created over a 6 year horizon. The upper bound is associated with the inclusion of the trade effects related to machinery. The inclusion of machinery trade raises the estimate of direct plus indirect effects on job creation by nearly 60 percent from 65,000 to 104,000 (assuming flexible exchange rates). The structure of the WEFA Canada Quarterly Economic Model is not detailed enough on the production or trade side to dissect the origins of the effect specifically related to trade in machinery any further than what has been done already in this study. But, the effect is large and growth in machinery exports have been high in the recent past. This suggests that an additional detailed study of the machinery trade sector would be a desirable next step in any further analysis undertaken with regard to the impact that FDI might have on growth and job creation in Canada.

Conclusion

There is an important policy lesson that flows from the results of this study. They suggest that FDI can have positive, beneficial, real impacts on the growth and job creation process in Canada. The route by which these impacts occur is partly related to explanations that are current and whose origins are the *new growth theory* of Paul Romer. These explanations are bound up in the way in which *newness plays a potential positive powerful force in the growth process*. FDI flows appear to operationally embody this sort of potential for Canada in as much as the effects of increase FDI flows are amplified in regard to their impact on the economy by both the *matching effect in regard to investment and the dynamic effect in regard to trade*.

Executive Summary Table 1
Direct Impact of FDI on Investment, Exports, Imports and TFP - Annual Model

	1995	1996	1997	1998	1999	2000
LEVEL DIFFERENCE						
Change in total FDI	1000	1000	1000	1000	1000	1000
Investment, machinery & equipment	249	517	1098	1095	1084	1085
Investment, non-res construction	345	807	1621	1475	1344	963
Total exports	738	1869	3986	4579	5089	5279
Goods	738	1869	3986	4579	5089	5279
Mining	5	15	34	48	62	73
Food, beverages and tobacco	0	0	0	0	0	0
Wood	10	58	124	167	145	105
Pulp and paper	100	138	242	61	103	139
Primary metals	45	129	268	326	343	305
Auto and parts	0	0	0	0	0	0
Machinery	317	1056	2463	3468	3928	4044
Chemicals and fertilizer	82	127	216	90	101	130
Other manufacturing	179	347	639	419	408	482
Services	0	0	0	0	0	0
Total imports	909	1431	2493	1492	1594	1838
Goods	909	1431	2493	1492	1594	1838
Fabricated materials	375	638	1047	646	605	703
Machinery and equipment	107	237	495	536	537	526
Autos and parts	408	507	866	221	373	507
Other end products	0	0	0	0	0	0
Food, beverages and tobacco	0	0	0	0	0	0
Crude materials	14	31	49	40	21	32
Oil	5	17	36	50	58	70
Services	0	0	0	0	0	0
Total Factor Productivity (TFP)	0.0002	0.0004	0.0007	0.0008	0.0009	0.0011
PERCENTAGE DIFFERENCE						
Investment, machinery & equipment	0.4	0.8	1.6	1.5	1.4	1.3
Investment, non-res construction	1.3	2.9	5.6	5.0	4.4	3.0
Total exports	0.3	0.7	1.5	1.7	1.8	1.8
Goods	0.3	0.8	1.6	1.8	2.0	2.0
Mining	0.1	0.3	0.6	0.8	0.9	1.1
Food, beverages and tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Wood	0.1	0.7	1.4	2.0	1.7	1.2
Pulp and paper	0.7	0.9	1.5	0.4	0.6	0.8
Primary metals	0.3	0.9	1.8	2.1	2.2	1.9
Auto and parts	0.0	0.0	0.0	0.0	0.0	0.0
Machinery	0.6	1.8	3.8	5.1	5.5	5.5
Chemicals and fertilizer	1.2	1.8	3.0	1.3	1.4	1.8
Other manufacturing	0.5	0.9	1.7	1.1	1.1	1.2
Services	0.0	0.0	0.0	0.0	0.0	0.0
Total imports	0.4	0.6	1.0	0.6	0.6	0.7
Goods	0.4	0.7	1.2	0.7	0.7	0.8
Fabricated materials	1.0	1.8	3.0	1.9	1.8	2.0
Machinery and equipment	0.3	0.6	1.2	1.3	1.3	1.2
Autos and parts	1.0	1.3	2.3	0.6	0.9	1.2
Other end products	0.0	0.0	0.0	0.0	0.0	0.0
Food, beverages and tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Crude materials	0.3	0.6	0.9	0.8	0.4	0.6
Oil	0.1	0.4	0.8	1.1	1.2	1.4
Services	0.0	0.0	0.0	0.0	0.0	0.0
Total Factor Productivity (TFP)	0.4	0.7	1.4	1.3	1.5	1.6

Executive Summary Table 2
Multiplier Analysis

	1995	1996	1997	1998	1999	2000
Partial Model Simulation:						
Impact on Business Investment and TFP	594	1324	2719	2570	2428	2048
Impact on Exports Excluding Machinery	421	814	1523	1111	1162	1234
Impact on Exports Including Machinery	738	1870	3986	4579	5090	5278
Impact on Imports Excluding Machinery	802	1193	1998	957	1057	1312
Impact on Imports Including Machinery	909	1430	2493	1493	1594	1838
Full Model Simulation:						
Impact on GDP - Investment and TFP	786	2044	4406	4555	4640	4514
Multiplier	1.32	1.54	1.62	1.77	1.91	2.20
Impact on GDP - Exports and Imports	-173	638	2107	3680	4098	3999
Multiplier	1.01	1.45	1.41	1.19	1.17	1.16
Impact on GDP - Flexible Regime Excl. Machinery	384	1591	3823	4546	4649	4342
Multiplier	1.80	1.68	1.70	1.67	1.84	2.20
Impact on GDP - Flexible Regime Incl. Machinery	602	2449	5922	7775	8490	8440
Multiplier	1.42	1.39	1.41	1.38	1.43	1.54
Impact on GDP - Fixed Regime	591	2225	5392	7530	8719	9164
Multiplier	1.40	1.26	1.28	1.33	1.47	1.67

Executive Summary Table 3
Deviation from the Base Case

	1995	1996	1997	1998	1999	2000
Employment (Thousands)						
<u>Level difference:</u>						
Flexible Regime						
Investment and TFP	5	19	47	63	67	66
Exports and Imports	-2	4	19	35	44	46
Investment, Exports and Imports Excl. Machinery	2	14	40	59	66	65
Investment, Exports and Imports Incl. Machinery	3	19	53	83	100	104
Fixed Regime	3	15	42	73	98	114
<u>Percentage difference:</u>						
Flexible Regime						
Investment and TFP	0.0	0.1	0.3	0.5	0.5	0.5
Exports and Imports	0.0	0.0	0.1	0.3	0.3	0.3
Investment, Exports and Imports Excl. Machinery	0.0	0.1	0.3	0.4	0.5	0.5
Investment, Exports and Imports Incl. Machinery	0.0	0.1	0.4	0.6	0.7	0.7
Fixed Regime	0.0	0.1	0.3	0.5	0.7	0.8
Real GDP (1986\$ Million)						
<u>Level difference:</u>						
Flexible Regime						
Investment and TFP	786	2044	4406	4555	4640	4514
Exports and Imports	-173	638	2107	3680	4099	3999
Investment, Exports and Imports Excl. Machinery	384	1591	3823	4546	4649	4342
Investment, Exports and Imports Incl. Machinery	602	2449	5922	7775	8491	8441
Fixed Regime	592	2225	5392	7530	8719	9164
<u>Percentage difference:</u>						
Flexible Regime						
Investment and TFP	0.1	0.3	0.7	0.7	0.7	0.6
Exports and Imports	0.0	0.1	0.3	0.6	0.6	0.6
Investment, Exports and Imports Excl. Machinery	0.1	0.3	0.6	0.7	0.7	0.6
Investment, Exports and Imports Incl. Machinery	0.1	0.4	0.9	1.2	1.3	1.2
Fixed Regime	0.1	0.4	0.8	1.2	1.3	1.3

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Introduction

There is growing evidence that globalization, as characterized by the international linkages which have developed as a result of the opening of the world economy during the past 20 years, is now and will continue to be a key component of the growth and job creation process. For example, in *Foreign Direct Investment and APEC Economic Integration*, a study done for the APEC Economic Committee by Industry Canada, the trade and investment patterns of all APEC member countries show a strong and positive correlation in both 1980 and 1992, suggesting trade and Foreign Direct Investment (FDI) are complements rather than substitutes.¹ Similarly, *Canadian-based Multinationals: An Analysis of Activities and Performance*, a study done for Industry Canada, clearly indicates that outwardly-oriented firms performed better than domestically oriented firms in three key areas: capital productivity, R&D intensity and average rate of return on assets.² Finally, the new growth arithmetic of Paul Romer suggests that a direct linkage exists between the investment process, especially that related to investment in human capital and total factor productivity (TFP).³ In short, both theory and the empirical evidence now suggest linkages among and between investment, trade and productivity play a key roll in the job creation and growth process.

In the case of FDI most studies have concentrated on direct effects as they might impact on investment in the aggregate or as they might impact on selected performance indicators of individual companies. To date we know of no Canadian study that has assessed the direct effects of FDI on investment, carried the assessment forward to determine the direct impact of FDI on exports, imports and TFP and then using a macro econometric model of the Canadian economy obtained estimates of the indirect effects for a full range of macro performance indicators including jobs, real growth, deficits, per-capita income growth and so forth. The WEFA Canada Macro Economic Model is well suited for such an undertaking.

The WEFA Canada Macro Economic Model is a quarterly model. This study begins by estimating annualized homologues of the investment, export and import equations, and the production function contained in this model to obtain the elasticities associated with the direct effects of a sustained increase in the change in the real stock of FDI in Canada on real domestic investment, real exports and imports, and TFP. An annual time framework is used as the starting point because the FDI data are only made available in annual frequency. It uses these estimated elasticities to determine the direct effect, using a six-year time horizon, of a permanent increase in the change in the real stock of FDI by one billion dollars on domestic investment spending, export and import spending, and TFP. These estimated direct effects are then used to adjust the quarterly homologues contained in the WEFA Canada Macro Economic Model. Once these adjustments are complete, the model is

¹ See Conclusions and Policy Implications, page 33, in Foreign Direct Investment and APEC Economic Integration, Asia-Pacific Economic Cooperation, APEC Secretariat, Singapore, June 1995.

² See Figure 16 - Performance of Outward-Oriented and Domestically Oriented Canadian Firms, page 38, in Canadian-Based Multinationals: An Analysis of Activities and Performance, Industry Canada Working Paper Number 2, Ottawa, July 1994.

³ See Towards an Operational Definition of Knowledge-Based Growth, Peter Howitt, in The implications of Knowledge-Based Growth for Micro-Economic Policy, The University of Calgary Press (1996).

simulated over a 24 quarter horizon to obtain the indirect (systems) effects associated with these direct effects. The simulation results are then annualized for purposes of presentation. Comparing the simulation results (which contain both direct and indirect effects) with those of the base case (which contain no direct or indirect effects) provides an indication of the impact of a sustained change in the real stock of FDI by one billion dollars on key performance indicators including those related to jobs, real growth and the deficit in the medium-run (6 years). In computing the direct and indirect effects, three cases are considered as they relate to the indirect impact of investment and trade, and two alternatives are considered as they relate to the impact of the exchange rate regime: fix and flexible.

Impact study design

The WEFA Canada Macro Economic Model is ideally suited to deal with the issue at hand. It is a structural econometric model of the Canadian economy with both a demand and a supply side, containing 140 stochastic equations, 257 identities and 216 exogenous variables. The exogenous variables are drawn from a variety of data sources including the WEFA Group World Model and the WEFA Group US Macro Economic Model. Thus, the resulting estimated demand and supply elasticities control for a wide variety of effects both domestic and foreign. A complete description of the equations contained in the model is available to WEFA Canada clients on a confidential loan basis. However, the specific equations related to investment, exports and imports, and the production function required for this study are set out in Appendix A.

For the purpose of assessing direct effects we need only concern ourselves with those parts of the model that are related to business investment, exports and imports, and the production function. There are two business investment equations, ten export equations, eight import equations and one production function. On the demand side of the model, for business investment there are two equations, one for machinery and equipment and the other for structures. For exports there are equations for mining; food, beverages, and tobacco; wood; pulp and paper; primary metals; auto and parts; machinery; chemicals and fertilizer; other manufacturing; and services. For imports there are equations for fabricated materials; machinery and equipment; autos and parts; other end products; food, beverage and tobacco; crude materials; oil; and services. On the supply side of the model there is one production function and a Lucas type supply equation that reacts to the ratio of sales to normal output, the ratio of desired to actual inventory stock and a profitability index. For computing direct effects on the supply side, however, we need only be concerned with the production function. When computing indirect effects, the Lucas type supply equation provides feedback on the size of the gap (or change thereof) between production as determined from the operation of production technology at "normal profit or cost minimizing input levels" and sales as determined from spending on consumption, investment, exports and so on. The supply/demand balance as it evolves once the "shock" is imposed plays a key role in the analysis to follow.

Because the FDI stock data for Canada is available in an annual time framework only, the first step in the impact study design is to estimate the annualized homologue of the relevant quarterly equations, namely, the two investment equations, the ten export equations, the eight import equations and one production function. There are two issues to resolve here. The first is related to the time aggregation of the data (both right and left hand side variables). The second is related to the time aggregation of those lag distributions and moving averages which are used on the right hand side of the equations under consideration.

Data issues

Data issues are not as straight forward as one might think. Identities related to user cost, depreciation rates, prices and capital stock require the use of aggregation methodology that is consistent at an annual frequency with the theory/methods used to develop the data at a quarterly frequency. In most cases using simple annual averages to convert the data from a quarterly frequency to an annual frequency is not the proper route. In the case of user cost, for example, individual inputs must be annualized first and proper discounting must be applied to depreciation rates before the annualized version of the user cost formula can be used to compute the user cost numbers from the annualized inputs. Similarly, proper quarterly averaging must be applied first to both quarterly value and volume data to provide the annual data required to obtain estimates for the deflators (taking a simple average of prices is inappropriate). The same is true when annualizing other variables such as the unemployment rate where quarterly numbers for labour force and employment must be annualized first. As for capital stocks, proper discounting of depreciation rates is required to ensure that end of year stocks and end of fourth quarter stocks are identical. Thus, in all cases the appropriate time aggregation method must be used to account for the "theory behind the concepts."

Lag distribution and moving averages

In developing the annualized homologue of the quarterly equation it is important to preserve the dynamics in the annual equations that are embedded in the quarterly equations. The rule employed is simply to divide the length of the lag by 4. Thus in those cases where a right hand side variable entered an equation with a lag of 12 quarters, the annualized homologue is given a lag of 3 years. In cases where the division by four rule produces a fraction, for example 1.5 years, both 1 and 2 year lags are examined for relevance.

Adding the FDI impact to the annualized homologue

Once the annualized homologues were estimated and compared to their quarterly counterpart, the sustained real change in FDI stock (the nominal change in stock divided by the deflator for business investment) is added to the regression as an independent variable and tested for statistical significance. In a number of cases where both past and current changes are significant, a moving average of real FDI flow is included as a right hand side variable. In addition, in some cases it was necessary to constrain the coefficients to those obtained from the annualized homologue of the quarterly specification before adding the FDI effect. FDI impacts were found in all but three export equations and three import equations. For both investment and TFP long lags are the rule rather than the exception. The objective in all cases is to quantify the direct effect of FDI on domestic investment spending, export and import performance and TFP. Note that in many cases the short-run effect of FDI (in the single equation context) differs from the long-run effect. This along with the fact that some of the equations are in *percent change form* has a bearing on the manner in which the quarterly system is adjusted and the way in which the normal multiplier is computed. More on this latter.

Simulating the direct effects

Seven separate simulations (one annual and six quarterly) are needed to partition the total impact for analysis especially in regard to the analysis of the standard multiplier. The first simulation, based on the *annual model subsystem*, isolates the direct impact of the FDI change on investment, exports and

imports, and TFP. We label these effects as *single equation static and dynamic effects*. The second simulation, based on the *quarterly model subsystem*, uses the data from the first simulation to obtain a set of interpolated adjustments which insure that the single equation static and dynamic effects obtained from the quarterly model subsystem, when annualized are *identically equal* to those already obtained from the annual model subsystem simulation. This second simulation has no analytical content but validates the fact that we have correctly carried the direct impacts found using the annual model subsystem over to the adjustments used in the quarterly framework. These adjustments will be required for insertion into the full quarterly model simulation exercise. Thus, we undertook to ensure that the annualized dynamic effects obtained for this second simulation are identical to those obtained for the first. Finally, a set of five full system simulation (the third through seventh, but identified in the analysis to follow as Case (1) through Case (5)) using the quarterly model employ various combinations of the same adjustments employed in the quarterly model subsystem validation exercise to study the supply, demand, supply/demand, flexible regime and fix regime aspects of the indirect effects. We label the additional effects which occur in simulations three through seven (that is, Case (1) through (Case (5)) as *system effects*. Here we deal with the logic behind the subsystem simulations, that is the first and second simulations as set out above.

Since the research design calls for the assessment of direct (single equation static and dynamic) effects by using the annualized homologues, the impact stemming from the presence of lagged dependent variables (for example, many of the export and import equations are in percent change form) must be accounted for in the analysis at the outset (the origins of these sorts of impacts can be traced to the dynamic structure of the single equation(s) and not the system as a whole). To complicate matters, in those cases where the FDI variable enters as a moving average, the direct (single equation) effect has a dynamic pattern (related to FDI). One should not confuse this dynamic effect with the time related effects traceable to the presence of a lagged dependent variable used on the right hand side of the equation(s) in question. The first simulation combines all of these aspects of the structure of the annual single equations to obtain the single equation direct effects (both static and dynamic as they relate to FDI). It is this direct effect that we want to impose on the quarterly model to obtain the system effects. As mentioned above, we use an interpolated time path of the annual model solution to develop a set of quarterly adjustments. When these adjustments are added to the quarterly model subsystem, the dynamic simulation which results tracks the dynamic annual model subsystem results identically. We then use various combinations of these interpolated adjustments as input to a set of five full model dynamic simulation to obtain the respective indirect effects. For this reason we present two separate tables containing direct effects. The first contains the direct (single equation static and dynamic) effects which are obtained from a dynamic simulation of the annual model subsystem. The second (identically equal to the first) verifies that the interpolated quarterly model adjustments produce a solution that tracks the annual model direct effects identically.

Simulating the indirect effects using the WEFA Macro Economic Model

Once the table of direct (static and dynamic) effects is developed, these impacts are interpolated to a quarterly time framework and introduced as adjustments to the appropriate equations. The full macro model is then simulated over a 24 quarter time period. Because we intend to present annual impacts only, we used an interpolation method which preserves the annual time pattern on a uniform quarterly basis. This means that one must aggregate to an annual frequency before interpreting the results. From the full model simulation(s) emerge the system effects that stem from the fact that more domestic investment, more exports, more imports and a higher growth rate of TFP combine to produce higher income, more jobs, a bigger tax base, a smaller deficit and so on which then feedback

to the demand side. It is the assessment of (1) the direct effects of FDI on investment, exports and imports, and TFP and (2) the computation of the indirect effects which result that is the unique aspect of this study. These results are reported in Tables 1 to 18 and Figures 1 to 5 and will be discussed more fully in the sections which follow.

Analogy to the simple tax/expenditure multiplier calculation

From the technical point of view, the research design has as a maintained hypotheses that the single equation residuals associated with the existing annualized homologues from the WEFA Canada Macro Economic Model for those equations related to investment, exports and imports and TFP, are not orthogonal to changes in the real stock of FDI, but are positively related to them. Under these circumstance, the "elasticity(s)" between these "residuals" and the change in the real stock of FDI can be used to compute direct (single equation static and dynamic) effects. These direct (single equation static and dynamic) effects are then used to compute indirect effects using the full macro model. In short, the research design is analogous to the simple tax/expenditure multiplier calculation carried to a framework where the "stimulus" is a change in the real stock in FDI rather than a change in a tax rate or the level of government spending and the outcome is the impact of such change on growth and jobs. The undertaking is complicated by the fact that we derive the impacts from a set of estimated elasticities that correlate the residuals of the "annualized" equations where we suspect direct effects exist as they relate to the FDI variable (investment, exports, imports and TFP) and then "switch" the frequency of the model to undertake an assessment of the indirect effects taking care to insure that the switch in frequency from annual to quarterly does not influence the outcome of the analysis.

Estimating the impact equations

Estimating the impact equations involved three steps. First, re-estimation of the quarterly equations from the model that are relevant to the impact assessment, using the original sample period but using the most current data. This step was necessary because the coefficients now in use have been obtained using a sample period that extends only through 1991. Since recent data revisions might lead to changes in the estimated parameters, it is our judgement that for purposes of comparison (annual with quarterly versions of the same basic specification) a clean starting point is in order with regard to the quarterly equations. As it turned out, there were only very minor differences between the parameter estimates associated with the current model and those related to a data set for the current model that is up-to-date. Second, annual estimates were obtained using annual specifications analogous to those of the quarterly equations. Third, the real change in FDI was introduced into the annual equations as a right hand side variable.

The original quarterly equations (sample period through 1991)

The original equations are recorded in Appendix A. The investment functions are derived from an underlying Cobb-Douglas production function assuming profit maximization. Output, user cost (and the associated factors that determine the user cost, for example, tax rates, interest rates, depreciation rates and schedules, investment price), output price, lagged capital stock, and TFP effects are the main right hand side variables. In addition an index of profitability is also included as a right hand side variable. Constrained estimation techniques are used to ensure long-run wage and profit shares are carried over from the production function to maintain consistency between the key elasticities of the investment demand functions and those of the underlying production function. TFP is captured as a simple log linear function of time. Normal output is defined as that which would obtain if the

firm were operating on its production function. Factors of production are assumed to be quasi fixed. The residual from the production function, once quasi fixed inputs and the log linear trend are accounted for, is labelled as the unexplained portion of TFP.

The export and import equations are specified as demand functions, and include key right hand side variables associated with foreign and domestic indicators for real activity/income, relative prices and cost, and exchange rates. In some cases (auto and parts exports, for example) near identities are used.

The updated quarterly equations (sample period through 1991)

A validation of those equations currently in use, using the identical sample period but the most current data available, indicates no substantive change in the parameters. These estimates are recorded in Appendix B. This step was undertaken to be certain that there is a clean base on hand to which we can compare the annualized estimates. Thus it is this set of estimates that will be used for comparison purposes, although the equations reported in Appendix A will be used to compute the indirect effects using the full Macro Model. The difference here are not worth worrying about.

The annual counterpart to the updated quarterly equations

The estimates recorded in Appendix C are those obtained after annualizing the quarterly data, but before adding the real FDI flow as an additional right hand side variable. In general, there were no sign changes of any significance. However, in the case of investment in business structures (non-residential construction) the profitability term turned up with the wrong sign. For key output/income and price elasticities there were changes, but they remained within the range expected when moving from a quarterly to an annual time framework. The raw annual elasticities attached to the right hand side variables were in the majority of cases greater than raw quarterly elasticities as they should be - at a lower frequency a longer run effect (larger coefficient) should be captured by the estimation technique. This set of estimated equations (and their associated residuals) provided the starting point for developing a new set of annual equations which will include as a right hand side variable the real change in the stock of Foreign Direct Investment.

Adding the impact of FDI and re-estimating through 1994

In Appendix D are recorded the final estimates of each of the equations used to compute the direct (single equation static and dynamic) effects of FDI. To ensure that all statistical information was brought to bear on this set of estimates the sample period was also extended to 1994. In addition, the nominal values of the change in FDI were deflated by the business fixed investment price deflator to produce an estimate of the real change. In most cases the left hand side variables were unitless (ratios or logs). As a result we scaled this constructed FDI change variable by the stock of machinery and equipment (KIMEB). We obtained the following results.

Real Business Investment in Machinery and Equipment

In this case a weighted average of the change in the real value of FDI was entered as a ratio to the lagged stock of business machinery and equipment to maintain consistency with the specification of the original equation. The weights were chosen that minimized the standard error. Weights of .25, .25 and .50 imply that the full pass through effect takes about three years. The addition of the FDI to the equation reduced the significance of the profitability index. This is consistent with the

hypothesis that suggests FDI flows and profitability should be positively correlated. In fact a simple log linear regression between the ratio of the real change in FDI to domestic capital stock and the log of the profitability index produces a positive elasticity. Under these circumstance, therefore, it was decided to drop the profitability index from the equation (t-test of 7.6).

Real Business Investment in Non-Residential Construction

Because of the collinearity problems we constrained the coefficients of this equation to be the same as were obtained in the previous step. Using the residuals from the equation estimated for a sample period which runs through 1994 as the dependent variable and a three year moving average of the real change in FDI as a ratio to the stock of machinery investment as the independent variable, a positive significant elasticity was obtained (t-test of 7.1). In this case it is important to note that the change in the stock was taken as a ratio to the stock of machinery and equipment investment and not the stock of structures investment. Our logic here follows the argument that the flows of FDI are directed at equipment and such flows are complimentary to structures and not substitutes for them.

Mining Exports

Mining exports was dealt with in a manner similar to that of business structures. That is, a constrained estimation technique was used to produce an estimate of the elasticity between the real change in FDI stock and mining exports. In short, what we use is the residual of the existing annualized equation as the dependent variable in a regression where the right hand side variable is a three year weighted average of the ratio of the real change in the stock of FDI to machinery and equipment domestic capital stock. The relationship is positive (t-test of 1.6). In cases where the statistical significance of the effect of FDI is marginal, as it is in this case, we have chosen to retain the effect if the sign is positive. We will show in a future section that the retention of such marginally significant effects accounts for only about 30 percent of the total final direct plus indirect effect derived from the analysis.

Food, Beverages and Tobacco Exports

In this case we were unable to find an effect.

Wood Exports

For wood exports a four year weighted average of the ratio of the change in the real stock of FDI to domestic machinery and equipment capital stock provided a marginally significant (t-test of 1.3) positive elasticity related to the FDI effect. In addition, the original coefficients did not change much. As a result we have retained this impact for further analysis.

Pulp and Paper Exports

In this case a marginally significant (t-test of 1.6) positive coefficient was obtained with little change occurring to the original coefficients in the annualized equation. For this reason we have retained this effect in the impact assessment.

Primary Metals Exports

For exports of primary metals a very marginal (t-test of 0.8) positive effect was obtained using a three year moving average of the FDI to capital stock ratio. In view of the positive sign this effect was retained for further analysis.

Autos and Parts Exports

In this case we were unable to find an effect.

Machinery Exports

For machinery export we were able to obtain a significant (t-test of 2.1) positive effect using a four year moving average of the FDI to capital stock ratio. In addition, the original right hand side variables all remained statistically significant. The fact that machinery has a large "high technology" content makes this impact all the more reasonable. There are many who argue that the inflow of FDI, openness and a high technology base of exports are the elements required to move to higher growth and income performance. Our analysis suggests that these linkages not only exist in Canadian FDI, investment and export data but are also statistically significant. For example, FDI is highly significant in both the machinery and equipment investment equation (see above), in the export equation for machinery and as we shall see in the import equation for machinery and equipment. This is an important finding as these equations alone will produce direct effects which when introduced in the WEFA Canada Macro Economic Model produce sizeable indirect effects associated with real growth, job creation and deficit reduction. More on the important aspects of trade in machinery later.

Chemicals and Fertilizer Exports

In the case of the equation for chemicals and fertilizer we find a significant (t-test of 2.4) and positive elasticity that relates exports to the FDI to capital stock ratio. As in the case of machinery exports, this significant and positive impact validates the argument that FDI flows in an open trading system are associated with substantial gains in export markets, even after other direct effects related to output/income and price are taken into account in explaining export growth. Here, as in the previous cases, we point out that the original coefficients did not change much reflecting the fact that the addition of the FDI variable to the equation explains variation in the dependent variable that the original right hand side variables did/could not explain.

Other Manufacturing Exports

When the FDI to capital stock ratio was entered as a right hand side variable, the equation produced a marginally significant (t-test of 1.1) positive effects. In view of the positive sign of the effect, the FDI variable was retained in this equation for further analysis.

Service Exports

In this case we were unable to find an effect.

Fabricated Materials Imports

For fabricated materials we found a positive significant elasticity (t-test of 2.3) for the ratio of the change in the real stock of FDI to the stock of domestic machinery and equipment. We were unable to detect any moving average effect.

Machinery and Equipment Imports

The existing equation already contains the variable for business investment in machinery and equipment (IMEB) with a coefficient of .77 that is highly significant (t-test of 4.9). As a result of this and the fact that the introduction of an FDI effect into the equation for IMEB will provide a channel by which FDI can/will effect machinery imports the only question which remains is whether the size or statistical significance of this effect (which is already large) is overwhelmed statistically by the direct addition of the FDI variable into the existing equation. When the ratio of the change in the real stock of FDI to the stock of domestic machinery and equipment is introduced into the equation for machinery and equipment we obtained a wrong sign, the coefficient on IMEB did not change much (by less than 5 percent), and the original coefficient remained highly significant. In addition, the simple correlation of the residual from the equation which excludes the FDI effect with the FDI variable also produced the wrong sign. Rather than the expected result of a positive sign we obtained a negative sign. For this reason we took the decision to leave this equation unchanged and thus obtain the impact of FDI from the existing channel - that is from the impact that FDI will have on IMEB and the subsequent impact that follows from the presence of the IMEB variable as a right hand side variable (with a coefficient of .77) in the machinery imports equation. Note that this presents a special problem when isolating the separate effects of trade and/or investment as one must be careful not to feed investment effects to this equation when studying the impact of FDI change on the supply side. The same is true when isolating the demand side impacts. One must be careful to be sure that the machinery import effect is present even though its origin follows from an indirect route by way of the IMEB variable.

Autos and Parts Imports

For autos and parts we obtained a positive and significant (t-test of 2.0) elasticity between the FDI variable under consideration (as a ratio to domestic stock) and imports in this category. There are no lags involved.

Other End Products Imports

For this category of imports the introduction of the FDI variable (in ratio form) produced a wrong sign (negative). For this reason we left the original equation unchanged.

Food, Beverages and Tobacco Imports

As with the previous case, we obtained a wrong sign (negative) and for this reason left the original equation unchanged.

Crude Material Imports

For crude materials we found a marginally significant (t-test of 1.1) positive coefficient related to a two year moving average of the ratio of the change in the real stock of FDI to domestic capital stock associated with machinery and equipment.

Oil Imports

As with the case of crude material imports we found a marginally significant (t-test of 1.1) positive coefficient related to a two year moving average of the FDI variable under study.

Services Imports

We were unable to obtain an effect with the proper sign.

Total Factor Productivity

Romer argues that the neo-classical production framework of Solow is missing an important component of the growth process. To Romer knowledge/technology stocks and their change/additions play an important role in raising the productivity of those traditional factors (stocks of existing capital and labour inputs) which are usually considered by neo-classical production theory. In particular, Romer suggests the introduction of new ideas or just plain "newness" onto the shop floor can lead to dynamic gains in the growth process. To capture this effect we have used a six year moving average of the log of the change in the stock of FDI as a right hand side variable. This constructed variable can be interpreted as an index of "newness." In estimating the production function, the parameters including that associated with the trend TFP effect, all have been constrained to their original values. The assumption here is that the residual variance of the dependent variable (of the production function) should be positively correlated with real FDI flows (our index of newness) over a long time horizon. The result which used a 6 year moving average produced a marginally significant (t-test of 1.1) positive elasticity.

Summary of model building

The estimation of the annual equations which include FDI effects have met with varying degrees of success. In six cases we have identified very strong positive statistical effects. These include the two investment equations, the export equations associated with machinery, and chemicals and fertilizer and the import equations associated with fabricated materials and autos and parts. The presence of these effects is not dissimilar to and validates the findings of others using cross section data with regard to the impact of the openness and integration of the investment/trade sector. For three export categories (food, beverage and tobacco; auto and parts; and services) and three import equations (other end products; food, beverage and tobacco; and services) we have been unable to identify any effect or the effect identified produced the wrong sign. For one import equation (machinery imports) we have chosen to accept the structure that exists in the existing model which channels the impact by way of domestic investment in machinery. For the remaining export and import categories and for TFP we have been able to identify a marginally significant positive effect. We use only those estimates which produced a positive effect in the impact analysis reported in the next section leaving unchanged those equations where we obtained no effect or the wrong sign.

Direct impacts for a sustained one billion dollar increase in the real flow of FDI

The direct impacts of a sustained one billion dollar increase in the real flow of FDI is obtained from the annual model which incorporates each of the equations recorded in Appendix D. The effects on each of the variables (investment, exports, imports and TFP) are recorded in Table 1(A). What results is as follows:

- The effect of a sustained one billion dollar real increase of the FDI inflow raises real domestic investment spending by about twice the amount of the change in the inflow. This result suggests that foreign savings teams up with domestic savings in the investment process to produce a powerful first round effect.
- This "matching" process is dynamic (it takes time). The implication is that a stable policy regime is desirable to ensure the long-term effects are as large as possible. Our results suggest that in the long-run (over 6 years), for every additional dollar of real FDI that flows into Canada, two dollars of savings (both domestic and foreign) flow into the business investment process.
- The impact on exports is also significant. A sustained one billion dollar increase in the flow of real FDI gives rise to about 5.3 times that amount with respect to additional exports. More important is the fact that more than 70 percent of the effect is located in export sectors where we obtained the highest t-tests (machinery, and chemicals and fertilizer). The implication is that excluding the marginal cases from further analysis would reduce the indirect effects by about a third. However, a powerful first round effect from the export sector would still be present. Excluding the impact of machinery exports, lowers the direct effect to 1.3.
- The impact on imports is limited by the fact that we did not find as large a significant elasticity related to the imports of machinery as we did for the exports of machinery. Thus, we find that the long-run direct effect on imports is only about 1.8 times the original shock of a sustained extra one billion in FDI. Excluding machinery imports reduces the impact to 1.3.
- This smaller direct effect on the import side as compared to the larger effect obtained for the export side (1.8 as compared to 5.3) leads to a net direct effect of about 3.5 associated with "trade." Where as the net impact associated with trade excluding the export and import effect associated with machinery is close to zero. As a result, when computing indirect effects using the full model, two simulations will be undertaken to deal with the trade impacts, one that excludes the trade effects from machinery and one that includes the trade impacts of machinery. In this way we hope to establish a range of where the true impact might lie in circumstances where further analysis determines the export elasticity used in this study is high.
- The increase in total factor productivity builds to one tenth of one percent in six years. This result may seem small, but one must remember that this impact represents a permanent increase in the rate of growth of TFP in response to "newness." When this permanent increase is combined with the increase in domestic capital stock (and the higher rate of labour force participation that we would expect economic opportunity to encourage), the increase in supply from both factor augmentation and the increase in factor efficiency is substantial. A full rendering of these effects on the supply side must wait until the direct impacts associated with investment and TFP are imposed on the macro model.

- There are important policy implications here. For example, courting foreign savings via FDI flows not only lays the foundation for job creation, but adds to the economy's potential to produce, grow and thus create new incomes and permanent jobs. This is not the "manna from heaven" solution of Robert Solow to the current growth malaise that exists in Canada, nor the pump priming solution of Keynes but a down to earth empirical verification of Paul Romer's notion that "newness" in the guise of an open investment and trading system and a policy that supports it can give rise to a dynamic process which raises the growth of both demand and supply in a way that is sustainable. Finding evidence of this process at work in Canadian data is not a trivial result.

Computing the indirect effects with the WEFA Canada Macro Economic Model

Preliminaries

To assess the indirect effects we begin with a base case. The base case used in this analysis is taken from the December 1995 release of the Canadian Macro Service (see Table 2). The base case does not contain the assumptions that pertain to the recent Federal Budget of March 1996. A separate analysis of the budget (not reported here) indicates that not much difference results during the period 1996/2000 from ignoring the budget measures in the base case. In addition, the analysis is based on the "shock minus control" premises. Because the impact of the budget is small, excluding the budget from both the shocked and base case should produce incremental results identical to a situation where the budget is included in both the shocked and base case solutions.

With the base case in hand the next step in the analysis is to adjust those equations in the Macro Model using the interpolated adjustments obtained in the second simulation of the analysis previously discussed and then simulate the full model. To be sure that these interpolated adjustments are correct the second simulation uses the quarterly subsystem to verify that the direct effects obtained from the quarterly model equations are identically equal to those obtained from the annual model direct effect impact analysis as recorded in Table 1(A). The results of this validation exercise are recorded in Table 1(B). The full systems solution provides the indirect effects when differences are extracted from the base case for selected economic indicators.

Again, we point out that it is at this stage of the analysis that the static and dynamic single equation effects (from the change in FDI) combine with system effects on both the supply side (capital stock, labour force and TFP) and the demand side (the real income/consumption, real output/profit/investment feedback loops) to produce a full rendering of the total impact of a change of FDI on jobs and growth in Canada.

To isolate the indirect effects of the investment (supply) and trade (demand) impacts separately and to study more fully the role that the exports and import equations related to machinery play in the assessment of the multiplier effect of FDI on the system, we have run separate case for investment/TFP and trade (assuming a flexible exchange rate regime). Case (1) assesses the indirect effects that flow from the direct effects on investment and TFP (supply) while Case (2) assesses the indirect effects that flows from the impact on both exports and imports (demand). We then combine the inputs from these two simulations to produce two additional cases. Case (3) assesses the indirect effects which flow from the direct effects on investment and TFP, and trade (excluding both the impact of the high elasticity export equation related to machinery and the impact on machinery imports derived from the FDI/IMEB investment route discussed previously), and, Case (4) assesses

the indirect effects related to investment and TFP, and trade (including the trade effects from machinery).

Because we expect the direct and indirect effects to produce feedback that influence the trade position, competitiveness via productivity and financial markets via stronger domestic and foreign demand we have run an additional indirect assessments using the full set of indirect effect adjustments (as implemented in Case (4)). This final case, Case (5) assumes a fixed exchange rate regime (the exchange rate is fixed to base case values) with domestic financial markets taking all the pressure from the increased demand which results. This is in contrast to Case (4) which assumes a flexible exchange rate regime that permits the exchange rate to take some of the pressure that results from the increase in demand. In Case (4) as compared to Case (5) we expect the "shocked" system to show some exchange rate appreciation as the unit cost, trade and productivity position of the economy improves relative to that of the external sector. Domestic pressures from financial markets will also tend to put upward pressure on the exchange rate.

Direct and indirect effects assuming a flexible exchange rate regime

Case (1): Investment and TFP impacts - supply side impact

Table 4 contains the results in shock minus control format related to the total (direct plus indirect) impact of a sustained one billion dollar increase in the change in the stock of real FDI on selected economic indicators. The level results are shown in Table 3. The results are associated only with the investment equations and TFP and therefore must be interpreted with this in mind. Thus Case (1) is the *pure supply* side of the story that is associated with the increased inflow of FDI. In this case *trade or demand* effects react to the income/output/cost structure that evolves from this supply shock, but not from the direct effects related to the demand side shock whose origin is increased FDI. A few of the key results are:

- After 6 years the cumulative increase in real Gross Domestic Product is .64 percentage point or 4.5 billion more than the base case and about 2.5 billion more than the direct effect of 2.0 billion. By the third year, the year-over-year growth rate is up by almost 0.4 percentage point. After the third year the impact levels off.
- In the first year only 5 thousand jobs are created, but by the sixth year a sustained injection of an extra one billion in real Foreign Direct Investment produces 66 thousand jobs (0.46 percentage point above the base case) and reduces the unemployment rate by 0.26 percentage points by way of the investment effects. Because cumulative job creation (0.46 percentage points above the base case) turns out to be greater than the reduction of the unemployment rate (0.26 percentage points below the base case), the difference can be taken to represent the impact of increased economic opportunity on labour force growth (see Table 5 for these effects). In short, some of those who might seek jobs in the late 1990s currently not in the labour force as well as those who continue to search for work now will end up with work in the "shocked" case under discussion. The supply side impact both draws in more workers and employs them.
- Because we have ignored the trade effects in this case the trade position deteriorates as imports are *sucked in*. For this reason we must interpret this case as only exploratory in as much as it provides insight into the way in which the supply reacts to the infusion of extra real FDI. Under these circumstances Figure 1-13 indicates that most of the extra growth in supply is related to the increase in the capital stock that takes place. In addition, Table 5 that shows the supply/demand

balance, indicates that a gap opens as supply (normal output) increases by 1.24 percentage points and demand is up by only .64 percentage point. This gap is related to export capacity which remains unused as the trade impact of FDI has not been imposed in this case.

- This last point is important as it indicates that the increased inflow of FDI builds a capacity to export that we have specifically ignored in the simulation of Case (1). We now turn to Case (2) where the supply side effects are ignored when the demand side effects are imposed.

Case (2): Trade impacts (all equations) - the demand side effects

Table 7 contains the results in shock minus control format related to the total (direct plus indirect) impact of a sustained one billion dollar increase in the change in the stock of real FDI on selected economic indicators. The level results are shown in Table 6. The results are associated only with the trade equations (including those associated with machinery) and therefore must be interpreted with this in mind. Thus, Case (2) is the *demand* side of the story that is associated with the increased inflow of FDI. A few of the key results are:

- After 6 years the cumulative increase in real Gross Domestic Product is .57 percent or 4.0 billion more than the base case *but equal in size to the net direct effect due to trade*. By the third and fourth year, the year-over-year growth rate is up by almost 0.2 percentage point.
- In the second year only 4 thousand jobs are created, but by the sixth year a sustained injection of an extra one billion in real foreign investment produces 46 thousand jobs (0.32 percentage point above the base case) and reduces the unemployment rate by 0.19 percentage points by way of the trade effects. Because cumulative job creation (0.32 percent above the base case) turns out to be greater than the reduction of the unemployment rate (0.19 percentage points below the base case), the difference can be taken to represent the impact of increased economic opportunity on labour force growth (see Table 8 for these effects). As in the pure supply side case, some of those who might seek jobs in the late 1990s currently not in the labour force as well as those who continue to search for work now will end up with work in the "shocked" case under discussion. In this case they would be employed in the export sector and not in the sector which produces domestic capital goods (as would be the case in the pure supply case).
- Because we have ignored the investment effects (and the TFP effects) we can interpret these results as only an exploratory case that provides insight into the way in which the demand side reacts to the infusion of real FDI. Furthermore, Figure 2-13 indicates that most of the extra growth in supply is related to the increase in labour input that takes place (in the export sector). Remember that supply growth here has its origins as an indirect effect stemming from increased demand and a direct effect stemming from increased FDI. In addition, Table 8 which shows the supply/demand balance, indicates that the supply/demand gap shuts as supply increases by .24 percentage points but demand is up by .57 percentage point. This suggests that the ability to export must be supported, as it would be in the case when the *supply (investment and TFP)* and *demand (trade)* analysis are combined.
- As with Case (1) this last point is important as it indicates that an increased inflow of FDI results in increased trade (in Case (2)) but if the capacity to export is ignored (as we have done in Case (2)) a supply demand imbalance would result from specifically ignoring the investment (capacity building effects) in the simulation of pure *trade* effects.

The next two cases (Case (3) and Case (4)) combine the supply and demand side impacts. Case (3) does this while excluding the *trade* effects for machinery. Case (4) includes these same trade effects. Both cases assume a flexible exchange rate regime.

Case (3): All impacts (excluding the trade effects related to machinery)

Table 10 contains the results in shock minus control format related to the total (direct plus indirect) impact of a sustained one billion dollar increase in the change in the stock of real FDI on selected economic indicators. The level results are shown in Table 9. The results are associated with the investment equations and TFP, and with the trade equations. It combines both demand and supply side impacts, but excludes the trade effects of machinery. By doing this we hope to obtain a lower bound for the supply/demand impact of FDI on growth and jobs. In Case (4) we introduce these two excluded effects (related to exports and imports of machinery) to obtain an upper bound supply/demand impact. A few of the key results are:

- After 6 years the cumulative increase in real Gross Domestic Product is .62 percent or 4.3 billion more than the base case and about 2.3 billion more than the direct effect of about 2.0 billion net (investment plus net trade effects excluding those related to machinery). Without the machinery export and import equations the trade effects are a "wash" in the short-run and negative in the long-run. By the third year, the year-over-year growth rate for GDP is up by almost 0.4 percentage point. After the third year the impact levels off.
- In the first year only 2 thousand jobs are created, but by the sixth year a sustained injection of an extra one billion in real foreign investment produces 65 thousand jobs (0.45 percentage point above the base case) and reduces the unemployment rate by 0.26. As in the separately reported cases related to pure supply and pure demand, because cumulative job creation (0.45 percent above the base case) turns out to be greater than the reduction of the unemployment rate (0.26 percentage points below the base case), the difference can be taken to represent the impact of increased economic opportunity (see Table 11 for these effects). In short, some of those who might seek jobs in the late 1990s currently not in the labour force as well as those who continue to search for work now will end up with work in the "shocked" case under discussion in both the export and capital good production sector.
- Because we have ignored some of the trade effects (in particular the those related to machinery) in this case the trade position deteriorates as imports are *sucked in* faster than exports grow. This case provides additional insight into the way in which the supply/demand balance reacts to the infusion of real FDI (ignoring the impact on the highly elastic machinery sector). Under these circumstances Figure 3-13 indicates that most of the extra growth in supply is related to the increase in the capital stock that takes place. In addition, Table 11 still shows a supply/demand balance develops indicating that a gap opens as supply increases by 1.23 percentage points and demand is up by only .62 percentage point.
- This last point is important as it indicates that the increased inflow of FDI builds a capacity to export that we have specifically ignored in the simulation of Case (3) - that which is associated with the highly elastic machinery sector. We conjecture that these results form a lower bound for the impact of a one billion dollar change in the real stock of FDI. An upper bound can be obtained from including the trade impacts for machinery in the next impact assessment case.

Case (4): All impacts

Table 13 contains the results in shock minus control format related to the total (direct plus indirect) impact of a sustained one billion dollar increase in the change in the stock of real FDI on selected economic indicators. The level results are shown in Table 12. This case, as it includes the effects of trade from machinery exports and imports can be thought of as representing an upper bound to the FDI effect on growth and job creation. A few of the key results are:

- After 6 years the cumulative increase in real Gross Domestic Product is 1.2 percent or 8.4 billion more than the base case (about equal to the combined separate effects of Case (1) and Case (2)). By the third year, the year-over-year growth rate for GDP is up by almost 0.5 percentage point.
- In the first year only 3 thousand jobs are created, but by the sixth year a sustained injection of an extra one billion in real foreign investment produces 104 thousand jobs (0.72 percent above the base case) and reduces the unemployment rate by 0.4 percentage points. Because cumulative job creation (0.72 percent above the base case) turns out to be greater than the reduction of the unemployment rate (0.4 percentage points below the base case), the difference can be taken to represent the impact of increased economic opportunity on labour force growth (see Table 14 for these effects). In short, some of those who might seek jobs in the late 1990s currently not in the labour force as well as those who continue to search for work now will end up with work in the "shocked" case under discussion and these jobs will occur in all sectors of the economy, export, capital goods production and those related to the growth of consumption.
- Nevertheless, the increase in growth and the job creation that results is investment and export led, not consumption led with nearly 4.7 billion of additional demand stemming from the former and only 3.9 billion traceable to the latter. This is important as it suggests that an open investment/trade driven economy will provide/drive the consumption base via increased real incomes and job opportunities and not the other way around.
- Because the supply side reacts favourably in the medium-run (no large change in the gap results) there is only minor price pressure. However, real wages are up about 0.5 percentage point and real disposable income is up by more than 1.3 percentage points.
- The personal savings rate is up by 0.2 percentage point and corporate profits (after tax) are up by more than 1.3 billion by the sixth year.
- The Federal government balance improves by .5 billion.
- The exchange rate appreciates by about half a cent.
- Most of the supply/demand imbalance (observed in Cases (1), (2) and (3)) is eliminated as supply (normal output) increase by 1.46 percentage points by the sixth year while demand increases by 1.20 percentage points. Thus the export capacity is more effectively used in this case. Figure 4-13 indicates that the factor contribution to supply growth is more balanced in this case also. More on this latter.

Case (5): Indirect effects from assuming a fixed exchange rate regime

Table 15 contains the results associated with assessing the impact under a fixed exchange rate regime. These results demonstrate a key point. In an investment/trade led expansion, one might gain on the jobs front in the medium-run by dampening the tendency of the value of the domestic currency to appreciate, but the net result in the long-run will be higher interest rates (as compared to a flexible exchange rate regime) and a higher inflation rate. This can be seen quite clearly by comparing the impact on employment, interest rates and inflation of the two cases in question (Case (5) and Case (6)) with the base case. The implication here is that policy makers in an open investment/trade driven economy must be sensitive to the macro implications of an investment/trade driven solution to low growth in a situation where openness can influence exchange and interest rates. In short, a fixed exchange rate regime leads to more jobs, but higher interest rates.

The impact on supply (flexible exchange rate regime)

An important question relates to the impact of FDI on the productive potential of the Canadian economy and the way in which additional productive potential supports an increase in export capacity. We have already indicated when examining Case (1) that a sustained one billion dollar increase in the flow of real FDI increases normal output by about 1.24 percentage point (both direct and indirect effects related to investment, see Table 5 and Figure 1-13) and that which results from the indirect effect of trade (in the case where all trade effects are included, see Table 8 and Figure 2-13) is about .24 percentage points (Case (2)) for a total of 1.48 percentage points, which is close to the total impact in normal output from Case (4) reported in Table 14 and Figure 4-13 of 1.46 percentage points. Although, in the case of flexible exchange rates the increase in normal supply falls short of the increase in aggregate demand in the first three years, by the fifth year the imbalance has been corrected and in the sixth year a small positive gap opens, thus there is little change in the normal supply/demand gap that exists in the base case in the long-run - in short, supply eventually catches up with demand. Although in Case (4) the unemployment rate declines by 0.4 of a percentage point from the base case, it remains above the natural rate, this and the absence of any change in the gap (in the medium-run) means the inflation rate does not become a problem. In short, the potential of the system to produce and export is supported by additional capital that combines with unused labour input. This observation suggests that it is not unreasonable to conjecture that a jobs effect as high as 104,000 cannot be dismissed as the upper limit of the impact related to the FDI effect under study.

To demonstrate this point, Tables 11 and 14 and Figures 3,4-13 to 3,4-18 present a number of supply/demand indicators and a decomposition of those factors that contribute to the change in aggregate supply as a result of a sustained real increase of one billion dollars in the flow of FDI for Case (3) and Case (4) - that is without and with the trade effects from machinery.

- In Case (3) the increase in "normal output" keeps pace with the increase in aggregate demand until the fourth year. However, by the sixth year, normal output (supply) increases by 1.23 percentage point and aggregate demand increase by .62 percentage point. The difference of 0.61 percentage point is a measure of the unused incremental productive capacity, resulting from the exclusion of machinery trade from the analysis.
- In Case (4) the increase in exports is supported by both an increase in productive potential (more physical capital and higher TFP growth) and a larger increase in the utilization rate of labour (lower unemployment rates and higher participation rates are a little less than double of those in

Case (3)). The result is a much smaller supply/demand gap. Here normal output is up 1.46 percentage point and demand is up 1.20 percentage point for a net (negative) gap of .26 percentage point as compared to a net (positive) gap of .66 percentage point for Case (3). Thus the addition of the high elasticity machinery sector helps close the normal supply/ demand gap.

- For Case (4) a decomposition of the increase in supply indicates that of the 1.46 percentage point increase in supply (shock versus control), 0.44 of a percent can be traced to the additional utilization of labour, 0.23 can be traced to the increase in the stock of machinery, 0.64 percent can be traced to the increase in the stock of structures and 0.15 can be traced to the increase in TFP. If this decomposition is compared to the outcome of Case (3), it is apparent that the extra demand produced in Case (4) (to satisfy the extra net exports that result from the addition of the trade effect from machinery) as compared to Case (3) is derived from a much higher ratio of utilized labour to capital as labour's contribution to supply growth almost doubles from .23 percentage point to .44 percentage point while the contribution of "capital" barely changes between the two case. This last observation supports the notion that the sustained increase in the change in the real stock of FDI by one billion creates a supply side shift (export capacity) that is not fully utilized by the case which excludes the trade impacts of machinery. Including the trade impacts of machinery more fully utilizes the extra productive potential in a more balanced way (by way of increase utilization of labour input given the extra capital already in place).
- This last point related to the balance between supply and demand also relates to the fact that a regime which admits some upward drift in the exchange rate as competitiveness increases will be less inflationary than one which does not (compare Case (4) with Case (5)). The "cost" of inflexibility is more inflation and higher interest rates. The benefit is more jobs but higher inflation.

Trade impacts - Some Caveats (flexible exchange rate regime)

The direct (single equation static and dynamic) effects related to a one billion dollar increase in the real change in the stock of FDI stem from the analysis done with the re-estimated annual equations. These direct impacts are recorded in Table 1(A)/(B) and have already been discussed. Nevertheless, it should be emphasized that these direct impacts are derived from the re-estimated annual equations and not from simulating the full model. The results obtained from the full model are both direct (single equation static and dynamic) and indirect effects (system static and dynamic effects stemming from, exchange rate, income and output changes) that impact on relative competitiveness and Canada's propensity/potential to both import and export as a result of the increased flow of FDI. These direct and indirect effects are obtained from the dynamic simulations using the WEFA Canada Macro Economic Model after adjusting the export equation (and those associated with investment and TFP) employing the direct (single equation static and dynamic) effects as a guide to developing the interpolated adjustments. In developing the export and import equations for use in assessing the direct effects as we have already indicated, the trade effects related to machinery are pivotal in the analysis. Now, the annualized version of the machinery import equation already includes as a right hand side variable domestic purchases of machinery and equipment with a coefficient of .77. Thus a very high percentage (77 percent) of the extra investment caused by the extra FDI find its way to import demand - that is it *will* impact in a positive (the expected sign) way on machinery imports. Furthermore, when the FDI variable was added to the equation for machinery imports we could not obtain the right sign. In addition the inclusion of the FDI variable did not effect the significance, sign or size of the variable IMEB (domestic machinery and equipment investment) already included in the equation. This suggests that the existing structure of the machinery import equation (*without*

the addition of the FDI variable) is sufficient to catch the FDI effect (indirectly from a route that goes from FDI to domestic investment in machinery and equipment to machinery imports). On the other hand, machinery export equation produces a sizeable (trade) direct effect that is much greater in the long-run than the direct effect we have isolated on the import side and as a result accounts for most of the "trade" gains when included in the analysis (compare Case (3) with Case (4)). A prudent interpretation would therefore place the gains from the "trade" effect somewhere in-between. Thus Case (3) and Case (4) suggest a lower and upper bound for the indirect effects. With these caveats in mind, some of the more important results under the flexible exchange rate regime for Case (3) and Case (4) are as follows.

- By the sixth year for Case (4) real exports increase by about 1.6 percentage points as a result of a sustained 1 billion real increase in the FDI flow (Figure 4-7). Real imports are also up by about 1.6 percent. Thus the effect on the real trade position is a "wash". The impact on the trade balance is zero. For Case (3) exports are up .3 percentage point by the sixth year and imports are up .9 percentage point. A substantial trade imbalance results. This again suggests that the Case (3) and Case (4) bound the impact.
- The trade balance and the current account balance remain unchanged after six years (Figures 4-9 and 4-10). The inverted "V" pattern observed in Case (4) for both the trade and the current account stems from the additional imports that materialize from the added spending on investment and consumption caused by higher real incomes, profits and the original increase in FDI (the coefficient of .77 on IMEB in the machinery import equation teams up with the dynamics of FDI as it effects domestic investment and the indirect effects as they influence domestic investment). This indirect effect dampens the original direct effect from exports. In an open economy if one exports then one must expect to import too. The issue remains as to whether the current structure of the model catches the correct impact at the margin, for example. These results assume that the propensity to import machinery remains unchanged (at .77) as the FDI flow increases. Under these circumstances the reported impacts may be over stated (the import impact is understated as well as the export impact is overstated in the case of machinery) as the FDI flows themselves may directly increase the import propensity of the economy. At the same time, our statistical tests suggest that adding the FDI variable as a right hand side variable in the machinery import equation does not improve the explanation. Nevertheless, this remains part of the analysis that cannot be resolved at the level of aggregation available to the current study. Thus, prudence leads us to use Case (4) as an upper bound of the effect and Case (3) as the lower bound.
- Under a flexible exchange rate regime, which takes into account not only the static and dynamic aspects of the single equations related to trade but also the static and dynamic aspects of the model itself, upward pressure from the exchange rate (the Canada/US dollar exchange rate falls by a little less than 1 cents) dampens the total impact in comparison to a case where the exchange rate is inflexible (for the impact under flexible exchange rates compare Figure 4-10 with Figure 5-10). In short, the trade position of the inflexible case is marginally better than the flexible case (more exports and less imports stemming from less appreciation of the dollar and the subsequent impact on relative price/cost).

In both cases (flexible and fixed exchange rates), nominal short- and long-term interest rates increase. However, the increase associated with the inflexible case is more than that associated with the flexible case (for the impact under flexible exchange rates compare Figures 4-12 and 5-12).

Computing the multiplier

Computing the multiplier in a situation where annual impact (direct effect) analysis is applied to a quarterly dynamic model to obtain the indirect effects is not straightforward. The multiplier calculation is further complicated by the presence of own variable dynamic effects in the single equations for exports. If quarterly data for the FDI were available then quarterly equations of the WEFA Canada Macro Economic Model would have been modified by re-estimating the investment, export and imports, and the production function directly. However, this was not possible. As indicated in a previous section, the direct (single equation static and dynamic) effects are computed using the annual equations. These impacts capture the way in which investment, exports, imports, and TFP would be effected if there were a sustained 1 billion dollar increase in the real FDI flow introduced into these equations (Table 1(A)/(B)).

Now, the direct impact on the level of a variable that would result because an equation is formulated in percent change, grows over time. There are some equations with this sort of specification/structure (for example machinery exports and chemicals and fertilizer exports). Thus entering the ratio of the real flow of FDI to machinery and equipment stock in log form and then increasing the real flow of FDI turns out to have an impact on the growth rate of machinery exports (as well as the level). This result follows the logic of what we suspect the impact of FDI to be. Its impact is on growth rates (not just levels), as the process that the new growth theory describes is dynamic.

To assess the standard multiplier it is important to separate out these sorts of effects from the standard *system multiplier effects*. Thus, a proper computation of the standard multiplier is derived from the data in Table 1(A)/(B) that relates to the direct single equation dynamic effects from the annual/quarterly subsystem and the data in Tables 4, 7, 10, 13 and 16 that relates to the full system impact of the direct effects for each of the cases in question. In the subsystem simulation reported in Table 1(A)/(B), there is no "system feedback." No doubt, the question arises, why not use the annual model to compute this direct dynamic impact (as we have done) and then enter the total impact into the full quarterly simulation? The answer is straightforward. Under these circumstances we would be *double counting* the impact of the effects as the single equation dynamics of the quarterly equations in a full simulation would be functional (note this is also the case of any subsystem simulation with the full model that includes the equations under consideration or any part thereof). This is why the data in Table 1(A) was used to derive a set of interpolated quarterly adjustments that would avoid a double counting of the impacts computed with the annual model when using the quarterly model. Alternatively, why not use the dynamic calculation from the annual model and then adjust the base case path of the investment, exports and imports, and the production functions after exogenizing the quarterly equations? This approach would ignore all the important system feedback that occurs to investment, exports and imports, and normal output as the direct effects of the change in FDI work their way through incomes, prices, exchange rates and so on.

Under these circumstance the subsystem solution (Table 1(A)/(B)) produces estimates of the non-system impact of the change in FDI. It is these non-system impacts that is the starting point of the standard multiplier analysis reported in this section. For example, Table 18 depicts the range of standard multipliers, computed from comparing the increase in net exports and investment obtained from the partial model simulation(s) with the impacts on GDP obtained with the full model simulation for each of the five cases. All relevant data are recorded. These results are not out of line with our general expectations in regard to "garden variety multipliers." Note that the pure investment multiplier is higher than the pure trade multiplier (Case (1) compared to Case (2)). This

is because the dampening effects from imports are not present in the supply side case but fully operative in the demand side case. Note that the multiplier related to Case (3) appears very much like that associated with the investment only case (Case (1)). Case (4) and Case (5) fall in a range between 1.5 and 1.6 after the sixth year.

What is interesting and new is the way in which a billion dollar change in FDI flow *supercharges the system* (like ether in the gas tank of an alcohol drive Indy racer) and leads to a very large expansion of output - 8.4 to 1 at the upper bound and 4.3 to 1 at the lower bound. This confirms that the FDI multiplier is far greater than the "garden variety multiplier" even in the most conservative of interpretations. The explanation lies in the fact that the extra FDI effects growth rates in the model not just levels and a "matching effect" is present on the supply side. These impacts are found in investment, exports and imports and TFP. This is in fact the "rudiments" of the new growth theory paradigm. Increasing the proportion of foreign capital in the economy carries with it an injection of new technology, management skills, new organizational forms and so on. This accelerates the ability of the system to grow (just as the injection of ether into the carburettor of an alcohol drive Indy racer does on the straightway - permitting the attainment of a high speed in a shorter period of time). This explanation fits what we have observed in South East Asia. The interesting thing is that we have also been able to capture in Canadian data using a satellite annual model and a Canadian Macro Model these sorts of effects.

Summary and conclusion

The objective of this study is to develop, test and implement a methodology to assess the direct and indirect effects of Foreign Direct Investment on the Canadian economy with special emphasis on investment, exports, imports, TFP, real growth and jobs. The results reported in this study have been obtained by: (1) assessing the direct effects after introducing the change in the real stock of FDI as a right hand side variable in a set of annualized equations derived from the investment, export and import, and production sectors of the WEFA Canada Macro Economic Model; (2) using the estimated annualized equations from step 1 that capture such direct (single equation static and dynamic) effects through the presence of statistically significant positive elasticities, to quantify the impact of a sustained 1 billion dollar real change in the stock of FDI; and, (3) using the direct impacts obtained in step 2 as a guide to adjust investment, export and imports, and production equations contained in the WEFA Canada Macro Economic Model to determine the indirect effects of a 1 billion dollar change in the real stock of FDI. In addition the subsystem simulation using the annual homologue to the quarterly model is employed to assess the standard multiplier - the garden variety investment/export multiplier - as distinct from the *supercharged* FDI/investment/trade multiplier. The former falls in the range of 1.5 to 1.6, the later in a range of 4.3 to 8.4. The difference in the range between the two multiplier concepts is explained by the fact that the change in FDI effects growth rates directly and there is a matching effect at work. The wider range related to the "*supercharged*" multiplier related to the questions raised in the analysis that relate to the impact of FDI on the exports and imports for machinery. Supply/demand analysis of the results suggest that the upper bound is not unreasonable. The large differences in the export and import elasticities obtained suggests prudence in moving to far above the lower bound without a detailed sector analysis of machinery exports and imports, an undertaking that is beyond the scope of this study.

These results suggests a substantial increase in growth at the margin can result from FDI and supports the notion that additions to productive capital whose origin is FDI, being on the leading edge of technology/management skill and so on, are *supercharged* - that is they are highly

productive. This result is consistent with the cross section results reported in the introduction to this paper which suggest that outward looking firms have higher rates of return on assets. In addition, we find the following.

Summary of findings

- We were able to obtain strong direct effects for the two investment equations (machinery and equipment, and structures), for two export equation (machinery, and chemicals and fertilizer) and for two import equations (fabricated materials, and autos and parts). We were able to obtain the correct sign on FDI associated with marginal significance in all but three of the remaining export equations and four of the remaining import equations, and in the case of TFP (the production function). We were unable to obtain any effect in three export equations (auto and parts; food, beverages and tobacco; and services) and three import equation (other end products; food, beverages and tobacco; and services). We used the existing structure for the machinery import equation which contains a coefficient of .77 on IMEB to capture the impact of increased FDI on machinery imports (via domestic investment) As already indicated, in several of the export equations we obtained *supercharged* single equation dynamic effects that lead to very powerful impacts between FDI, domestic investment, exports and growth.
- Considering only the direct (single equation static and dynamic) effects of FDI and not those effects associated with the system as a whole, a one billion dollar real increase in the stock of FDI produces double the amount of domestic investment in the medium-run. This we call the "matching effect" as it suggests that domestic savings partners with foreign savings in the medium-run. The ratio of the direct impact on exports to the sustained change in the real stock of FDI was about 5.3 to 1 in the medium-run for the upper boundary and 1.3 to 1 for the lower boundary. Nearly 70 percent of this direct effect stems from those equations in which the addition of the FDI variable itself was statistically significant. Thus, the marginal contributors (those equations with t-test less than 2, but with positive effects) account for only about 30 percent of the direct effects. The ratio of the direct impact on imports to the sustained change in the real stock of FDI was about 1.8 to 1. (This takes into account the effect of the .77 on the change in IMEB whose origin is the increase in FDI.) And the lower bound direct impact for imports is 1.3 to 1 which excludes the effect from machinery imports. This bounds the trade impacts in a range from 3.4 to 0. The upper end of the range is supported by the fact that the export and import equations employed to derive the estimate of 3.4 are statistically significant. Also, the upper bound estimate is dependent on equations where the specific structure causing the effects has passes a null hypothesis test. In short we can be confident that these effects are not "accidental," but rather "structural." This combined with the investment matching effects brings the combined direct impact for investment and trade to a range between 5.4 and 2.
- Using the direct effects recorded in Table 1(A)/(B) as the basis for constructing a set of interpolated adjustments for use with the quarterly equations in the WEFA Canada Macro Economic Model, computing solution(s) which includes these adjustments and then comparing the time path of selected economic indicators which emerge in the shocked Case (3) with that of the base case (which excludes the impacts), suggests the following effects for the upper and lower bound as obtained from Case (3), Case (4) and Case (5):

Jobs - Depending on the exchange rate regime in play, an upper bound reading of the analysis suggests that between 104,000 and 114,000 jobs will be created for a sustained 1 billion dollar increase in the change in the real stock of FDI. If exchange rate appreciation is avoided the high-

end estimate is more likely. Under a flexible regime the lower bound estimate associated with Case (3) produces 65,000 new jobs. Thus even under a conservative assessment the impact is substantial in the medium-run falling between 65,000 and 114,000 jobs.

Growth - Again, depending on the exchange rate regime in play, the upper bound estimate obtained from the analysis suggests that additional cumulative real growth of about 1.3 percentage points will result on the demand side and 1.5 percentage points on the supply side. Case (3) suggests that ignoring the direct trade impacts of machinery leave unused capacity for exports. The lower bound estimate of a .62 percentage point increase in demand coupled with a 1.23 percentage point increase in supply leaves lots of room for extra growth from the "machinery export" effect. This points in the direction of the upper bound as not unreasonable.

Balances - Again, depending on the exchange rate regime in play, Case (4) suggests that the personal saving rate would increase, that the dollar volume of business profits would increase, that government deficits would decline and that productive private sector capital stock would expand. Thus wealth creation of this sort leads to more domestic savings and less total foreign borrowing. This is an important point. At first blush it appears to be an oxymoron. But, funnelling foreign savings directly to the capital base as opposed to directly to the consumption base is what explains the apparent contradiction. The direct effect of government borrowing has supported and continues to support the consumption base mainly via transfer payments to persons; the direct effect of foreign direct investment through an increased flow of FDI has in the past and will in the future support the wealth creating base by way of a larger and more up-to-date stock of physical capital and an increased degree of competitiveness. The impact on balances derived from Case (3) can be interpreted as a lower bound to the impacts obtained for Case (4). Thus the trade balance, the current account balance and other balances in some cases deteriorate (the current account), do not change (the federal balance) or improve only marginally (the real trade balance). However, small positive improvements in after tax profits, the personal savings rate and growth in real disposable income remain.

Inflation and Costs - Again, depending on the exchange rate regime in play (Case (4) versus Case (5)), an unqualified reading suggests that the expansion of supply that accompanies the increase in demand permits real effects to dominate. Wages would increase more than prices in either case. In the case where the exchange rate is inflexible more inflation and higher interest rates creep into the system. In general, the more demand pressure that enters the system the more that inflation creeps into the results.

Interest Rates - A key result is apparent by comparing the fixed with the flexible exchange rate case (Case (4) versus Case (5)). Under a flexible exchange rate regime less inflation and lower interest rates would prevail, but fewer jobs would be created. In a fixed rate regime, more jobs would be created, but more inflation would creep into the system. This of course is a standard result but it provides important policy guidance in circumstances where openness coupled to a focus on investment/trade is a key policy objective. Although we have obtained this result from a comparison of Case (5) with Case (4), these results would carry over to a Case (3) run under a fixed regime.

Table 1(A)
Direct Impact of FDI on Investment, Exports, Imports and TFP -- Annual Model

LEVEL DIFFERENCE	1995	1996	1997	1998	1999	2000
Change in total FDI	1000	1000	1000	1000	1000	1000
Investment, machinery & equipment	249	517	1098	1095	1084	1085
Investment, non-res construction	345	807	1621	1475	1344	963
Total exports	738	1869	3986	4579	5089	5279
Goods	738	1869	3986	4579	5089	5279
Mining	5	15	34	48	62	73
Food, beverages and tobacco	0	0	0	0	0	0
Wood	10	58	124	167	145	105
Pulp and paper	100	138	242	61	103	139
Primary metals	45	129	268	326	343	305
Auto and parts	0	0	0	0	0	0
Machinery	317	1056	2463	3468	3928	4044
Chemicals and fertilizer	82	127	216	90	101	130
Other manufacturing	179	347	639	419	408	482
Services	0	0	0	0	0	0
Total imports	909	1431	2493	1492	1594	1838
Goods	909	1431	2493	1492	1594	1838
Fabricated materials	375	638	1047	646	605	703
Machinery and equipment	107	237	495	536	537	526
Autos and parts	408	507	866	221	373	507
Other end products	0	0	0	0	0	0
Food, beverages and tobacco	0	0	0	0	0	0
Crude materials	14	31	49	40	21	32
Oil	5	17	36	50	58	70
Services	0	0	0	0	0	0
Total Factor Productivity (TFP)	0.0002	0.0004	0.0007	0.0008	0.0009	0.0011
PERCENTAGE DIFFERENCE						
Investment, machinery & equipment	0.4	0.8	1.6	1.5	1.4	1.3
Investment, non-res construction	1.3	2.9	5.6	5.0	4.4	3.0
Total exports	0.3	0.7	1.5	1.7	1.8	1.8
Goods	0.3	0.8	1.6	1.8	2.0	2.0
Mining	0.1	0.3	0.6	0.8	0.9	1.1
Food, beverages and tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Wood	0.1	0.7	1.4	2.0	1.7	1.2
Pulp and paper	0.7	0.9	1.5	0.4	0.6	0.8
Primary metals	0.3	0.9	1.8	2.1	2.2	1.9
Auto and parts	0.0	0.0	0.0	0.0	0.0	0.0
Machinery	0.6	1.8	3.8	5.1	5.5	5.5
Chemicals and fertilizer	1.2	1.8	3.0	1.3	1.4	1.8
Other manufacturing	0.5	0.9	1.7	1.1	1.1	1.2
Services	0.0	0.0	0.0	0.0	0.0	0.0
Total imports	0.4	0.6	1.0	0.6	0.6	0.7
Goods	0.4	0.7	1.2	0.7	0.7	0.8
Fabricated materials	1.0	1.8	3.0	1.9	1.8	2.0
Machinery and equipment	0.3	0.6	1.2	1.3	1.3	1.2
Autos and parts	1.0	1.3	2.3	0.6	0.9	1.2
Other end products	0.0	0.0	0.0	0.0	0.0	0.0
Food, beverages and tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Crude materials	0.3	0.6	0.9	0.8	0.4	0.6
Oil	0.1	0.4	0.8	1.1	1.2	1.4
Services	0.0	0.0	0.0	0.0	0.0	0.0
Total Factor Productivity (TFP)	0.4	0.7	1.4	1.3	1.5	1.6

Table 1(B)
Direct Impact of FDI on Investment, Exports and Imports – Quarterly Model

	1995	1996	1997	1998	1999	2000
LEVEL DIFFERENCE						
Change in total FDI	1000	1000	1000	1000	1000	1000
Investment, machinery & equipment	249	517	1098	1095	1084	1085
Investment, non-res construction	345	807	1621	1475	1344	963
Total exports	738	1870	3986	4579	5090	5278
Goods	738	1870	3986	4579	5090	5278
Mining	5	15	34	48	62	73
Food, beverages and tobacco	0	0	0	0	0	0
Wood	10	58	124	167	145	105
Pulp and paper	100	138	242	61	103	139
Primary metals	45	129	268	326	343	305
Auto and parts	0	0	0	0	0	0
Machinery	317	1056	2463	3468	3928	4044
Chemicals and fertilizer	82	127	216	90	101	130
Other manufacturing	179	347	639	419	408	482
Services	0	0	0	0	0	0
Total imports	909	1430	2493	1493	1594	1838
Goods	909	1430	2493	1493	1594	1838
Fabricated materials	375	638	1047	646	605	703
Machinery and equipment	107	237	495	536	537	526
Autos and parts	408	507	866	221	373	507
Other end products	0	0	0	0	0	0
Food, beverages and tobacco	0	0	0	0	0	0
Crude materials	14	31	49	40	21	32
Oil	5	17	36	50	58	70
Services	0	0	0	0	0	0
PERCENTAGE DIFFERENCE						
Investment, machinery & equipment	0.4	0.8	1.6	1.5	1.4	1.3
Investment, non-res construction	1.3	2.9	5.6	5.0	4.4	3.0
Total exports	0.3	0.7	1.5	1.7	1.8	1.8
Goods	0.3	0.8	1.6	1.8	2.0	2.0
Mining	0.1	0.2	0.5	0.8	0.9	1.1
Food, beverages and tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Wood	0.1	0.7	1.4	2.0	1.7	1.2
Pulp and paper	0.7	0.9	1.5	0.4	0.6	0.8
Primary metals	0.3	0.9	1.8	2.1	2.2	1.9
Auto and parts	0.0	0.0	0.0	0.0	0.0	0.0
Machinery	0.6	1.8	3.8	5.1	5.5	5.5
Chemicals and fertilizer	1.2	1.8	3.0	1.3	1.4	1.8
Other manufacturing	0.5	0.9	1.7	1.1	1.1	1.2
Services	0.0	0.0	0.0	0.0	0.0	0.0
Total Imports	0.4	0.6	1.0	0.6	0.6	0.7
Goods	0.4	0.7	1.2	0.7	0.7	0.8
Fabricated materials	1.0	1.8	3.0	1.9	1.8	2.0
Machinery and equipment	0.3	0.6	1.2	1.3	1.3	1.2
Autos and parts	1.0	1.3	2.3	0.6	0.9	1.2
Other end products	0.0	0.0	0.0	0.0	0.0	0.0
Food, beverages and tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Crude materials	0.3	0.6	0.9	0.8	0.4	0.6
Oil	0.1	0.4	0.8	1.1	1.2	1.4
Services	0.0	0.0	0.0	0.0	0.0	0.0

Table 2
Selected Economic Indicators: Base Case

	1995	1996	1997	1998	1999	2000
Real GDP (\$1986 M)	613110	623862	635450	652578	677150	705465
% Change	2.5	1.8	1.9	2.7	3.8	4.2
Consumer Expenditures	358887	362368	365489	369971	378712	393094
% Change	1.6	1.0	0.9	1.2	2.4	3.8
Government Expenditure on Goods & Services	114821	109841	104040	101199	102589	104271
% Change	-1.5	-4.3	-5.3	-2.7	1.4	1.6
Government Fixed Investment	18271	18738	19090	19404	19722	20048
% Change	5.835	2.555	1.879	1.642	1.642	1.649
Business Residential Investment	28564	27899	28679	30240	33631	36406
% Change	-12.0	-2.3	2.8	5.4	11.2	8.3
Business Non-Residential Investment	86324	92699	97522	101817	108573	115861
% Change	6.3	7.4	5.2	4.4	6.6	6.7
Exports	250760	261194	269708	276241	282816	290030
% Change	10.8	4.2	3.3	2.4	2.4	2.6
Imports	249757	249941	247624	247980	252133	258394
% Change	8.2	0.1	-0.9	0.1	1.7	2.5
Inventory Change	6051	1432	-1085	2054	3607	4519
Raw Material Price Index	1.301	1.280	1.310	1.352	1.381	1.415
% Change	8.0	-1.6	2.3	3.2	2.1	2.5
Industry Price Index	1.285	1.302	1.328	1.360	1.390	1.420
% Change	7.8	1.3	2.0	2.4	2.2	2.1
GDP Deflator	1.276	1.290	1.304	1.318	1.336	1.359
% Change	1.7	1.1	1.1	1.1	1.3	1.7
Consumer Price Index	1.335	1.359	1.387	1.414	1.441	1.471
% Change	2.2	1.8	2.1	1.9	1.9	2.1
Employment (000's)	13503	13569	13637	13746	13997	14381
% Change	1.6	0.5	0.5	0.8	1.8	2.7
Unemployment Rate (%)	9.5	9.5	9.8	10.1	10.2	9.9
Productivity (% Change)	0.9	1.3	1.3	1.9	1.9	1.4
Average Hourly Earnings	14.29	14.62	14.93	15.17	15.48	15.98
% Change	1.1	2.3	2.1	1.6	2.0	3.2
3-Month T.B. Rate (%)	6.93	5.35	5.21	4.82	4.58	4.68
US 3-Month T.B. Rate (%)	5.49	4.65	4.56	4.56	4.78	4.92
Canada-US Differential	1.44	0.70	0.65	0.25	-0.20	-0.24
Prime Rate (%)	8.67	7.13	6.87	6.43	6.18	6.27
GOC 10+ Bond Rate (%)	8.33	7.32	7.01	6.62	6.19	6.05
M2 (\$M)	374364	385340	394690	406014	421738	441059
% Change	4.2	2.9	2.4	2.9	3.9	4.6
Household Credit (\$M)	451500	451186	446475	443030	442450	449078
% Change	4.4	-0.1	-1.0	-0.8	-0.1	1.5
Exchange Rate (US-Can.)	72.81	72.23	72.34	72.63	73.43	75.18
Current Account Balance (\$M)	-15164	-4446	7269	17671	24236	30232
Fed Government Balance (\$M)	-23780	-16066	-9809	-5824	-854	6455
% GNP	-3.2	-2.1	-1.2	-0.7	-0.1	0.7
Fed Government PA Balance (\$M)	-32069	-22105	-18588	-14343	-9373	-2064
% GNP	-4.3	-2.8	-2.3	-1.7	-1.1	-0.2
After-Tax Corporation Profit (\$M)	40890	43169	45093	54418	65780	75305
% Change	17.7	5.6	4.5	20.7	20.9	14.5
Housing Starts (000's)	111	105	111	130	159	172
Auto Sales (000's SAAR)	1187	1224	1256	1293	1347	1418
% Change	-5.8	3.1	2.6	3.0	4.2	5.3
Passenger	680	675	683	701	732	778
% Change	-9.1	-0.7	1.2	2.6	4.4	6.4
Commercial	507	549	572	593	615	640
% Change	-0.8	8.3	4.2	3.6	3.8	3.9
Personal Savings Rate (%)	7.1	6.8	6.8	6.5	6.3	5.8
Real Disposable Income Growth	1.2	0.7	0.8	0.8	1.9	3.2

Table 3
Selected Economic Indicators: Flexible Regime - Investment & TFP

	1995	1996	1997	1998	1999	2000
Real GDP (\$1986 M)	613896	625906	639856	657133	681790	709978
% Change	2.7	2.0	2.2	2.7	3.8	4.1
Consumer Expenditures	358962	362556	366462	371708	380935	395699
% Change	1.6	1.0	1.1	1.4	2.5	3.9
Government Expenditure on Goods & Services	114821	109841	104040	101199	102589	104271
% Change	-1.5	-4.3	-5.3	-2.7	1.4	1.6
Government Fixed Investment	18271	18738	19090	19404	19722	20048
% Change	5.835	2.555	1.879	1.642	1.642	1.649
Business Residential Investment	28576	27950	28842	30495	33956	36762
% Change	-12.0	-2.2	3.2	5.7	11.3	8.3
Business Non-Residential Investment	86981	94264	100731	105087	111772	118825
% Change	7.1	8.4	6.9	4.3	6.4	6.3
Exports	250770	261397	269947	276294	282636	289683
% Change	10.8	4.2	3.3	2.4	2.3	2.5
Imports	249859	250087	248059	248758	253081	259517
% Change	8.2	0.1	-0.8	0.3	1.7	2.5
Inventory Change	6185	1614	-830	2073	3631	4577
Raw Material Price Index	1.302	1.286	1.313	1.351	1.378	1.411
% Change	8.1	-1.2	2.0	2.9	2.0	2.4
Industry Price Index	1.286	1.305	1.329	1.360	1.390	1.420
% Change	7.9	1.5	1.9	2.3	2.2	2.1
GDP Deflator	1.275	1.291	1.305	1.319	1.338	1.362
% Change	1.7	1.2	1.1	1.1	1.4	1.8
Consumer Price Index	1.335	1.360	1.389	1.415	1.443	1.474
% Change	2.2	1.9	2.1	1.9	1.9	2.1
Employment (000's)	13508	13588	13684	13809	14064	14448
% Change	1.6	0.6	0.7	0.9	1.9	2.7
Unemployment Rate (%)	9.5	9.5	9.6	9.9	9.5	9.6
Productivity (% Change)	1.0	1.4	1.5	1.8	1.9	1.4
Average Hourly Earnings	14.29	14.63	14.97	15.23	15.55	16.06
% Change	1.1	2.4	2.3	1.7	2.1	3.3
3-Month T.B. Rate (%)	6.93	5.42	5.39	5.03	4.82	4.93
US 3-Month T.B. Rate (%)	5.49	4.65	4.56	4.56	4.78	4.92
Canada-US Differential	1.44	0.77	0.83	0.47	0.04	0.01
Prime Rate (%)	8.67	7.20	7.05	6.65	6.42	6.52
GOC 10+ Bond Rate (%)	8.33	7.34	7.10	6.77	6.39	6.28
M2 (\$M)	374484	386100	396070	408014	424003	443567
% Change	4.2	3.1	2.6	3.0	3.9	4.6
Household Credit (\$M)	451540	451571	447269	444818	445786	453999
% Change	4.4	0.0	-1.0	-0.5	0.2	1.8
Exchange Rate (US-Can.)	72.66	71.86	72.27	72.74	73.63	75.41
Current Account Balance (\$M)	-15358	-4935	6753	16862	23190	28858
Fed Government Balance (\$M)	-23574	-15539	-8961	-5240	-476	6513
% GNP	-3.1	-2.0	-1.1	-0.6	-0.1	0.7
Fed Government PA Balance (\$M)	-31863	-21578	-17740	-13759	-8995	-2006
% GNP	-4.2	-2.8	-2.2	-1.6	-1.0	-0.2
After-Tax Corporation Profit (\$M)	41278	43988	46417	55204	66489	75805
% Change	18.8	6.6	5.5	18.9	20.4	14.0
Housing Starts (000's)	111	106	112	131	160	173
Auto Sales (000's SAAR)	1188	1226	1261	1301	1356	1429
% Change	-5.7	3.2	2.9	3.2	4.2	5.4
Passenger	681	676	687	706	738	786
% Change	-9.1	-0.7	1.6	2.8	4.5	6.5
Commercial	507	550	574	595	618	644
% Change	-0.8	8.4	4.4	3.7	3.9	4.1
Personal Savings Rate (%)	7.1	6.8	6.9	6.7	6.4	6.0
Real Disposable Income Growth	1.2	0.7	1.1	1.1	2.1	3.3

Table 4
Impact on Selected Indicators: Flexible Regime - Investment & TFP

	1995	1996	1997	1998	1999	2000
Real GDP (\$1986 M)	786	2044	4406	4555	4640	4514
% Change	0.1	0.2	0.4	0.0	0.0	0.0
Consumer Expenditures	75	188	973	1737	2223	2605
% Change	0.0	0.0	0.2	0.2	0.1	0.1
Government Expenditure on Goods & Services	0	0	0	0	0	0
% Change	0.0	0.0	0.0	0.0	0.0	0.0
Government Fixed Investment	0	0	0	0	0	0
% Change	0	0	0	0	0	0
Business Residential Investment	12	51	163	255	324	356
% Change	0.0	0.1	0.4	0.3	0.1	0.0
Business Non-Residential Investment	657	1565	3209	3270	3199	2965
% Change	0.8	1.0	1.7	-0.1	-0.3	-0.4
Exports	10	204	240	53	-180	-347
% Change	0.0	0.1	0.0	-0.1	-0.1	-0.1
Imports	101	146	435	778	948	1123
% Change	0.0	0.0	0.1	0.1	0.1	0.1
Inventory Change	134	182	255	19	23	58
Raw Material Price Index	0.001	0.006	0.003	-0.001	-0.003	-0.004
% Change	0.1	0.4	-0.3	-0.3	-0.2	0.0
Industry Price Index	0.001	0.003	0.002	0.000	0.000	0.000
% Change	0.1	0.2	-0.1	-0.1	0.0	0.0
GDP Deflator	0.000	0.001	0.000	0.001	0.002	0.003
% Change	0.0	0.1	0.0	0.1	0.1	0.1
Consumer Price Index	0.000	0.002	0.002	0.001	0.002	0.003
% Change	0.0	0.1	0.0	0.0	0.0	0.0
Employment (000's)	5	19	47	63	67	66
% Change	0.0	0.1	0.2	0.1	0.0	0.0
Unemployment Rate (%)	0.0	-0.1	-0.2	-0.2	-0.3	-0.3
Productivity (% Change)	0.1	0.1	0.2	-0.1	0.0	0.0
Average Hourly Earnings	0.00	0.01	0.03	0.06	0.07	0.08
% Change	0.0	0.1	0.1	0.1	0.1	0.1
3-Month T.B. Rate (%)	0.00	0.07	0.18	0.21	0.24	0.25
US 3-Month T.B. Rate (%)	0.00	0.00	0.00	0.00	0.00	0.00
Canada-US Differential	0.00	0.07	0.18	0.21	0.24	0.25
Prime Rate (%)	0.00	0.07	0.18	0.21	0.24	0.25
GOC 10+ Bond Rate (%)	0.00	0.02	0.09	0.15	0.19	0.22
M2 (\$M)	120	760	1380	1999	2265	2507
% Change	0.0	0.2	0.2	0.1	0.0	0.0
Household Credit (\$M)	40	384	794	1788	3336	4921
% Change	0.0	0.1	0.1	0.2	0.3	0.3
Exchange Rate (US-Can.)	-0.15	-0.37	-0.08	0.11	0.20	0.22
Current Account Balance (\$M)	-194	-489	-515	-808	-1046	-1374
Fed Government Balance (\$M)	207	527	848	584	378	58
% GNP	0.0	0.1	0.1	0.1	0.0	0.0
Fed Government PA Balance (\$M)	207	527	848	584	378	58
% GNP	0.0	0.1	0.1	0.1	0.1	0.0
After-Tax Corporation Profit (\$M)	388	819	1323	786	710	500
% Change	1.1	1.0	1.1	-1.7	-0.4	-0.5
Housing Starts (000's)	0	0	0	1	1	2
Auto Sales (000's SAAR)	1	2	5	8	9	11
% Change	0.0	0.1	0.3	0.2	0.1	0.1
Passenger	0	1	4	5	6	7
% Change	0.1	0.1	0.4	0.2	0.1	0.1
Commercial	0	1	1	2	3	4
% Change	0.0	0.1	0.2	0.1	0.1	0.1
Personal Savings Rate (%)	0.0	0.0	0.1	0.1	0.1	0.1
Real Disposable Income Growth	0.0	0.0	0.3	0.3	0.1	0.1

Table 5
Analysis of Supply: Flexible Regime - Investment and TFP¹

	1995	1996	1997	1998	1999	2000
LF participation rate (level)	0.01	0.04	0.09	0.12	0.12	0.11
Labour force	0.02	0.06	0.15	0.19	0.18	0.17
Employment	0.04	0.14	0.34	0.46	0.48	0.46
Capital stock, M&E	0.19	0.51	1.06	1.37	1.49	1.52
Capital stock, non-residential	0.15	0.51	1.21	1.84	2.37	2.73
Normal output	0.07	0.24	0.58	0.89	1.10	1.24
Lucas supply	0.13	0.33	0.69	0.70	0.69	0.64
Aggregate demand	0.13	0.33	0.69	0.70	0.69	0.64
Labour productivity	0.09	0.19	0.35	0.24	0.21	0.18
Unemployment rate (level)	-0.02	-0.07	-0.18	-0.24	-0.27	-0.26
Contributions to increased growth						
Normal output	0.07	0.24	0.58	0.89	1.10	1.24
Factor contribution	0.02	0.15	0.41	0.73	0.95	1.10
Labour	0.02	0.09	0.21	0.28	0.29	0.28
Machinery	0.00	0.02	0.06	0.13	0.17	0.19
Structures	0.00	0.04	0.13	0.32	0.49	0.63
TFP contribution	0.04	0.09	0.17	0.16	0.15	0.15

¹ Deviation from the base case, percentage difference.

Figure 1
Flexible Regime: Investment and TFP

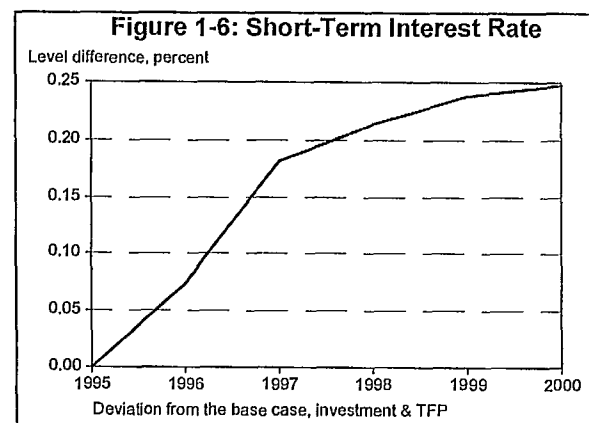
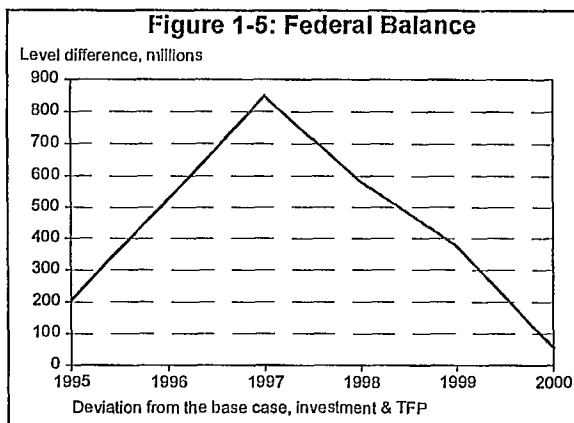
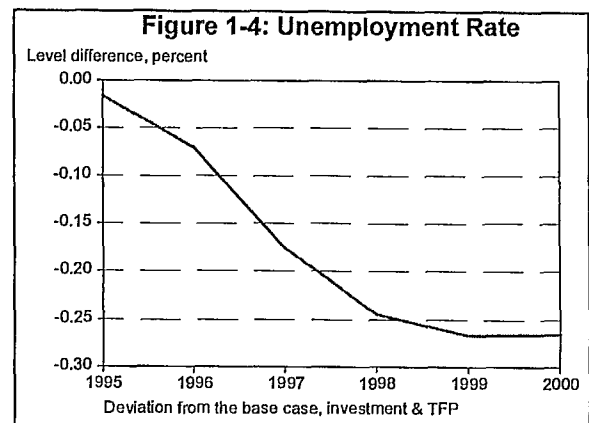
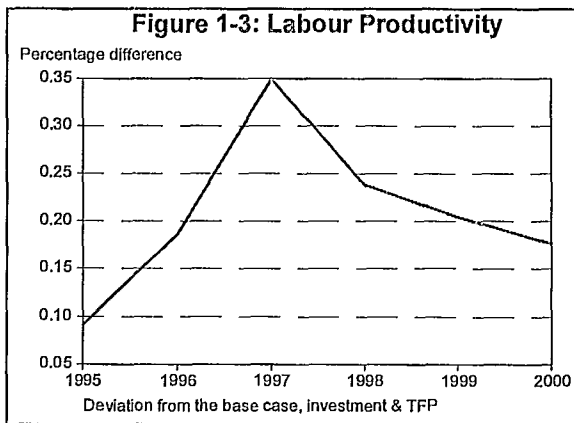
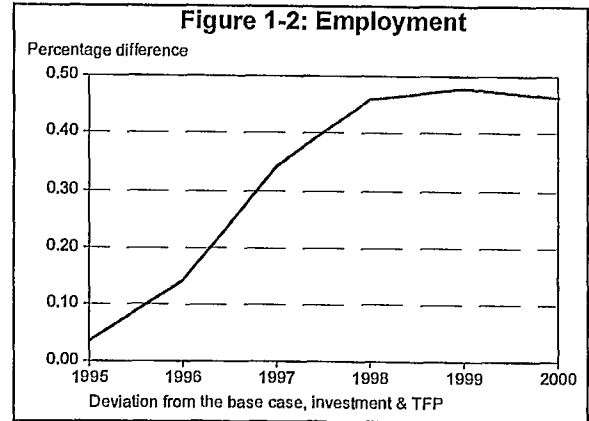
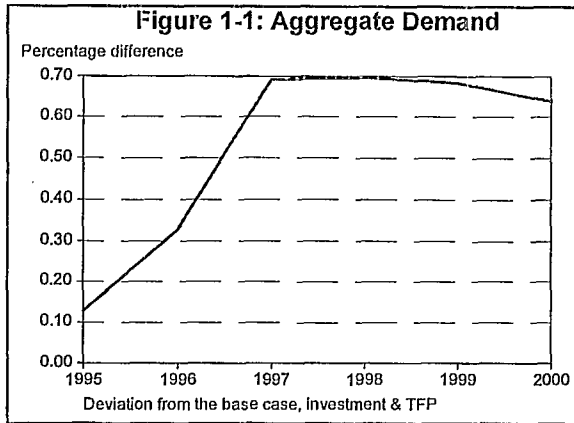


Figure 1-7: Real Exports

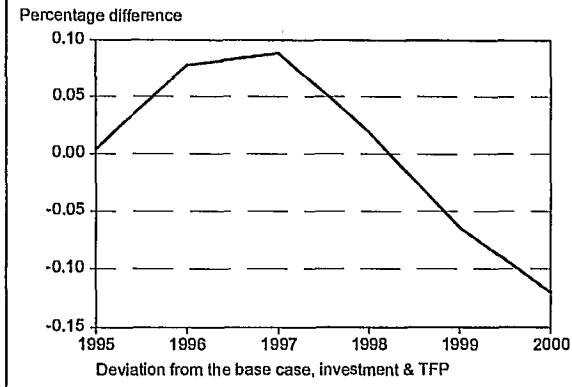


Figure 1-8: Real Imports

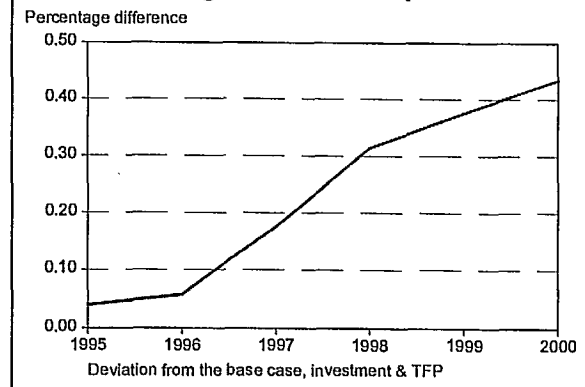


Figure 1-9: Current Account Balance

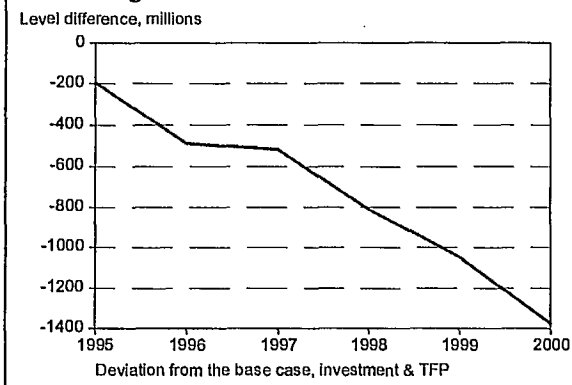


Figure 1-10: Trade Balance

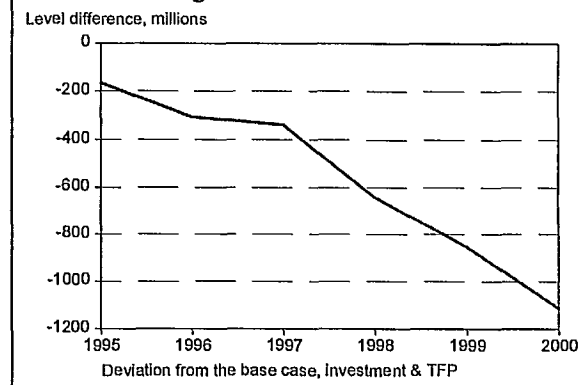


Figure 1-11: Exchange Rate, Canada/US

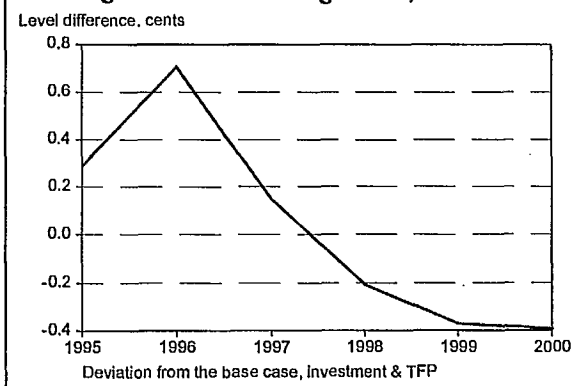


Figure 1-12: Short-Term Interest Rate

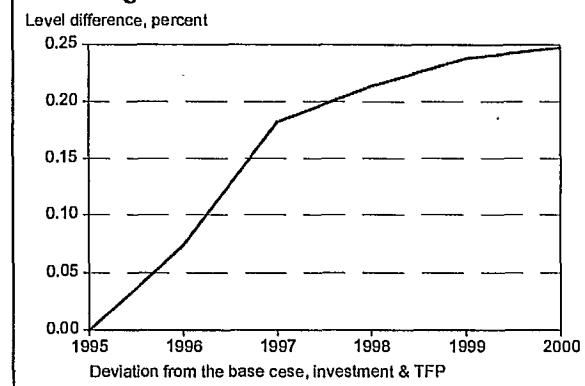


Figure 1-13: Contributions to Growth

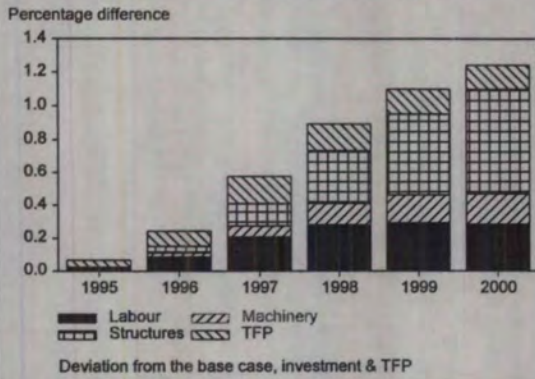


Figure 1-14: LF Participation Rate

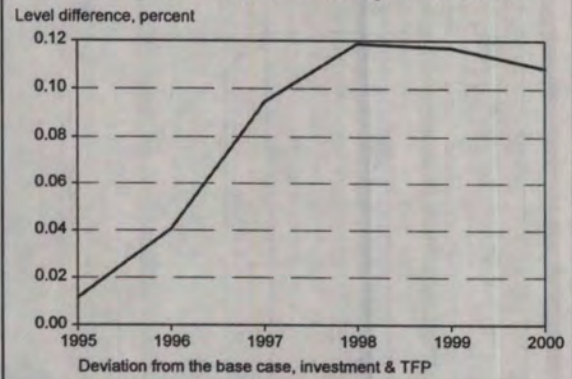


Figure 1-15: Labour Force

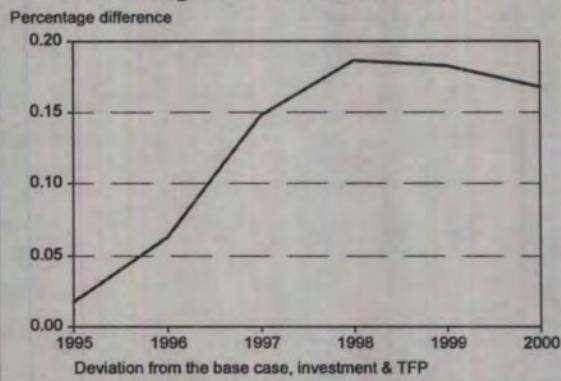


Figure 1-16: Employment

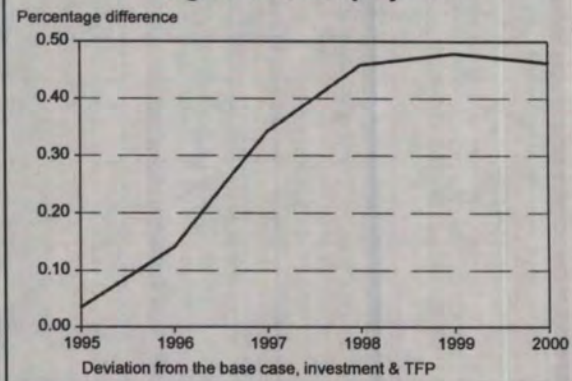


Figure 1-17: Capital Stock, Mach & Equip

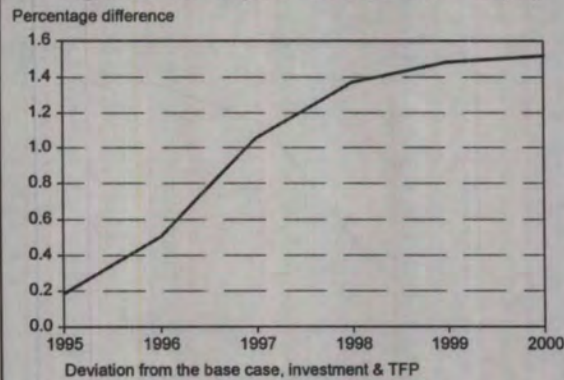


Figure 1-18: Capital Stock, Structures

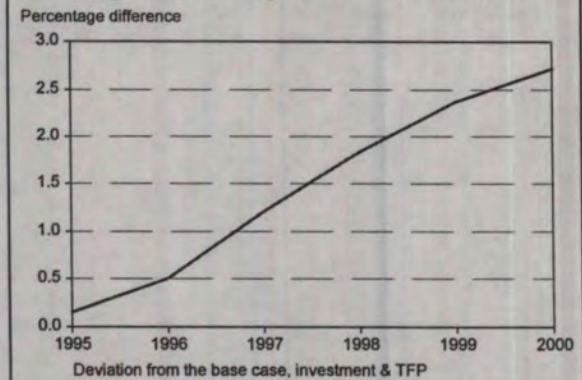


Table 6
Selected Economic Indicators: Flexible Regime - Exports and Imports

	1995	1996	1997	1998	1999	2000
Real GDP (\$1986 M)	612937	624500	637557	656258	681249	709464
% Change	2.5	1.9	2.1	2.9	3.8	4.1
Consumer Expenditures	358831	362139	365664	370615	379855	394627
% Change	1.6	0.9	1.0	1.4	2.5	3.9
Government Expenditure on Goods & Services	114821	109841	104040	101199	102589	104271
% Change	-1.5	-4.3	-5.3	-2.7	1.4	1.6
Government Fixed Investment	18271	18738	19090	19404	19722	20048
% Change	5.835	2.555	1.879	1.642	1.642	1.649
Business Residential Investment	28557	27892	28742	30355	33795	36608
% Change	-12.0	-2.3	3.0	5.6	11.3	8.3
Business Non-Residential Investment	86300	92682	97565	102039	109033	116449
% Change	6.3	7.4	5.3	4.6	6.9	6.8
Exports	251506	263268	273951	280931	287811	295034
% Change	11.2	4.7	4.1	2.5	2.4	2.5
Imports	250628	251253	250216	250138	254908	261779
% Change	8.6	0.2	-0.4	0.0	1.9	2.7
Inventory Change	6091	1561	-912	2221	3719	4575
Raw Material Price Index	1.302	1.287	1.314	1.353	1.379	1.411
% Change	8.1	-1.2	2.1	3.0	1.9	2.3
Industry Price Index	1.286	1.305	1.330	1.361	1.391	1.420
% Change	7.9	1.5	1.9	2.3	2.2	2.1
GDP Deflator	1.276	1.291	1.304	1.318	1.335	1.359
% Change	1.7	1.2	1.1	1.0	1.4	1.8
Consumer Price Index	1.335	1.361	1.389	1.416	1.443	1.474
% Change	2.2	1.9	2.1	1.9	1.9	2.1
Employment (000's)	13502	13573	13656	13780	14042	14428
% Change	1.6	0.5	0.6	0.9	1.9	2.8
Unemployment Rate (%)	9.5	9.5	9.7	10.0	10.0	9.7
Productivity (% Change)	0.9	1.4	1.5	2.0	1.9	1.4
Average Hourly Earnings	14.29	14.63	14.95	15.20	15.53	16.04
% Change	1.1	2.4	2.2	1.7	2.1	3.3
3-Month T.B. Rate (%)	6.93	5.39	5.30	4.97	4.76	4.88
US 3-Month T.B. Rate (%)	5.49	4.65	4.56	4.56	4.78	4.92
Canada-US Differential	1.44	0.74	0.74	0.41	-0.02	-0.04
Prime Rate (%)	8.67	7.18	6.96	6.59	6.36	6.47
GOC 10+ Bond Rate (%)	8.33	7.33	7.06	6.71	6.33	6.22
M2 (\$M)	374337	385618	395211	406959	423118	442711
% Change	4.2	3.0	2.5	3.0	4.0	4.6
Household Credit (\$M)	451519	451407	446850	443727	443916	451694
% Change	4.4	0.0	-1.0	-0.7	0.0	1.8
Exchange Rate (US-Can.)	72.66	71.84	72.20	72.65	73.56	75.39
Current Account Balance (\$M)	-15501	-4482	8067	19583	26051	31603
Fed Government Balance (\$M)	-23813	-15900	-9493	-5334	-427	6703
% GNP	-3.2	-2.0	-1.2	-0.6	0.0	0.7
Fed Government PA Balance (\$M)	-32102	-21938	-18272	-13853	-8946	-1816
% GNP	-4.3	-2.8	-2.3	-1.6	-1.0	-0.2
After-Tax Corporation Profit (\$M)	40790	43467	45609	55415	66792	76277
% Change	17.4	6.6	4.9	21.5	20.5	14.2
Housing Starts (000's)	111	105	112	130	159	172
Auto Sales (000's SAAR)	1187	1224	1257	1296	1352	1425
% Change	-5.8	3.1	2.7	3.1	4.3	5.4
Passenger	680	675	684	703	735	783
% Change	-9.2	-0.8	1.5	2.7	4.6	6.5
Commercial	507	549	573	594	617	642
% Change	-0.8	8.3	4.3	3.6	3.9	4.1
Personal Savings Rate (%)	7.1	6.8	6.9	6.6	6.4	6.0
Real Disposable Income Growth	1.2	0.6	1.0	1.0	2.1	3.3

Table 7
Impact on Selected Indicators: Flexible Regime - Exports and Imports

	1995	1996	1997	1998	1999	2000
Real GDP (\$1986 M)	-173	638	2107	3680	4098	3999
% Change	0.0	0.1	0.2	0.2	0.0	0.0
Consumer Expenditures	-57	-229	175	644	1143	1532
% Change	0.0	0.0	0.1	0.1	0.1	0.1
Government Expenditure on Goods & Services	0	0	0	0	0	0
% Change	0.0	0.0	0.0	0.0	0.0	0.0
Government Fixed Investment	0	0	0	0	0	0
% Change	0	0	0	0	0	0
Business Residential Investment	-7	-7	64	115	163	202
% Change	0.0	0.0	0.3	0.2	0.1	0.1
Business Non-Residential Investment	-24	-17	43	222	460	588
% Change	0.0	0.0	0.1	0.2	0.2	0.1
Exports	746	2074	4244	4690	4996	5004
% Change	0.3	0.5	0.8	0.1	0.1	0.0
Imports	871	1312	2592	2158	2774	3384
% Change	0.4	0.2	0.5	-0.2	0.2	0.2
Inventory Change	40	129	174	167	111	56
Raw Material Price Index	0.002	0.007	0.004	0.000	-0.002	-0.003
% Change	0.1	0.4	-0.3	-0.3	-0.2	-0.1
Industry Price Index	0.001	0.003	0.002	0.001	0.000	0.000
% Change	0.1	0.2	-0.1	-0.1	0.0	0.0
GDP Deflator	0.000	0.001	0.000	-0.001	0.000	0.001
% Change	0.0	0.0	-0.1	0.0	0.0	0.1
Consumer Price Index	0.000	0.002	0.002	0.002	0.002	0.003
% Change	0.0	0.2	0.0	0.0	0.0	0.0
Employment (000's)	-2	4	19	35	44	46
% Change	0.0	0.0	0.1	0.1	0.1	0.0
Unemployment Rate (%)	0.0	0.0	-0.1	-0.1	-0.2	-0.2
Productivity (% Change)	0.0	0.1	0.1	0.1	0.0	0.0
Average Hourly Earnings	0.00	0.00	0.02	0.03	0.05	0.06
% Change	0.0	0.0	0.1	0.1	0.1	0.1
3-Month T.B. Rate (%)	0.00	0.04	0.09	0.15	0.18	0.20
US 3-Month T.B. Rate (%)	0.00	0.00	0.00	0.00	0.00	0.00
Canada-US Differential	0.00	0.04	0.09	0.15	0.18	0.20
Prime Rate (%)	0.00	0.05	0.09	0.15	0.18	0.20
GOC 10+ Bond Rate (%)	0.00	0.01	0.05	0.09	0.14	0.17
M2 (\$M)	-27	278	520	944	1380	1651
% Change	0.0	0.1	0.1	0.1	0.1	0.0
Household Credit (\$M)	19	221	375	696	1466	2616
% Change	0.0	0.0	0.0	0.1	0.2	0.3
Exchange Rate (US-Can.)	-0.16	-0.39	-0.15	0.02	0.13	0.20
Current Account Balance (\$M)	-337	-36	798	1912	1815	1371
Fed Government Balance (\$M)	-33	167	315	490	428	248
% GNP	0.0	0.0	0.0	0.1	0.0	0.0
Fed Government PA Balance (\$M)	-33	167	315	490	428	248
% GNP	0.0	0.0	0.0	0.1	0.1	0.0
After-Tax Corporation Profit (\$M)	-100	298	515	997	1012	973
% Change	-0.3	1.0	0.5	0.8	-0.3	-0.3
Housing Starts (000's)	0	0	0	0	0	1
Auto Sales (000's SAAR)	0	-1	1	3	5	7
% Change	0.0	0.0	0.2	0.1	0.1	0.1
Passenger	0	-1	1	2	3	4
% Change	0.0	-0.1	0.3	0.1	0.2	0.1
Commercial	0	0	0	1	1	2
% Change	0.0	0.0	0.1	0.1	0.1	0.1
Personal Savings Rate (%)	0.0	0.0	0.0	0.1	0.1	0.1
Real Disposable Income Growth	0.0	-0.1	0.2	0.2	0.2	0.1

Table 8
Analysis of Supply: Flexible Regime - Exports and Imports¹

	1995	1996	1997	1998	1999	2000
LF participation rate (level)	0.00	0.01	0.03	0.06	0.07	0.07
Labour force	-0.01	0.01	0.05	0.10	0.12	0.11
Employment	-0.01	0.03	0.14	0.25	0.32	0.32
Capital stock, M&E	-0.02	-0.02	0.01	0.12	0.28	0.42
Capital stock, non-residential	0.00	0.00	0.00	0.01	0.02	0.03
Normal output	-0.01	0.01	0.08	0.16	0.22	0.24
Lucas supply	-0.03	0.10	0.33	0.56	0.61	0.57
Aggregate demand	-0.03	0.10	0.33	0.56	0.61	0.57
Labour productivity	-0.02	0.08	0.19	0.31	0.29	0.24
Unemployment rate (level)	0.00	-0.02	-0.08	-0.14	-0.18	-0.19
Contributions to increased growth						
Normal output	-0.01	0.01	0.08	0.16	0.22	0.24
Factor contribution	-0.01	0.01	0.08	0.16	0.21	0.24
Labour	-0.01	0.02	0.08	0.15	0.19	0.20
Machinery	0.00	0.00	0.00	0.00	0.01	0.03
Structures	0.00	0.00	0.00	0.00	0.00	0.00
TFP contribution	0.00	0.00	0.00	0.00	0.01	0.01

¹ Deviation from the base case, percentage difference.

Figure 2 Flexible Regime: Exports and Imports

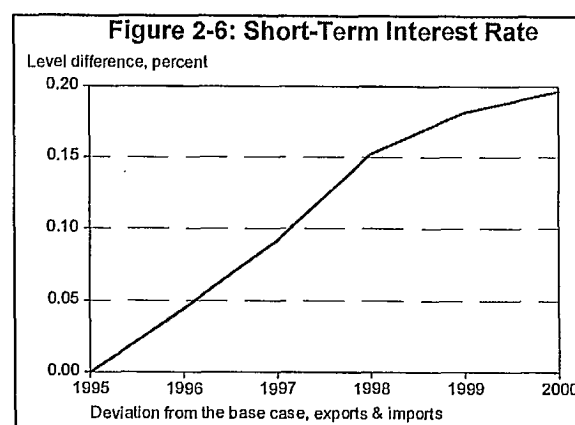
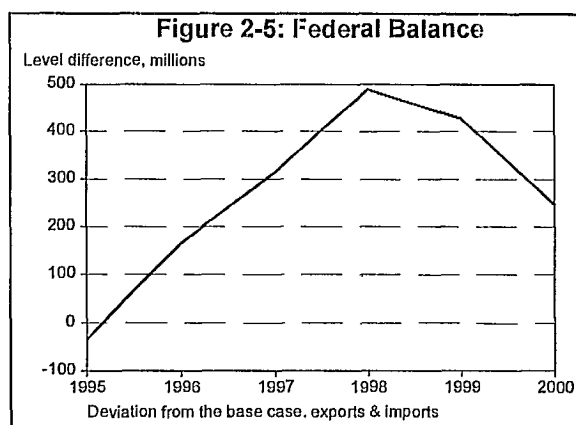
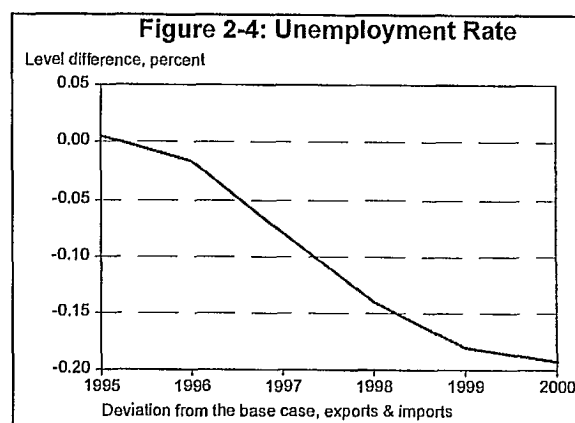
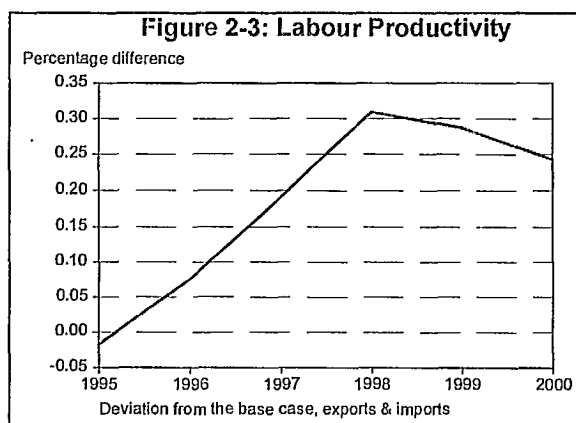
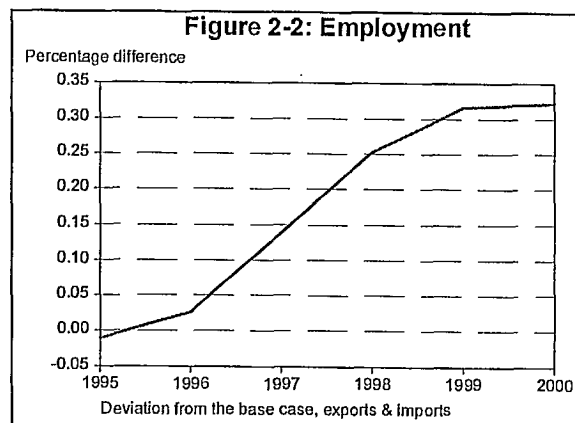
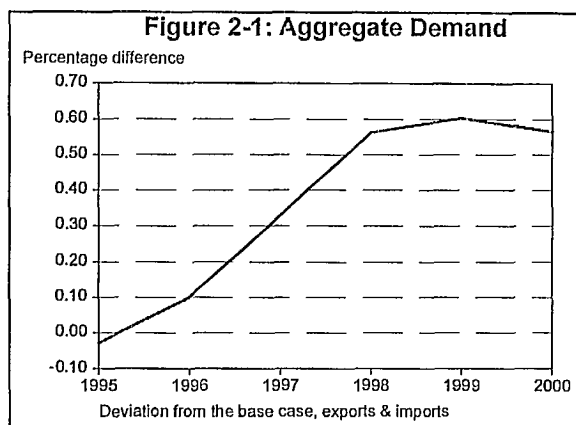


Figure 2-7: Real Exports

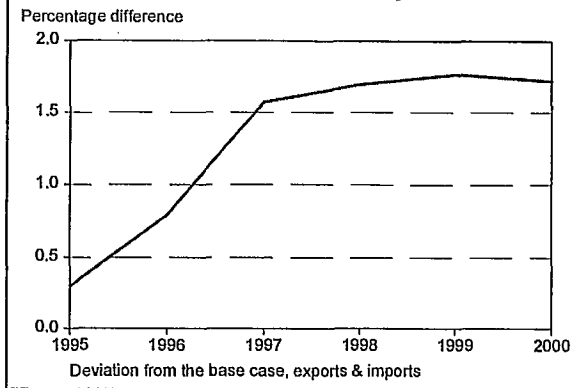


Figure 2-8: Real Imports

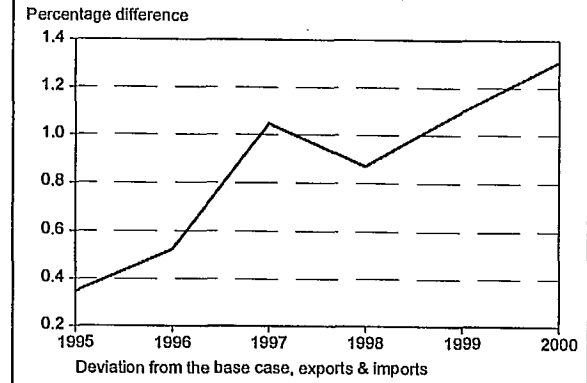


Figure 2-9: Current Account Balance

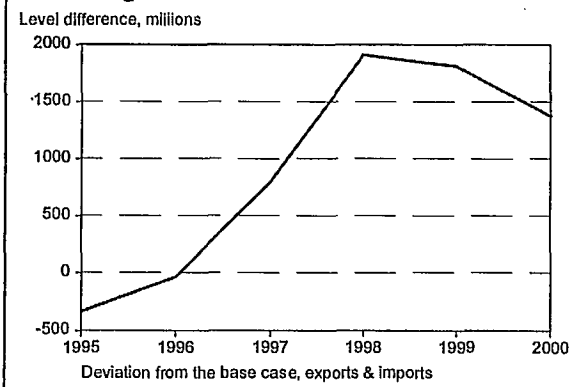


Figure 2-10: Trade Balance

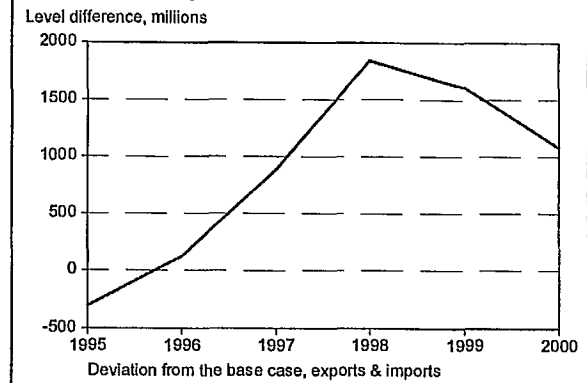


Figure 2-11: Exchange Rate, Canada/US

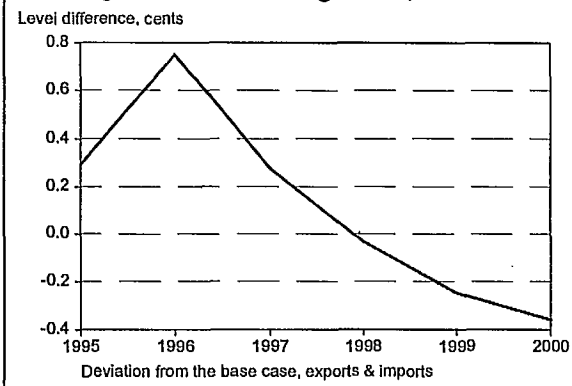
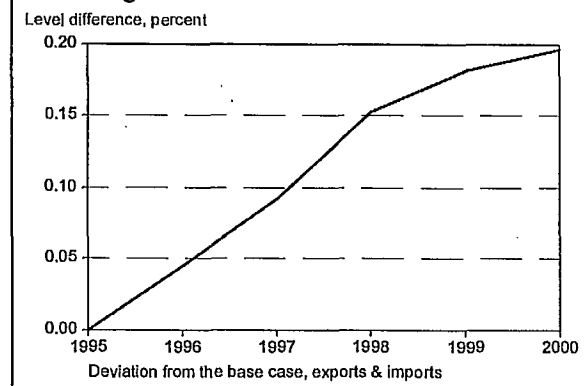


Figure 2-12: Short-Term Interest Rate



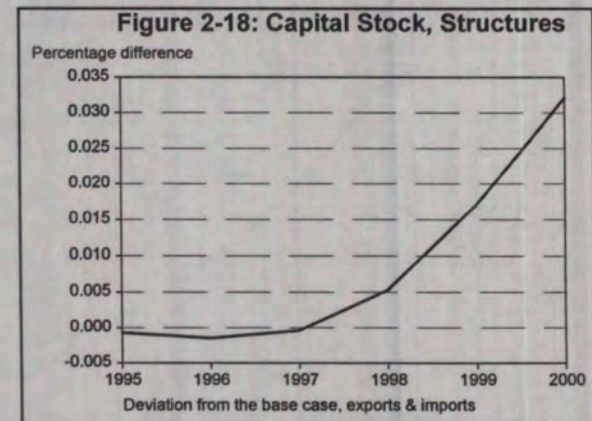
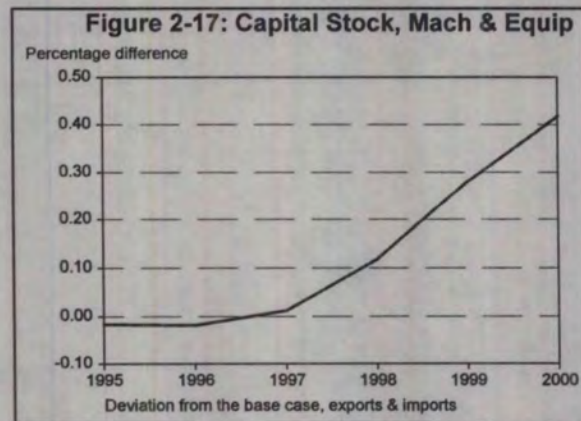
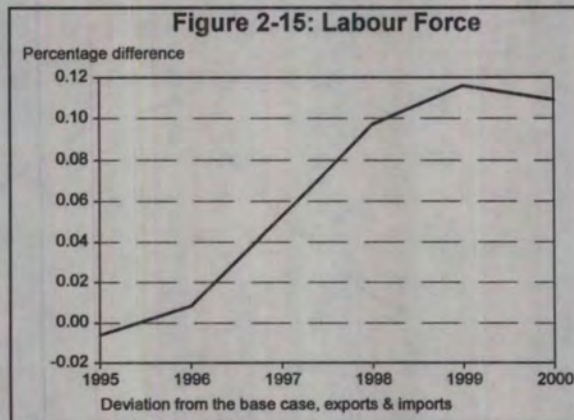
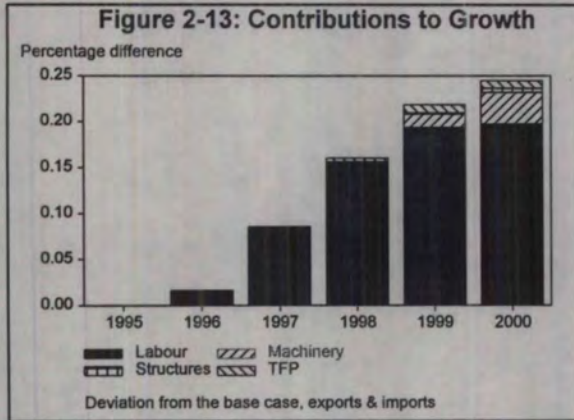


Table 9
Selected Economic Indicators: Flexible Regime Excluding Machinery¹

	1995	1996	1997	1998	1999	2000
Real GDP (\$1986 M)	613494	625453	639274	657124	681799	709806
% Change	2.6	1.9	2.2	2.8	3.8	4.1
Consumer Expenditures	358903	362397	366228	371483	380816	395614
% Change	1.6	1.0	1.1	1.4	2.5	3.9
Government Expenditure on Goods & Services	114821	109841	104040	101199	102589	104271
% Change	-1.5	-4.3	-5.3	-2.7	1.4	1.6
Government Fixed Investment	18271	18738	19090	19404	19722	20048
% Change	5.835	2.555	1.879	1.642	1.642	1.649
Business Residential Investment	28568	27927	28805	30451	33915	36735
% Change	-12.0	-2.2	3.1	5.7	11.4	8.3
Business Non-Residential Investment	86949	94191	100650	105047	111802	118828
% Change	7.1	8.3	6.9	4.4	6.4	6.3
Exports	251191	262213	271478	277424	283820	290931
% Change	11.0	4.4	3.5	2.2	2.3	2.5
Imports	250592	251162	249916	249633	254125	260805
% Change	8.5	0.2	-0.5	-0.1	1.8	2.6
Inventory Change	6194	1676	-733	2117	3628	4554
Raw Material Price Index	1.302	1.286	1.313	1.351	1.377	1.410
% Change	8.1	-1.2	2.0	2.9	1.9	2.4
Industry Price Index	1.286	1.305	1.329	1.360	1.390	1.419
% Change	7.9	1.5	1.9	2.3	2.2	2.1
GDP Deflator	1.276	1.291	1.305	1.319	1.338	1.361
% Change	1.7	1.2	1.1	1.1	1.4	1.8
Consumer Price Index	1.335	1.361	1.389	1.415	1.442	1.473
% Change	2.2	1.9	2.1	1.9	1.9	2.1
Employment (000's)	13505	13583	13677	13804	14064	14447
% Change	1.6	0.6	0.7	0.9	1.9	2.7
Unemployment Rate (%)	9.5	9.5	9.7	9.9	10.0	9.6
Productivity (% Change)	1.0	1.4	1.5	1.8	1.8	1.3
Average Hourly Earnings	14.29	14.63	14.96	15.22	15.55	16.05
% Change	1.1	2.4	2.3	1.7	2.1	3.3
3-Month T.B. Rate (%)	6.93	5.42	5.38	5.04	4.83	4.93
US 3-Month T.B. Rate (%)	5.49	4.65	4.56	4.56	4.78	4.92
Canada-US Differential	1.44	0.77	0.82	0.48	0.05	0.01
Prime Rate (%)	8.67	7.20	7.05	6.66	6.43	6.53
GOC 10+ Bond Rate (%)	8.33	7.34	7.10	6.77	6.39	6.28
M2 (\$M)	374432	385967	395909	407877	423940	443470
% Change	4.2	3.1	2.6	3.0	3.9	4.6
Household Credit (\$M)	451531	451470	447001	444276	445070	453338
% Change	4.4	0.0	-1.0	-0.6	0.2	1.9
Exchange Rate (US-Can.)	72.66	71.86	72.26	72.74	73.63	75.42
Current Account Balance (\$M)	-15711	-5231	6383	17160	23390	28850
Fed Government Balance (\$M)	-23665	-15643	-9090	-5262	-525	6424
% GNP	-3.1	-2.0	-1.1	-0.6	-0.1	0.7
Fed Government PA Balance (\$M)	-31953	-21682	-17868	-13781	-9044	-2095
% GNP	-4.2	-2.8	-2.2	-1.6	-1.0	-0.2
After-Tax Corporation Profit (\$M)	41079	43847	46240	55307	66479	75686
% Change	18.2	6.7	5.5	19.6	20.2	13.8
Housing Starts (000's)	111	105	111	130	160	173
Auto Sales (000's SAAR)	1188	1225	1260	1300	1356	1429
% Change	-5.8	3.2	2.8	3.2	4.3	5.4
Passenger	680	675	686	705	738	785
% Change	-9.1	-0.7	1.6	2.8	4.6	6.5
Commercial	507	550	574	595	618	644
% Change	-0.8	8.4	4.4	3.7	3.9	4.1
Personal Savings Rate (%)	7.1	6.8	6.9	6.7	6.4	6.0
Real Disposable Income Growth	1.2	0.7	1.1	1.1	2.1	3.3

¹ Flexible regime with investment, exports, imports and TFP but excludes exports & imports for machinery

Table 10
Impact on Selected Indicators: Flexible Regime Excluding Machinery¹

	1995	1996	1997	1998	1999	2000
Real GDP (\$1986 M)	384	1591	3823	4546	4649	4342
% Change	0.1	0.2	0.4	0.1	0.0	-0.1
Consumer Expenditures	16	29	739	1511	2103	2520
% Change	0.0	0.0	0.2	0.2	0.2	0.1
Government Expenditure on Goods & Services	0	0	0	0	0	0
% Change	0.0	0.0	0.0	0.0	0.0	0.0
Government Fixed Investment	0	0	0	0	0	0
% Change	0	0	0	0	0	0
Business Residential Investment	3	28	127	211	284	329
% Change	0.0	0.1	0.4	0.3	0.2	0.1
Business Non-Residential Investment	625	1493	3128	3230	3229	2967
% Change	0.8	0.9	1.7	0.0	-0.2	-0.4
Exports	431	1019	1771	1183	1005	902
% Change	0.2	0.2	0.3	-0.2	-0.1	0.0
Imports	834	1221	2292	1653	1992	2411
% Change	0.4	0.2	0.4	-0.3	0.1	0.1
Inventory Change	144	244	352	63	21	35
Raw Material Price Index	0.001	0.007	0.003	-0.001	-0.003	-0.004
% Change	0.1	0.4	-0.3	-0.3	-0.2	-0.1
Industry Price Index	0.001	0.003	0.002	0.000	0.000	0.000
% Change	0.1	0.2	-0.1	-0.1	0.0	0.0
GDP Deflator	0.000	0.001	0.000	0.001	0.002	0.003
% Change	0.0	0.1	0.0	0.0	0.1	0.1
Consumer Price Index	0.000	0.002	0.002	0.001	0.002	0.002
% Change	0.0	0.1	0.0	0.0	0.0	0.0
Employment (000's)	2	14	40	59	66	65
% Change	0.0	0.1	0.2	0.1	0.0	0.0
Unemployment Rate (%)	0.0	-0.1	-0.1	-0.2	-0.3	-0.3
Productivity (% Change)	0.0	0.1	0.2	0.0	-0.1	-0.1
Average Hourly Earnings	0.00	0.01	0.03	0.05	0.07	0.08
% Change	0.0	0.1	0.1	0.1	0.1	0.1
3-Month T.B. Rate (%)	0.00	0.07	0.18	0.23	0.25	0.25
US 3-Month T.B. Rate (%)	0.00	0.00	0.00	0.00	0.00	0.00
Canada-US Differential	0.00	0.07	0.18	0.23	0.25	0.25
Prime Rate (%)	0.00	0.07	0.18	0.23	0.25	0.25
GOC 10+ Bond Rate (%)	0.00	0.02	0.09	0.15	0.20	0.23
M2 (\$M)	68	627	1219	1862	2202	2411
% Change	0.0	0.1	0.1	0.2	0.1	0.0
Household Credit (\$M)	32	284	526	1245	2620	4260
% Change	0.0	0.1	0.1	0.2	0.3	0.4
Exchange Rate (US-Can.)	-0.15	-0.37	-0.09	0.10	0.21	0.24
Current Account Balance (\$M)	-547	-785	-885	-511	-847	-1382
Fed Government Balance (\$M)	116	423	719	562	329	-31
% GNP	0.0	0.1	0.1	0.1	0.0	0.0
Fed Government PA Balance (\$M)	116	423	719	562	329	-31
% GNP	0.0	0.1	0.1	0.1	0.0	0.0
After-Tax Corporation Profit (\$M)	189	678	1147	889	699	381
% Change	0.5	1.2	1.0	-1.1	-0.7	-0.6
Housing Starts (000's)	0	0	0	0	1	2
Auto Sales (000's SAAR)	0	1	4	7	9	11
% Change	0.0	0.0	0.3	0.2	0.1	0.1
Passenger	0	0	3	5	6	7
% Change	0.0	0.0	0.4	0.2	0.1	0.1
Commercial	0	0	1	2	3	4
% Change	0.0	0.1	0.1	0.1	0.1	0.1
Personal Savings Rate (%)	0.0	0.0	0.1	0.2	0.2	0.2
Real Disposable Income Growth	0.0	0.0	0.3	0.3	0.2	0.1

¹ Flexible regime with investment, exports, imports and TFP but excludes exports & imports for machinery

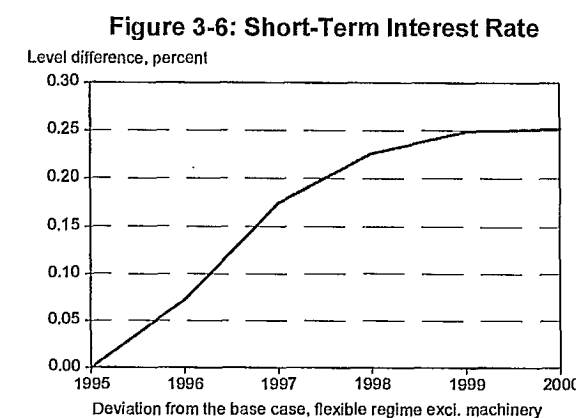
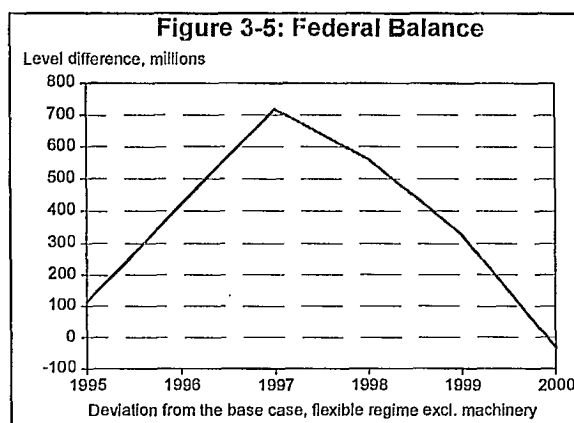
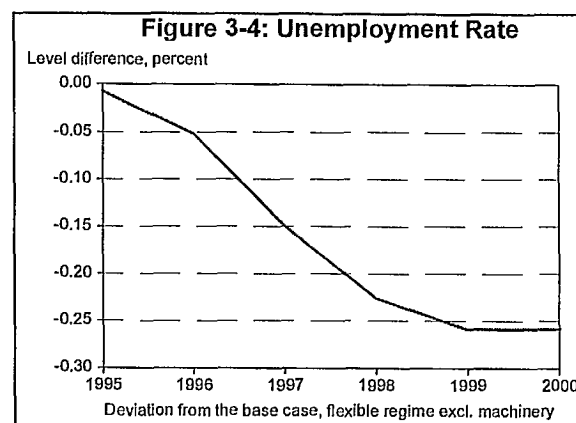
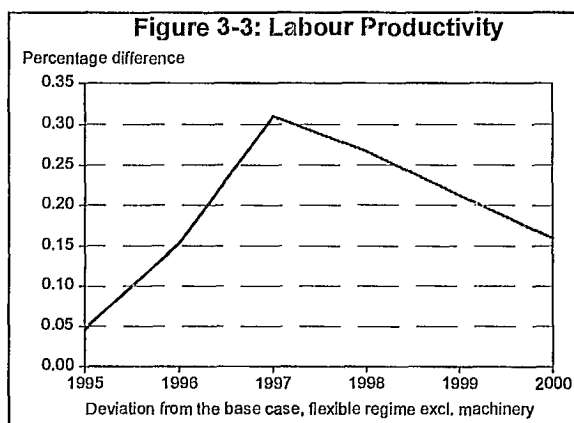
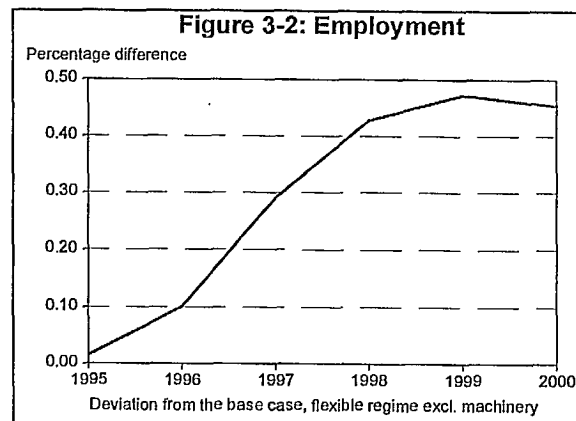
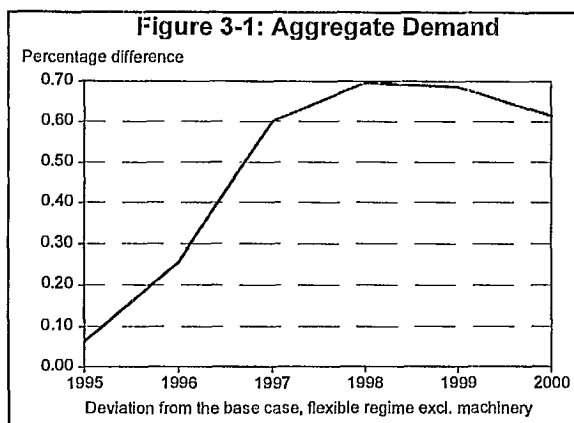
Table 11
Analysis of Supply: Flexible Regime Excluding Machinery^{1,2}

	1995	1996	1997	1998	1999	2000
LF participation rate (level)	0.01	0.03	0.08	0.11	0.12	0.11
Labour force	0.01	0.04	0.12	0.18	0.18	0.17
Employment	0.02	0.10	0.29	0.43	0.47	0.45
Capital stock, M&E	0.17	0.46	0.99	1.31	1.46	1.50
Capital stock, non-residential	0.15	0.51	1.21	1.83	2.37	2.72
Normal output	0.05	0.21	0.54	0.86	1.09	1.23
Lucas supply	0.06	0.26	0.60	0.70	0.69	0.62
Aggregate demand	0.06	0.26	0.60	0.70	0.69	0.62
Labour productivity	0.05	0.15	0.31	0.27	0.21	0.16
Unemployment rate (level)	-0.01	-0.05	-0.15	-0.23	-0.26	-0.26
Contributions to increased growth						
Normal output	0.05	0.21	0.54	0.86	1.09	1.23
Factor contribution	0.01	0.12	0.37	0.70	0.94	1.09
Labour	0.01	0.06	0.18	0.26	0.29	0.28
Machinery	0.00	0.02	0.06	0.12	0.16	0.18
Structures	0.00	0.04	0.13	0.32	0.48	0.63
TFP contribution	0.04	0.09	0.17	0.16	0.15	0.15

¹ Flexible regime with investment, exports, imports and TFP but excludes exports & imports for machinery

² Deviation from the base case, percentage difference.

Figure 3
Flexible Regime Excluding Machinery¹



¹ Flexible regime with investment, exports, imports and TFP but excludes exports & imports for machinery

Figure 3-7: Real Exports

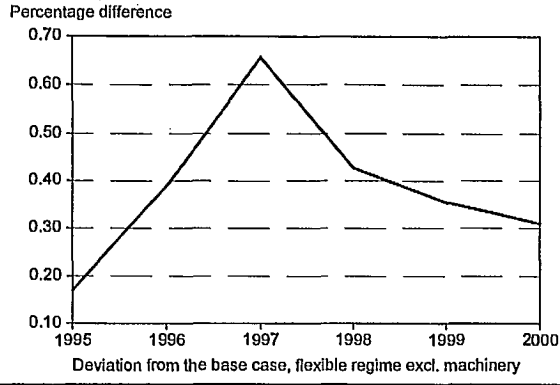


Figure 3-8: Real Imports

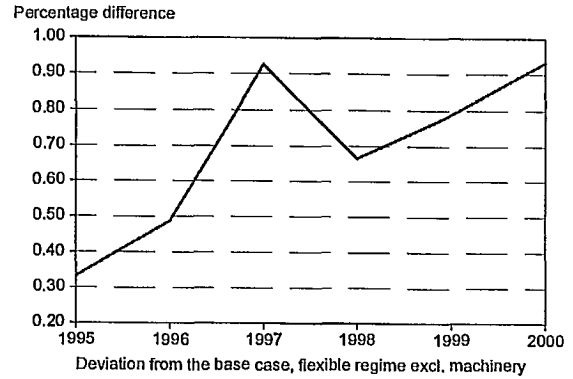


Figure 3-9: Current Account Balance

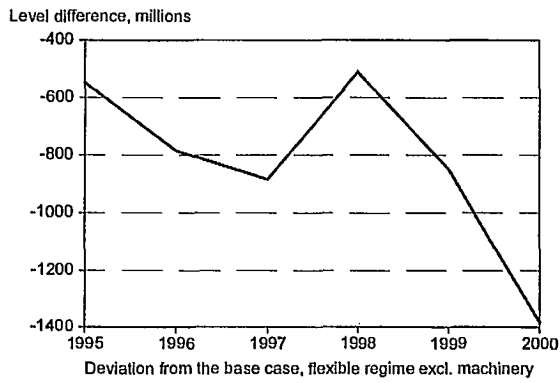


Figure 3-10: Trade Balance

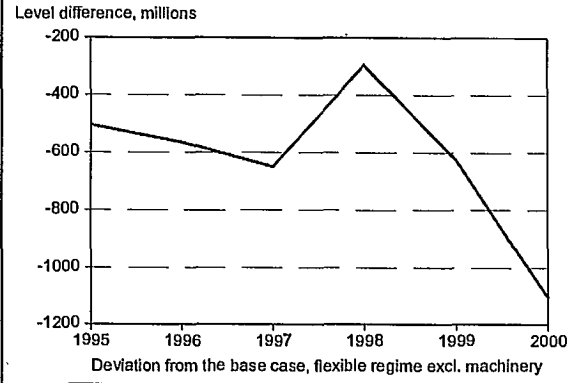


Figure 3-11: Exchange Rate, Canada/US

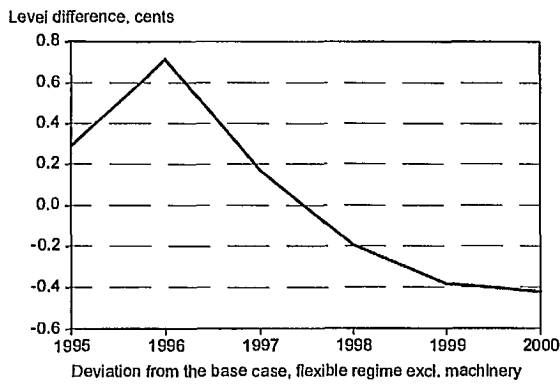


Figure 3-12: Short-Term Interest Rate

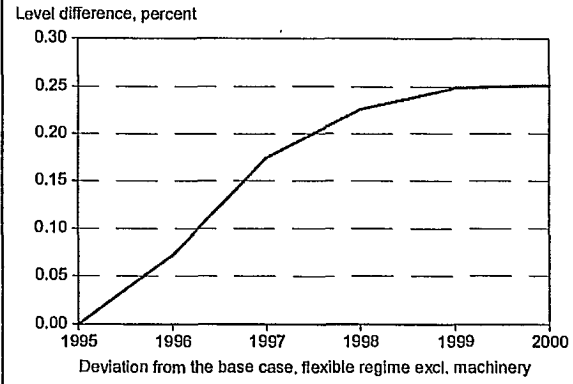


Figure 3-13: Contributions to Growth

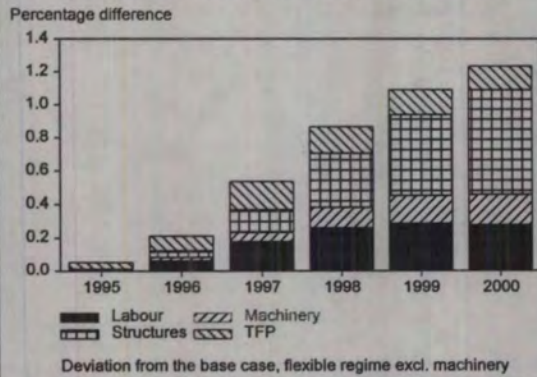


Figure 3-14: LF Participation Rate

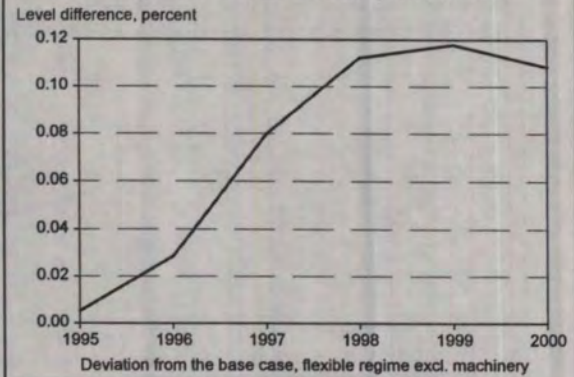


Figure 3-15: Labour Force

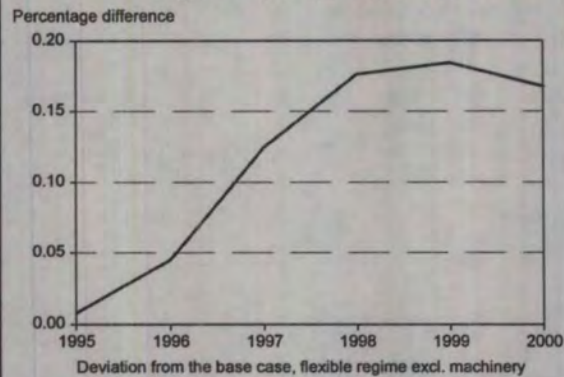


Figure 3-16: Employment

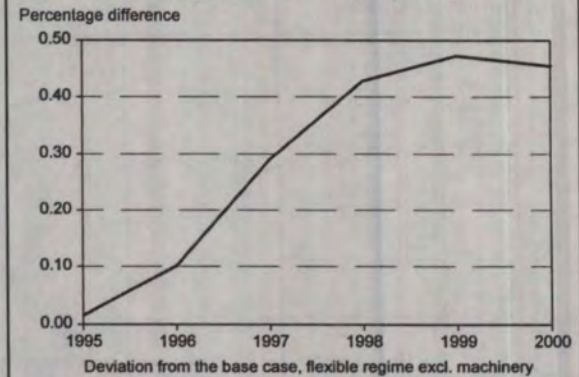


Figure 3-17: Capital Stock, Mach & Equip

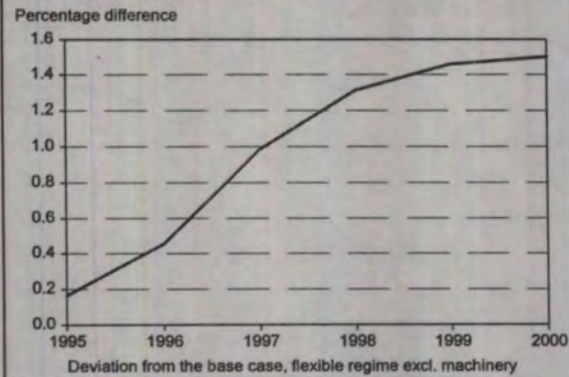


Figure 3-18: Capital Stock, Structures

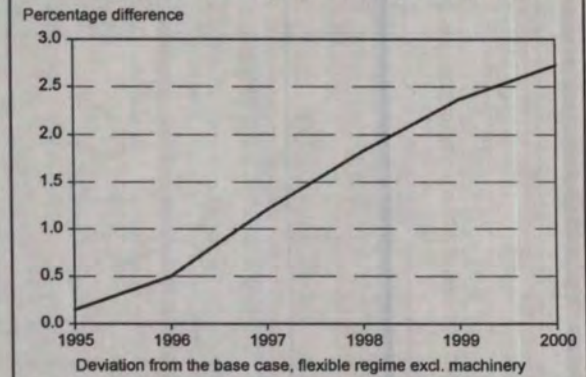


Table 12
Selected Economic Indicators: Flexible Regime

	1995	1996	1997	1998	1999	2000
Real GDP (\$1986 M)	613712	626311	641373	660353	685641	713905
% Change	2.6	2.1	2.4	3.0	3.8	4.1
Consumer Expenditures	358920	362489	366516	372091	381803	396974
% Change	1.6	1.0	1.1	1.5	2.6	4.0
Government Expenditure on Goods & Services	114821	109841	104040	101199	102589	104271
% Change	-1.5	-4.3	-5.3	-2.7	1.4	1.6
Government Fixed Investment	18271	18738	19090	19404	19722	20048
% Change	5.835	2.555	1.879	1.642	1.642	1.649
Business Residential Investment	28571	27941	28844	30532	34049	36928
% Change	-12.0	-2.2	3.2	5.8	11.5	8.5
Business Non-Residential Investment	86957	94239	100807	105379	112301	119441
% Change	7.1	8.4	7.0	4.5	6.6	6.4
Exports	251508	263269	273932	280848	287636	294772
% Change	11.2	4.7	4.1	2.5	2.4	2.5
Imports	250739	251574	250876	250988	255800	262750
% Change	8.6	0.3	-0.3	0.0	1.9	2.7
Inventory Change	6215	1736	-613	2257	3709	4592
Raw Material Price Index	1.302	1.286	1.312	1.350	1.375	1.406
% Change	8.1	-1.2	2.0	2.9	1.9	2.3
Industry Price Index	1.286	1.305	1.329	1.360	1.389	1.418
% Change	7.9	1.5	1.9	2.3	2.2	2.1
GDP Deflator	1.275	1.290	1.303	1.317	1.335	1.360
% Change	1.7	1.1	1.0	1.1	1.4	1.8
Consumer Price Index	1.335	1.361	1.389	1.415	1.443	1.474
% Change	2.2	1.9	2.1	1.9	1.9	2.2
Employment (000's)	13506	13588	13690	13829	14097	14486
% Change	1.6	0.6	0.8	1.0	1.9	2.8
Unemployment Rate (%)	9.5	9.5	9.6	9.8	9.8	9.5
Productivity (% Change)	1.0	1.4	1.6	1.9	1.9	1.3
Average Hourly Earnings	14.29	14.63	14.97	15.23	15.57	16.09
% Change	1.1	2.4	2.3	1.8	2.2	3.3
3-Month T.B. Rate (%)	6.93	5.43	5.42	5.12	4.94	5.06
US 3-Month T.B. Rate (%)	5.49	4.65	4.56	4.56	4.78	4.92
Canada-US Differential	1.44	0.78	0.86	0.56	0.16	0.14
Prime Rate (%)	8.67	7.21	7.09	6.74	6.54	6.65
GOC 10+ Bond Rate (%)	8.33	7.35	7.11	6.82	6.47	6.38
M2 (\$M)	374411	385965	395995	408246	424624	444409
% Change	4.2	3.1	2.6	3.1	4.0	4.7
Household Credit (\$M)	451539	451511	447143	444705	446074	455163
% Change	4.4	0.0	-1.0	-0.5	0.3	2.0
Exchange Rate (US-Can.)	72.66	71.87	72.29	72.83	73.80	75.65
Current Account Balance (\$M)	-15627	-4863	7295	18553	24936	30322
Fed Government Balance (\$M)	-23631	-15508	-8768	-4778	15	6921
% GNP	-3.1	-2.0	-1.1	-0.6	0.0	0.7
Fed Government PA Balance (\$M)	-31920	-21546	-17547	-13297	-8504	-1597
% GNP	-4.2	-2.8	-2.2	-1.6	-1.0	-0.2
After-Tax Corporation Profit (\$M)	41135	44068	46767	56112	67389	76654
% Change	18.4	7.1	6.1	20.0	20.1	13.7
Housing Starts (000's)	111	105	111	130	160	174
Auto Sales (000's SAAR)	1188	1226	1261	1303	1360	1435
% Change	-5.7	3.2	2.9	3.3	4.4	5.5
Passenger	680	676	687	707	741	789
% Change	-9.1	-0.7	1.7	2.9	4.7	6.6
Commercial	507	550	574	596	620	646
% Change	-0.8	8.4	4.4	3.8	4.0	4.2
Personal Savings Rate (%)	7.1	6.8	6.9	6.7	6.5	6.1
Real Disposable Income Growth	1.2	0.7	1.2	1.2	2.2	3.4

Table 13
Impact on Selected Indicators: Flexible Regime

	1995	1996	1997	1998	1999	2000
Real GDP (\$1986 M)	602	2449	5922	7775	8490	8440
% Change	0.1	0.3	0.5	0.3	0.1	-0.1
Consumer Expenditures	33	121	1027	2120	3091	3879
% Change	0.0	0.0	0.3	0.3	0.2	0.2
Government Expenditure on Goods & Services	0	0	0	0	0	0
% Change	0.0	0.0	0.0	0.0	0.0	0.0
Government Fixed Investment	0	0	0	0	0	0
% Change	0	0	0	0	0	0
Business Residential Investment	6	42	166	292	418	521
% Change	0.0	0.1	0.4	0.4	0.3	0.2
Business Non-Residential Investment	633	1540	3285	3562	3727	3580
% Change	0.8	1.0	1.8	0.1	-0.1	-0.4
Exports	748	2075	4225	4606	4820	4742
% Change	0.3	0.5	0.8	0.1	0.0	-0.1
Imports	982	1633	3253	3007	3667	4355
% Change	0.4	0.3	0.7	-0.1	0.2	0.2
Inventory Change	164	304	472	203	101	73
Raw Material Price Index	0.001	0.006	0.002	-0.003	-0.006	-0.008
% Change	0.1	0.4	-0.3	-0.4	-0.3	-0.1
Industry Price Index	0.001	0.003	0.001	0.000	-0.001	-0.002
% Change	0.1	0.2	-0.1	-0.1	-0.1	0.0
GDP Deflator	0.000	0.000	-0.002	-0.001	0.000	0.001
% Change	0.0	0.0	-0.1	0.0	0.1	0.1
Consumer Price Index	0.000	0.002	0.002	0.002	0.002	0.003
% Change	0.0	0.1	0.0	0.0	0.0	0.0
Employment (000's)	3	19	53	83	100	104
% Change	0.0	0.1	0.3	0.2	0.1	0.0
Unemployment Rate (%)	0.0	-0.1	-0.2	-0.3	-0.4	-0.4
Productivity (% Change)	0.1	0.2	0.3	0.0	0.0	-0.1
Average Hourly Earnings	0.00	0.01	0.03	0.06	0.09	0.11
% Change	0.0	0.1	0.2	0.2	0.2	0.1
3-Month T.B. Rate (%)	0.00	0.08	0.22	0.30	0.36	0.38
US 3-Month T.B. Rate (%)	0.00	0.00	0.00	0.00	0.00	0.00
Canada-US Differential	0.00	0.08	0.22	0.30	0.36	0.38
Prime Rate (%)	0.00	0.08	0.22	0.30	0.36	0.38
GOC 10+ Bond Rate (%)	0.00	0.03	0.11	0.20	0.27	0.33
M2 (\$M)	47	625	1305	2231	2886	3349
% Change	0.0	0.2	0.2	0.2	0.1	0.1
Household Credit (\$M)	40	325	668	1675	3624	6084
% Change	0.0	0.1	0.1	0.2	0.4	0.5
Exchange Rate (US-Can.)	-0.15	-0.36	-0.05	0.19	0.37	0.46
Current Account Balance (\$M)	-463	-417	26	882	699	91
Fed Government Balance (\$M)	149	559	1041	1046	869	466
% GNP	0.0	0.1	0.1	0.1	0.1	0.0
Fed Government PA Balance (\$M)	149	559	1041	1046	869	466
% GNP	0.0	0.1	0.1	0.1	0.1	0.1
After-Tax Corporation Profit (\$M)	245	898	1674	1694	1609	1349
% Change	0.7	1.6	1.7	-0.7	-0.8	-0.7
Housing Starts (000's)	0	0	0	0	1	3
Auto Sales (000's SAAR)	0	1	6	10	13	17
% Change	0.0	0.1	0.4	0.3	0.2	0.2
Passenger	0	1	4	7	9	11
% Change	0.0	0.1	0.5	0.4	0.3	0.2
Commercial	0	0	2	3	4	6
% Change	0.0	0.1	0.2	0.2	0.2	0.2
Personal Savings Rate (%)	0.0	0.0	0.1	0.2	0.2	0.2
Real Disposable Income Growth	0.0	0.0	0.4	0.4	0.3	0.2

Table 14
Analysis of Supply: Flexible Regime¹

	1995	1996	1997	1998	1999	2000
LF participation rate (level)	0.01	0.04	0.11	0.16	0.18	0.18
Labour force	0.01	0.06	0.17	0.25	0.28	0.28
Employment	0.02	0.14	0.39	0.61	0.71	0.72
Capital stock, M&E	0.17	0.49	1.09	1.54	1.82	1.98
Capital stock, non-residential	0.15	0.51	1.21	1.84	2.40	2.77
Normal output	0.06	0.24	0.60	0.99	1.27	1.46
Lucas supply	0.10	0.39	0.93	1.19	1.25	1.20
Aggregate demand	0.10	0.39	0.93	1.19	1.25	1.20
Labour productivity	0.07	0.25	0.54	0.58	0.54	0.47
Unemployment rate (level)	-0.01	-0.07	-0.20	-0.31	-0.38	-0.40
Contributions to increased growth						
Normal output	0.06	0.24	0.60	0.99	1.27	1.46
Factor contribution	0.01	0.15	0.43	0.83	1.11	1.30
Labour	0.01	0.08	0.24	0.37	0.43	0.44
Machinery	0.00	0.02	0.06	0.14	0.19	0.23
Structures	0.00	0.04	0.13	0.32	0.49	0.64
TFP contribution	0.04	0.09	0.17	0.17	0.16	0.15

¹ Deviation from the base case, percentage difference.

Figure 4 Flexible Regime

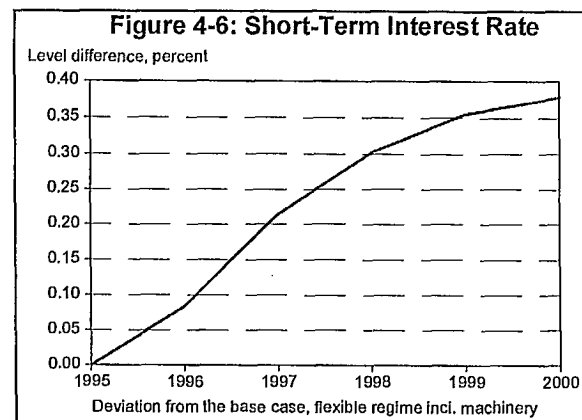
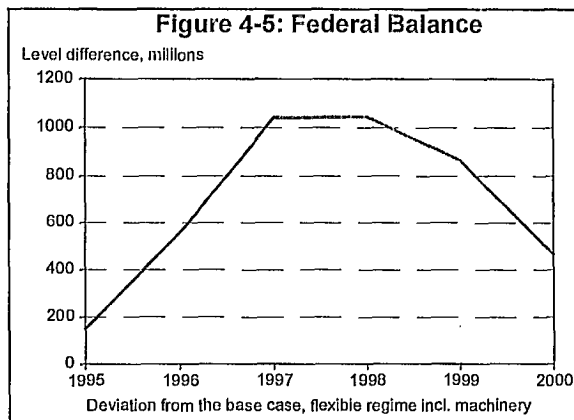
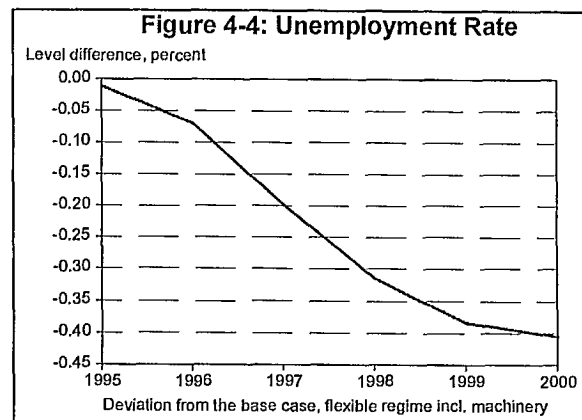
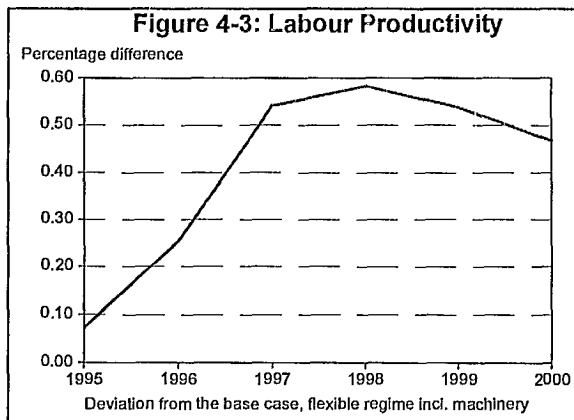
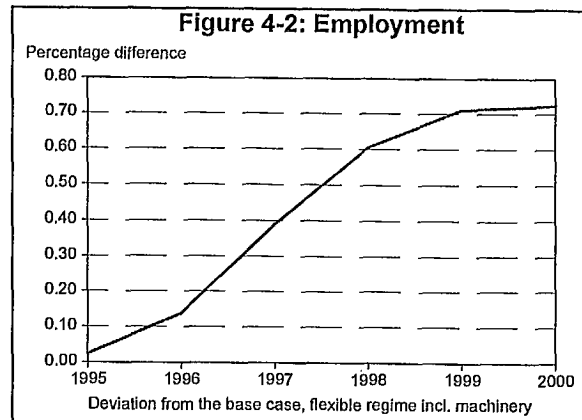
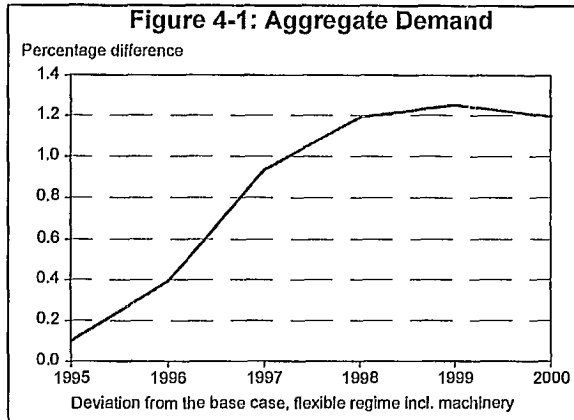


Figure 4-7: Real Exports

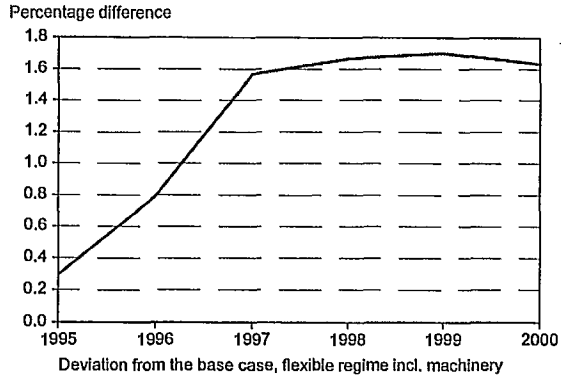


Figure 4-8: Real Imports

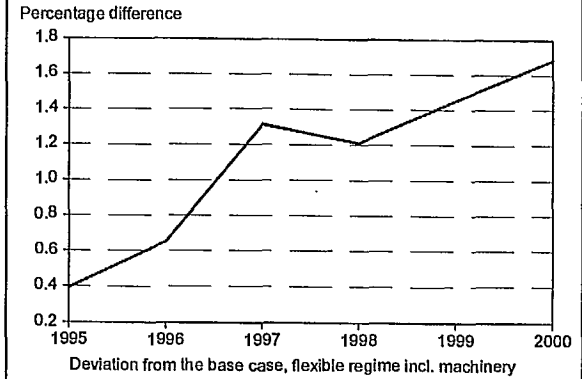


Figure 4-9: Current Account Balance

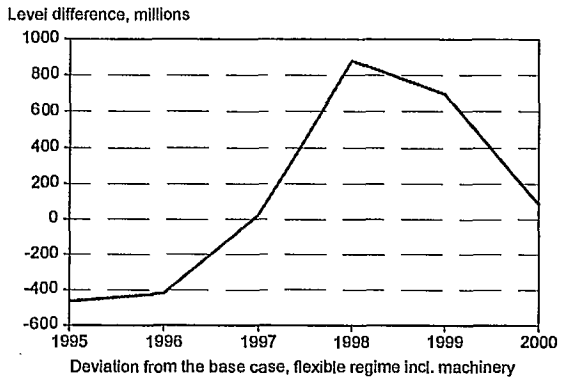


Figure 4-10: Trade Balance

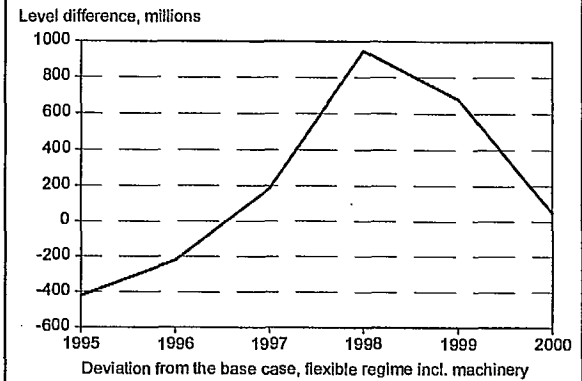


Figure 4-11: Exchange Rate, Canada/US

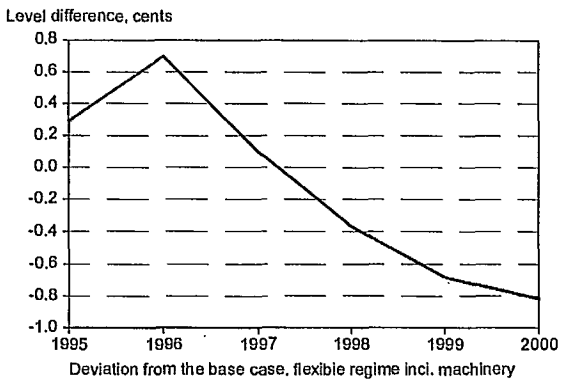


Figure 4-12: Short-Term Interest Rate

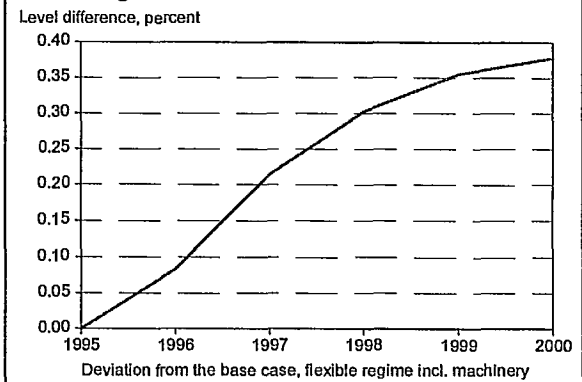


Figure 4-13: Contributions to Growth

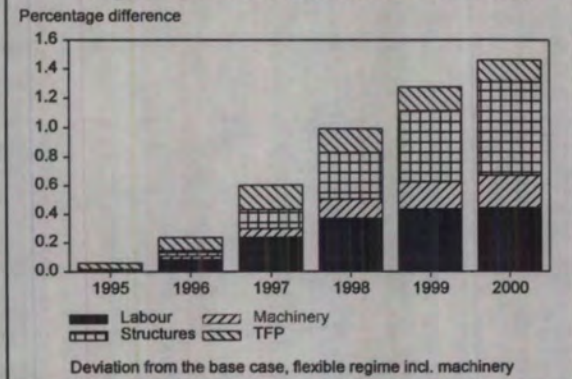


Figure 4-14: LF Participation Rate

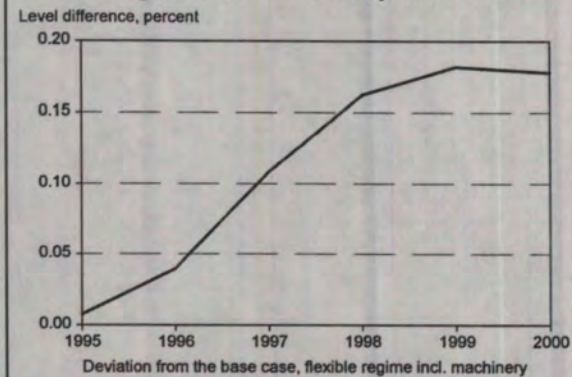


Figure 4-15: Labour Force

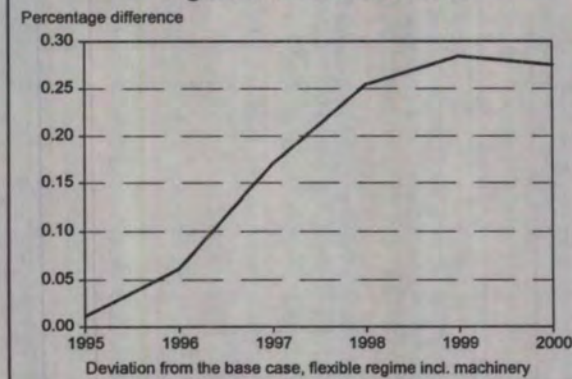


Figure 4-16: Employment

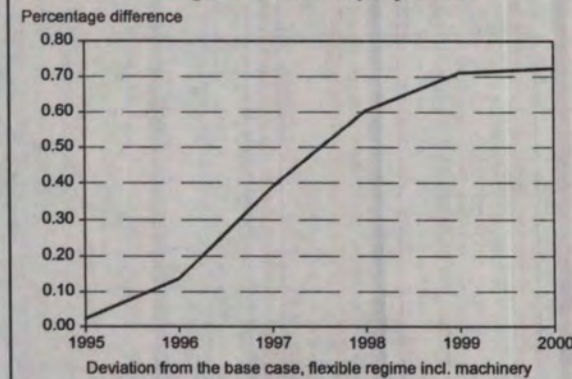


Figure 4-17: Capital Stock, Mach & Equip

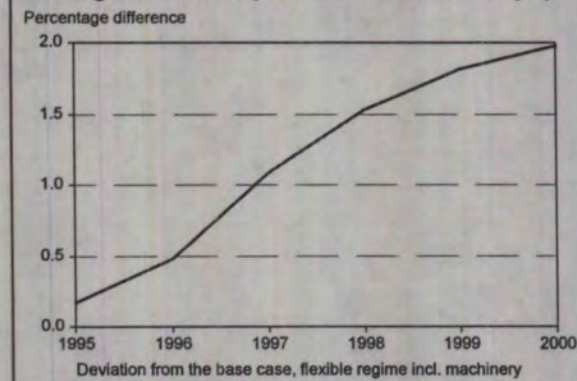


Figure 4-18: Capital Stock, Structures

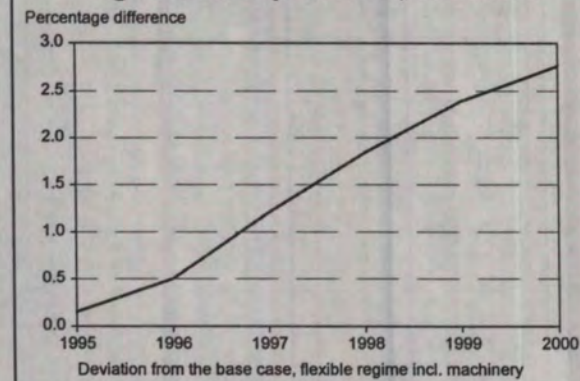


Table 15
Selected Economic Indicators: Fixed Regime

	1995	1996	1997	1998	1999	2000
Real GDP (\$1986 M)	613702	626087	640842	660108	685869	714629
% Change	2.6	2.0	2.4	3.0	3.9	4.2
Consumer Expenditures	358935	362645	366366	371786	381520	396834
% Change	1.6	1.0	1.0	1.5	2.6	4.0
Government Expenditure on Goods & Services	114821	109841	104040	101199	102589	104271
% Change	-1.5	-4.3	-5.3	-2.7	1.4	1.6
Government Fixed Investment	18271	18738	19090	19404	19722	20048
% Change	5.835	2.555	1.879	1.642	1.642	1.649
Business Residential Investment	28573	27938	28782	30458	34001	36947
% Change	-12.0	-2.2	3.0	5.8	11.6	8.7
Business Non-Residential Investment	86957	94233	100843	105452	112363	119440
% Change	7.1	8.4	7.0	4.6	6.6	6.3
Exports	251499	263072	273717	280850	287912	295243
% Change	11.2	4.6	4.0	2.6	2.5	2.5
Imports	250748	251745	251064	250955	255956	262333
% Change	8.6	0.4	-0.3	0.0	1.8	2.7
Inventory Change	6205	1732	-564	2283	3677	4550
Raw Material Price Index	1.301	1.280	1.310	1.352	1.381	1.415
% Change	8.0	-1.6	2.3	3.2	2.1	2.5
Industry Price Index	1.285	1.302	1.328	1.360	1.391	1.421
% Change	7.8	1.3	2.0	2.4	2.3	2.2
GDP Deflator	1.275	1.289	1.302	1.316	1.335	1.360
% Change	1.7	1.1	1.0	1.1	1.4	1.9
Consumer Price Index	1.335	1.359	1.388	1.415	1.443	1.475
% Change	2.2	1.8	2.1	1.9	2.0	2.2
Employment (000's)	13506	13584	13679	13818	14096	14496
% Change	1.6	0.6	0.7	1.0	2.0	2.8
Unemployment Rate (%)	9.5	9.5	9.7	9.9	9.8	9.4
Productivity (% Change)	1.0	1.4	1.6	2.0	1.9	1.3
Average Hourly Earnings	14.29	14.63	14.95	15.22	15.56	16.09
% Change	1.1	2.4	2.2	1.8	2.2	3.4
3-Month T.B. Rate (%)	6.93	5.40	5.38	5.10	4.96	5.13
US 3-Month T.B. Rate (%)	5.49	4.65	4.56	4.56	4.78	4.92
Canada-US Differential	1.44	0.75	0.81	0.54	0.18	0.21
Prime Rate (%)	8.67	7.18	7.04	6.71	6.56	6.72
GOC 10+ Bond Rate (%)	8.33	7.34	7.09	6.78	6.45	6.40
M2 (\$M)	374367	385572	395494	407824	424500	444705
% Change	4.2	3.0	2.6	3.1	4.1	4.8
Household Credit (\$M)	451519	451239	446690	444047	445269	454488
% Change	4.4	-0.1	-1.0	-0.6	0.3	2.1
Exchange Rate (US-Can.)	72.81	72.23	72.35	72.64	73.43	75.18
Current Account Balance (\$M)	-15558	-4763	7019	18350	25009	30724
Fed Government Balance (\$M)	-23655	-15635	-8862	-4738	182	7186
% GNP	-3.1	-2.0	-1.1	-0.6	0.0	0.8
Fed Government PA Balance (\$M)	-31943	-21674	-17641	-13256	-8337	-1333
% GNP	-4.2	-2.8	-2.2	-1.6	-0.9	-0.1
After-Tax Corporation Profit (\$M)	41094	43862	46655	56175	67559	76962
% Change	18.2	6.7	6.4	20.4	20.3	13.9
Housing Starts (000's)	111	105	111	130	160	174
Auto Sales (000's SAAR)	1188	1226	1260	1303	1360	1435
% Change	-5.7	3.2	2.8	3.3	4.4	5.5
Passenger	680	676	687	707	740	789
% Change	-9.1	-0.6	1.5	3.0	4.8	6.6
Commercial	507	550	574	596	620	646
% Change	-0.8	8.4	4.4	3.8	4.1	4.2
Personal Savings Rate (%)	7.1	6.8	6.9	6.7	6.5	6.1
Real Disposable Income Growth	1.2	0.8	1.0	1.2	2.3	3.5

Table 16
Impact on Selected Indicators: Fixed Regime

	1995	1996	1997	1998	1999	2000
Real GDP (\$1986 M)	591	2225	5392	7530	8719	9164
% Change	0.1	0.3	0.5	0.3	0.1	0.0
Consumer Expenditures	48	277	877	1815	2807	3740
% Change	0.0	0.1	0.2	0.3	0.3	0.2
Government Expenditure on Goods & Services	0	0	0	0	0	0
% Change	0.0	0.0	0.0	0.0	0.0	0.0
Government Fixed Investment	0	0	0	0	0	0
% Change	0	0	0	0	0	0
Business Residential Investment	9	39	104	217	370	540
% Change	0.0	0.1	0.2	0.4	0.4	0.4
Business Non-Residential Investment	633	1534	3321	3635	3790	3579
% Change	0.8	1.0	1.8	0.2	-0.1	-0.4
Exports	739	1879	4009	4609	5096	5213
% Change	0.3	0.4	0.8	0.2	0.1	0.0
Imports	991	1804	3440	2974	3413	3939
% Change	0.4	0.3	0.7	-0.2	0.2	0.2
Inventory Change	154	300	521	228	69	31
Raw Material Price Index	0.000	0.000	0.000	0.000	0.000	0.000
% Change	0.0	0.0	0.0	0.0	0.0	0.0
Industry Price Index	0.000	0.000	0.000	0.000	0.001	0.002
% Change	0.0	0.0	0.0	0.0	0.0	0.1
GDP Deflator	0.000	-0.001	-0.003	-0.002	-0.001	0.001
% Change	0.0	-0.1	-0.1	0.0	0.1	0.2
Consumer Price Index	0.000	0.000	0.000	0.001	0.002	0.004
% Change	0.0	0.0	0.0	0.0	0.1	0.1
Employment (000's)	3	15	42	73	98	114
% Change	0.0	0.1	0.2	0.2	0.2	0.1
Unemployment Rate (%)	0.0	-0.1	-0.1	-0.3	-0.4	-0.4
Productivity (% Change)	0.1	0.2	0.3	0.1	0.0	-0.1
Average Hourly Earnings	0.00	0.01	0.02	0.04	0.08	0.11
% Change	0.0	0.0	0.1	0.2	0.2	0.2
3-Month T.B. Rate (%)	0.00	0.05	0.17	0.28	0.38	0.45
US 3-Month T.B. Rate (%)	0.00	0.00	0.00	0.00	0.00	0.00
Canada-US Differential	0.00	0.05	0.17	0.28	0.38	0.45
Prime Rate (%)	0.00	0.05	0.17	0.28	0.37	0.45
GOC 10+ Bond Rate (%)	0.00	0.02	0.08	0.17	0.26	0.35
M2 (\$M)	3	232	804	1810	2761	3645
% Change	0.0	0.1	0.1	0.2	0.2	0.2
Household Credit (\$M)	20	53	215	1016	2819	5410
% Change	0.0	0.0	0.0	0.2	0.4	0.6
Exchange Rate (US-Can.)	0.00	0.00	0.00	0.00	0.00	0.00
Current Account Balance (\$M)	-394	-316	-249	679	772	492
Fed Government Balance (\$M)	126	431	947	1086	1036	731
% GNP	0.0	0.1	0.1	0.1	0.1	0.1
Fed Government PA Balance (\$M)	126	431	947	1086	1036	731
% GNP	0.0	0.1	0.1	0.1	0.1	0.1
After-Tax Corporation Profit (\$M)	204	693	1562	1757	1780	1658
% Change	0.6	1.2	1.9	-0.3	-0.6	-0.6
Housing Starts (000's)	0	0	0	0	1	2
Auto Sales (000's SAAR)	0	2	5	9	13	17
% Change	0.0	0.1	0.3	0.3	0.3	0.2
Passenger	0	1	3	6	9	11
% Change	0.0	0.1	0.3	0.4	0.3	0.2
Commercial	0	0	1	3	5	6
% Change	0.0	0.1	0.2	0.3	0.2	0.2
Personal Savings Rate (%)	0.0	0.0	0.1	0.2	0.2	0.3
Real Disposable Income Growth	0.0	0.1	0.2	0.4	0.3	0.3

Table 17
Analysis of Supply: Fixed Regime¹

	1995	1996	1997	1998	1999	2000
LF participation rate (level)	0.01	0.03	0.09	0.15	0.19	0.20
Labour force	0.01	0.05	0.14	0.24	0.29	0.31
Employment	0.02	0.11	0.31	0.53	0.70	0.80
Capital stock, M&E	0.17	0.48	1.11	1.58	1.87	2.01
Capital stock, non-residential	0.15	0.51	1.21	1.84	2.40	2.77
Normal output	0.06	0.22	0.55	0.95	1.28	1.51
Lucas supply	0.10	0.36	0.85	1.15	1.29	1.30
Aggregate demand	0.10	0.36	0.85	1.15	1.29	1.30
Labour productivity	0.07	0.25	0.54	0.62	0.58	0.50
Unemployment rate (level)	-0.01	-0.05	-0.15	-0.26	-0.36	-0.43
Contributions to increased growth						
Normal output	0.06	0.22	0.55	0.95	1.28	1.51
Factor contribution	0.01	0.13	0.38	0.78	1.11	1.36
Labour	0.01	0.07	0.19	0.32	0.43	0.49
Machinery	0.00	0.02	0.06	0.14	0.20	0.23
Structures	0.00	0.04	0.13	0.32	0.49	0.64
TFP contribution	0.04	0.09	0.17	0.17	0.16	0.15

¹ Deviation from the base case, percentage difference.

Figure 5 Fixed Regime

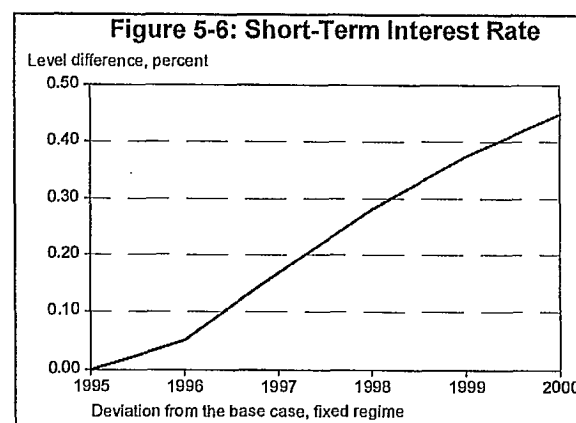
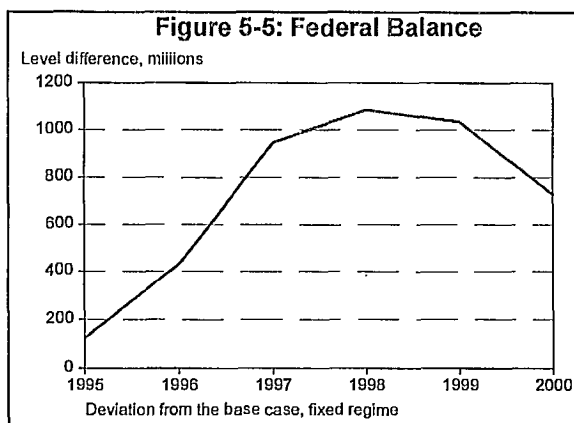
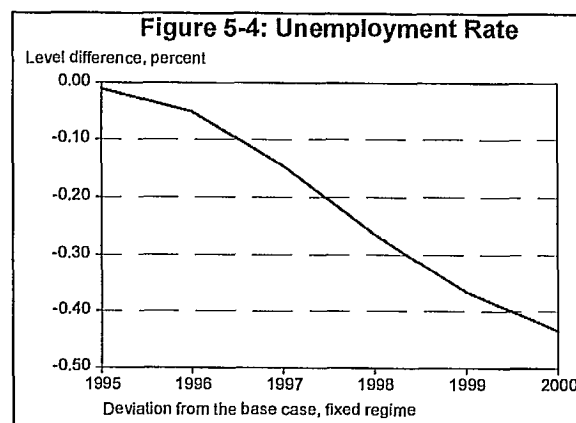
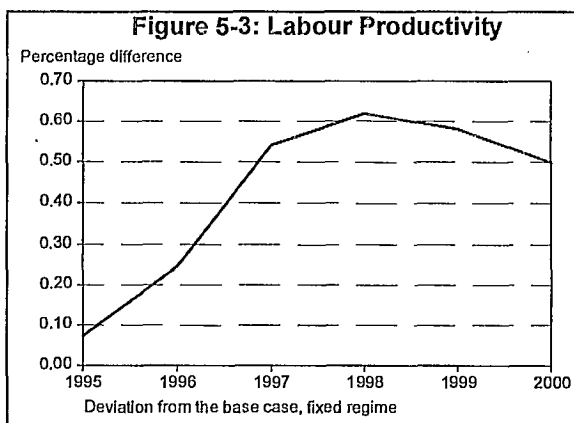
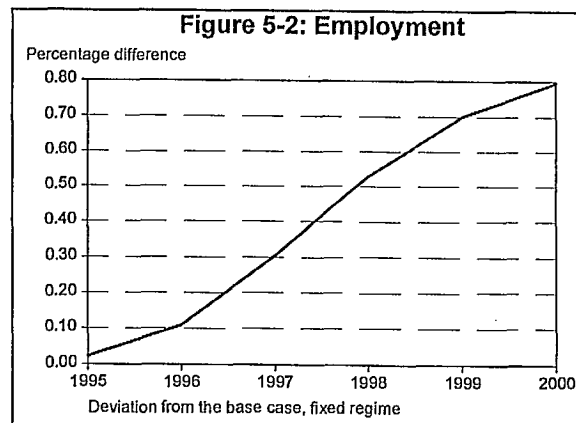
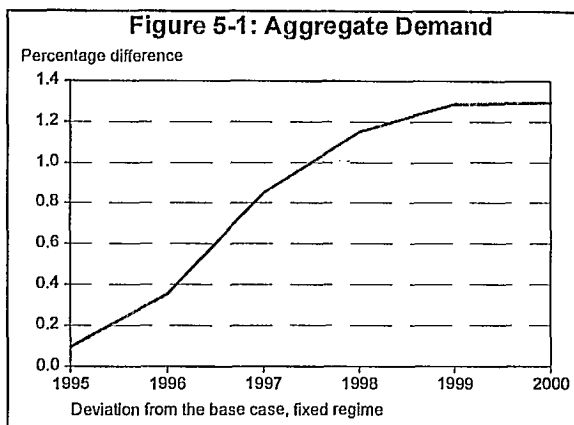


Figure 5-7: Real Exports

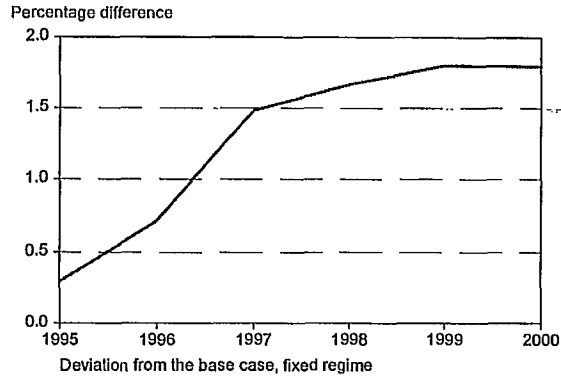


Figure 5-8: Real Imports

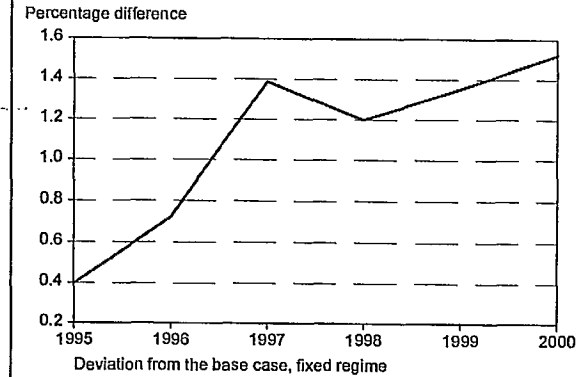


Figure 5-9: Current Account Balance

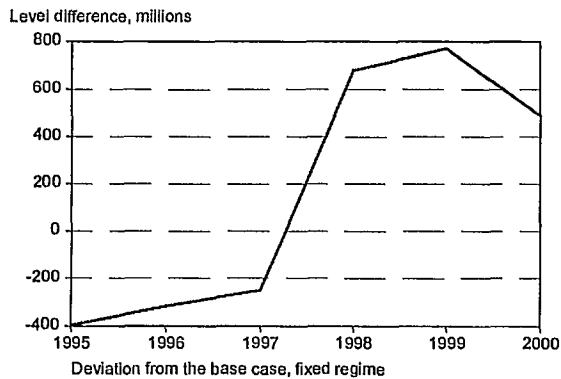


Figure 5-10: Trade Balance

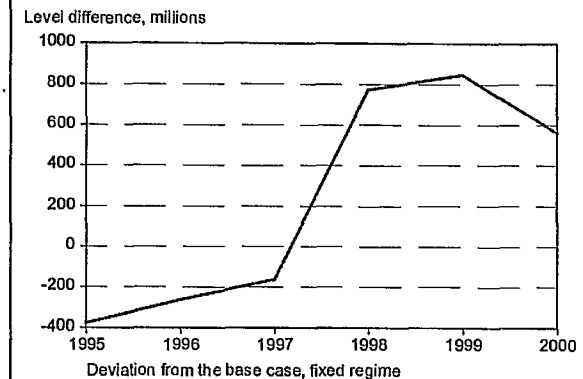


Figure 5-11: Exchange Rate, Canada/US

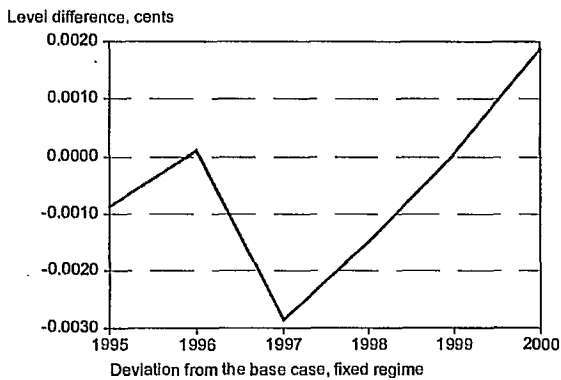


Figure 5-12: Short-Term Interest Rate

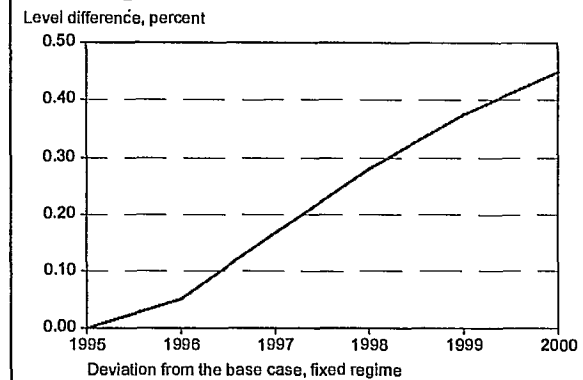


Figure 5-13: Contributions to Growth

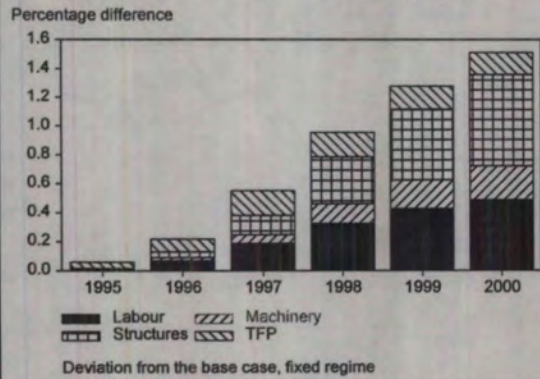


Figure 5-14: LF Participation Rate

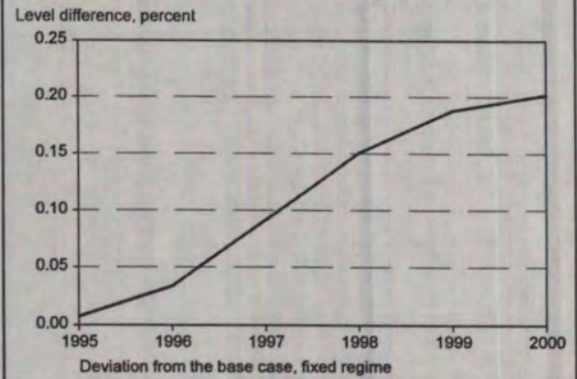


Figure 5-15: Labour Force

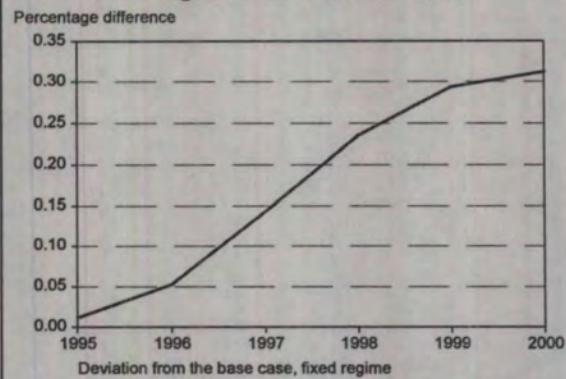


Figure 5-16: Employment

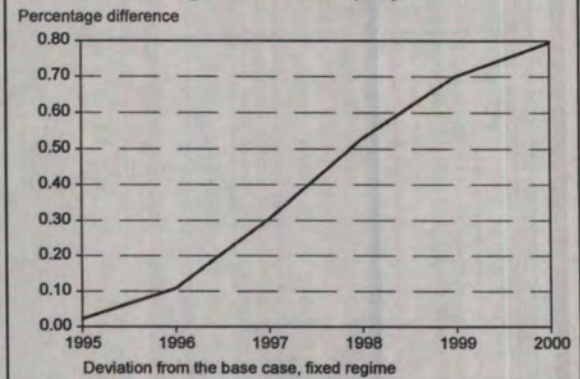


Figure 5-17: Capital Stock, Mach & Equip

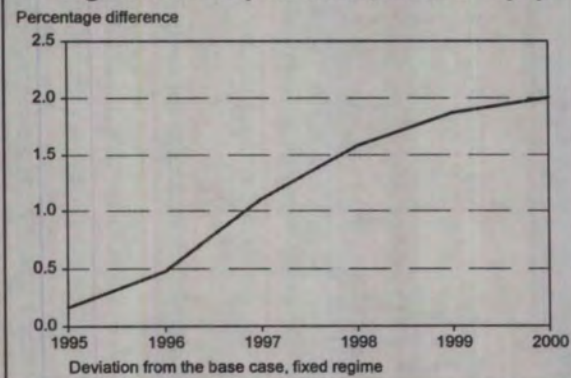


Figure 5-18: Capital Stock, Structures

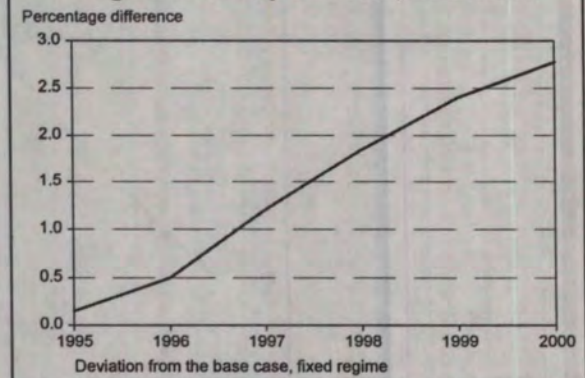


Table 18
Multiplier Analysis

	1995	1996	1997	1998	1999	2000
Partial Model Simulation:						
Impact on Business Investment and TFP	594	1324	2719	2570	2428	2048
Impact on Exports Excluding Machinery	421	814	1523	1111	1162	1234
Impact on Exports Including Machinery	738	1870	3986	4579	5090	5278
Impact on Imports Excluding Machinery	802	1193	1998	957	1057	1312
Impact on Imports Including Machinery	909	1430	2493	1493	1594	1838
Full Model Simulation:						
Impact on GDP - Investment and TFP	786	2044	4406	4555	4640	4514
Multiplier	1.32	1.54	1.62	1.77	1.91	2.20
Impact on GDP - Exports and Imports	-173	638	2107	3680	4098	3999
Multiplier	1.01	1.45	1.41	1.19	1.17	1.16
Impact on GDP - Flexible Regime Excl. Machinery	384	1591	3823	4546	4649	4342
Multiplier	1.80	1.68	1.70	1.67	1.84	2.20
Impact on GDP - Flexible Regime Incl. Machinery	602	2449	5922	7775	8490	8440
Multiplier	1.42	1.39	1.41	1.38	1.43	1.54
Impact on GDP - Fixed Regime	591	2225	5392	7530	8719	9164
Multiplier	1.40	1.26	1.28	1.33	1.47	1.67

Appendix A Original Canadian Macro Quarterly Equations⁴

Real Business Investment, Machinery and Equipment

IMEB

$(imeb/4)/kimeb.1-rdme$

=

$+ 0.09553 * (1-.61)*0.32*movavg(12,ygdpfc)*movavg(20,pgdpfc/ucme)/kimeb.1$

$+ 0.01122 * zimebft + 0.00418 * zimeb1 - 0.00016 * zimeb1^{**2}$

$+ 0.22048 * movavg(4,log(rprof.1)) - 0.14360$

$IMEB=4*kimeb.1*(rdme+??)$

Real Business Investment, Non-Residential Construction

INRCB

$(inrcb/4)/kinrcb.1-rdnrc$

=

$+ 0.00265 * 0.68*(1-.61)*movavg(16,ygdpfc.1)*movavg(20,pgdpfc.1/ucnrc.1)/ kinrcb.1$

$+ 0.00406 * step(87,3)-step(86,2)$

$+ 0.01983 * movavg(8,log(rprof.1)) - 0.00511$

$INRCB=4*kinrcb.1*(rdnrc+??)$

Real Exports, Mining

XMIN

$dlog(xmin)$

=

$+ 1.00000 * movavg(2,dlog(ipius^{**0.35}*pijap^{**0.31}*pieec^{**0.34}))+dlog(movavg(12,zxgst))$

$XMIN=xmin.1*exp(??)$

Real Exports, Food, Beverages and Tobacco

XFBT

$log(xfbt/xfbt.1)$

= $0.32673 * log(uscenfab)-log(xfbt.1)$

$- 0.23333 * log(pxfbt/(ppipff*exrcus)/zxgst) + 0.01059 * zxfbt$

⁴ An alphabetic listing of all variables used in Appendices A-D is available in the Appendix E.

- 21.3704

XFBT=xfbt.1*exp(??)

Real Exports, Wood

XWOOD

$\log(xwood/(uhsone^{**.8*jauhs^{**.2}}))$

= 0.21625 * $\log(movavg(2,pxwood)/movavg(12,ulcmc)*zxgst)$

+ 0.05230 * zxwood - 0.38363 * spike(75,3)

- 0.38183 * spike(75,4) + 0.20699 * step(87,3)-step(86,1)

+ 0.39418 * step(80,1) + 0.09572 * step(85,1) - 96.4670

XWOOD=(uhsone^{**.8*jauhs^{**.2}})*exp(??)

Real Exports, Pulp and Paper

XPP

$\log(xpp/(ipius^{**.72*ipijap^{**.09*ipieec^{**.19}}))-zxpp$

= 0.28668 * $\log(pxpp/movavg(12,ulcmc)*zxgst)$

- 0.34143 * spike(75,4) + 0.10278 * step(91,1) + 4.95925

XPP=(ipius^{**.72*ipijap^{**.09*ipieec^{**.19}}})*exp(zxpp+??)

Real Exports, Primary Metals

XPMT

$\log(xpmt/xpmt.1)$

= 0.40722 * $\log(ipius^{**.0.8*ipijap^{**.0.08*ipieec^{**.12}}/xpmt.1)$

+ 0.42554 * $\log(ppimmp.8*exrcus.8/pxpmt.8*zxgst)$

+ 0.08952 * step(91,1) - 0.22812

XPMT=xpmt.1*exp(??)

Real Exports, Autos and Parts

XAP

dlog(xap)

=

+ 1.00000 * $\log(movavg(2,dlog(uscedmvp))+diff(movavg(12,zxgst-1)))+zxap$

XAP=xap.1*exp(??)

Real Exports, Machinery

XMCH

$\log(xmch/xmch.1)$

$$= 0.34808 * \log(usipe/xmch.1) \\ + 0.27183 * \text{movavg}(4, \log(ppimae.2 * exrcus.2 / pxmch.2 * zxgst)) \\ + 0.04473 * \text{step}(89, 1) + 0.03595 * \text{step}(90, 1) + 0.00178 * zxmch \\ - 0.12715$$

$XMCH = xmch.1 * \exp(??)$

Real Exports, Chemical and Fertilizer

XCF

$\log(xcf/xcf.1)$

$$= 0.49260 * \log(ipius^{**0.8} * ipijap^{**0.06} * ipieec^{**0.14} / xcf.1) \\ + 0.24868 * \log(ppicap.4 * exrcus.4 / pxcf.4 * zxgst) + 0.00946 * zxcf \\ + 0.25329$$

$XCF = xcf.1 * \exp(??)$

Real Exports, Other Manufacturing

XOMF

$\log(xomf/xomf.1)$

$$= 0.31872 * \log(ipius^{**0.8} * ipijap^{**0.1} * ipieec^{**0.1}) - \log(xomf.1) \\ + 0.50888 * \log(ppi.1 * exrcus.1 / pxomf.1 * zxgst) + 0.01297 * zxomf \\ - 26.6716$$

$XOMF = \exp(??) * xomf.1$

Real Exports, Goods

XG

xg

$$= xag + xoil + xgas + xcoal + xmin + xfbt + xwood + xpp + xpmt + xap + xmch + xcf + xomf + xelec + xadj$$

Real Exports, Services

XS

$\log(xs/xs.1)$

$$= 0.47230 * 0.8 * \log(usgdp) + 0.2 * \log(ipijap) - \log(xs.1) \\ - 0.20476 * \text{movavg}(2, \log(pxs / (pdliimser * exrcus / zxgst))) + 0.05184$$

XS=xs.1*exp(??)

Real Exports, Total Goods and Services

X

x

= xg+xs

Real Imports, Fabricated Materials

IMFM

log(imfm/imfm.1)

= 0.43426 * log(movavg(2,ygdpfc))-log(imfm.1)
 - 0.38641 * movavg(12,log(pimfm/pgdpfc)) + 0.00283 * zimfm
 + 0.64022 * log(ygdpfc/ygdpfcn)
 - 0.07081 * step(75,2)-step(74,2)
 - 0.11783 * step(80,2)-step(79,2) - 1.49708

IMFM=imfm.1*exp(??)

Real Imports, Machinery and Equipment

IMME

log(imme/imme.1)

= 0.28710 * log(imeb/imme.1) + 0.44769 * log(ygdpfc/ygdpfcn)
 + 0.08110 * step(83,1)-step(81,1) - 0.00310 * zimme + 0.10979

IMME=imme.1*exp(??)

Real Imports, Autos and Parts

IMAP

log(imap)-movavg(2,log(cdap+xap))

= 0.05878 * step(84,1)-step(81,1) - 0.19706 * step(80,1)
 - 0.00459 * step(91,1) - 0.37272

IMAP=exp(movavg(2,log(cdap+xap))+??)

Real Imports, Other End Products

IMOEP

log(imoep/imoep.1)

= 0.35404 * log((c-cs+ircb+vcb)/imoep.1)

$$- 0.19223 * \log(\text{exrcus.4} * \text{ulcmus.4} / \text{ulcmc.4} * \text{zimgst})$$

$$+ 0.00750 * \text{zimoep} - 1.25462$$

$$\text{IMOEP} = \text{imoep.1} * \exp(??)$$

Real Imports, Food, Beverages and Tobacco

IMFBT

$$\log(\text{imfbt} / \text{movavg}(2, \text{c-csrent} + \text{xfbt}))$$

$$= - 0.67128 * \text{movavg}(12, \log(\text{exrcus.4} * \text{ulcmus.4} / \text{ulcmc.4} * \text{zimgst}))$$

$$+ 0.00140 * \text{zimfbt} - 3.76132$$

$$\text{IMFBT} = \text{movavg}(2, \text{c-csrent} + \text{xfbt}) * \exp(??)$$

Real Imports, Crude Materials

IMCM

$$\log(\text{imcm} / \text{movavg}(2, \text{ygdpcf}))$$

$$= - 0.17524 * \text{movavg}(12, \log(\text{exrcus.4} * \text{ulcmus.4} / \text{ulcmc.4} * \text{zimgst}))$$

$$- 0.09242 * \text{step}(87, 1) - 0.15824 * \text{step}(88, 1) - 4.69971$$

$$\text{IMCM} = \text{movavg}(2, \text{ygdpcf}) * \exp(??)$$

Real Imports, Oil

IMOIL

imoil

$$= 1.00000 * \text{imoil.1} * \exp(\text{movavg}(2, \text{dlog}(\text{ygdpcf}))) + 0.00000$$

Real Imports, Goods

IMG

img

$$= \text{imcm} + \text{imoil} + \text{imfbt} + \text{imfm} + \text{imme} + \text{imap} + \text{imoep} + \text{imadj}$$

Real Imports, Services

IMS

$$\log(\text{ims} / \text{ims.1})$$

$$= 0.19639 * \log(\text{ygdpcf} / \text{ims.1})$$

$$- 0.20654 * \log(\text{pims} / \text{movavg}(8, \text{ywssl} / \text{ygdpcf})) - 0.47107$$

$$\text{IMS} = \text{ims.1} * \exp(??)$$

Real Imports, Total Goods and Services

Appendix B Updated Canadian macroQuarterly Equations

Real Business Investment, Machinery and Equipment

IMEB

Ordinary Least Squares

QUARTERLY data for 56 periods from 1978Q1 to 1991Q4

$(\text{imeb}/4)/\text{kimeb}.1 - \text{rdme}$

=

+ 0.09721 * (1-.61)*0.32*movavg(12,ygdpfc)*movavg(20,pgdpfc/ucme)/kimeb.1
(3.96219)

+ 0.01157 * zimebft + 0.00420 * zimeb1 - 0.00016 * zimeb1**2
(6.07103) (6.25312) (7.07605)

+ 0.21214 * movavg(4,log(rprof.1)) - 0.14411
(5.33581) (5.67455)

Sum Sq 0.0010 Std Err 0.0045 LHS Mean 0.0165
R Sq 0.7844 R Bar Sq 0.7628 F 5, 50 36.3741
D.W.(.1) 0.8647 D.W.(4) 2.1468

IMEB=4*kimeb.1*(rdme+??)

Real Business Investment, Non-Residential Construction

INRCB

Ordinary Least Squares

QUARTERLY data for 36 periods from 1983Q1 to 1991Q4

$(\text{inrcb}/4)/\text{kinrcb}.1 - \text{rdnrc}$

=

+ 0.00381 * 0.68*(1-.61)*movavg(16,ygdpfc.1)*movavg(20,pgdpfc.1/ucnrc.1)/kinrcb.1
(2.73547)

+ 0.00396 * step(87,3)-step(86,2)
(6.70542)

+ 0.01404 * movavg(8,log(rprof.1)) - 0.00638
(1.41813) (2.41710)

Sum Sq 0.0000 Std Err 0.0011 LHS Mean 0.0040
R Sq 0.7021 R Bar Sq 0.6742 F 3, 32 25.1385
D.W.(.1) 1.1503 D.W.(4) 1.6619

INRCB=4*kinrcb.1*(rdnrc+??)

Real Exports, Mining

XMIN

(imposed)

QUARTERLY data for 88 periods from 1971Q1 to 1992Q4

dlog(xmin)

=

+ 1.00000 * movavg(2,dlog(ipius**0.35*ipijap**0.31*ipieec**0.34))+dlog(movavg(12,zxgst))
(NC)

+ 0.00000
(NC)

Sum Sq	NC	Std Err	NC	LHS Mean	NC	Res Mean	NC
R Sq	NC	R Bar Sq	NC	F 0, 0	NC	%RMSE	NC
D.W.(.1)	NC	D.W.(.4)	NC				

XMIN=xmin.1*exp(??)

Real Exports, Food, Beverages and Tobacco

XFBT

Ordinary Least Squares

QUARTERLY data for 83 periods from 1971Q2 to 1991Q4

log(xfbt/xfbt.1)

= 0.32749 * log(uscenfab)-log(xfbt.1)
(4.26747)

- 0.23109 * log(pxfbt/(ppipff*exrcus)/zxgst) + 0.01061 * zxfb
(1.47312) (3.74179)

- 21.3818
(3.92209)

Sum Sq	0.2822	Std Err	0.0598	LHS Mean	0.0101
R Sq	0.1938	R Bar Sq	0.1632	F 3, 79	6.3316
D.W.(.1)	2.2900	D.W.(.4)	1.9852		

XFBT=xfbt.1*exp(??)

Real Exports, Wood

XWOOD

Ordinary Least Squares

QUARTERLY data for 83 periods from 1971Q2 to 1991Q4

log(xwood/(uhsone**.8*jauhs**.2))

= 0.23464 * log(movavg(2,pxwood)/movavg(12,ulcmc)*zxgst)
(1.71542)

+ 0.05125 * zxwood - 0.40277 * spike(75,3)
(6.18303) (3.72165)

- 0.38443 * spike(75,4) + 0.20898 * step(87,3)-step(86,1)
(3.54731) (4.08886)

+ 0.40044 * step(80,1) + 0.09718 * step(85,1) - 94.3647
(7.04044) (2.80088) (5.74400)

Sum Sq	0.8524	Std Err	0.1066	LHS Mean	7.0404
--------	--------	---------	--------	----------	--------

R Sq 0.9196 R Bar Sq 0.9121 F 7, 75 122.601
D.W.(.1) 1.1078 D.W.(4) 1.9210

XWOOD=(uhsone**.8*jauhs**.2)*exp(??)

Real Exports, Pulp and Paper

XPP

Ordinary Least Squares

QUARTERLY data for 84 periods from 1971Q1 to 1991Q4

$\log(xpp/(ipius**.72*ipijap**.09*pieec**.19))-zxpp$

= 0.28742 * log(pxpp/movavg(12,ulcmc)*zxgst)
(5.79802)

- 0.32813 * spike(75,4) + 0.06464 * step(91,1) + 4.98200
(5.32808) (2.00384) (112.668)

Sum Sq 0.2977 Std Err 0.0610 LHS Mean 4.7261
R Sq 0.4198 R Bar Sq 0.3980 F 3, 80 19.2923
D.W.(.1) 1.2853 D.W.(4) 2.2679

XPP=(ipius**.72*ipijap**.09*pieec**.19)*exp(zxpp+??)

Real Exports, Primary Metals

XPMT

Ordinary Least Squares

QUARTERLY data for 76 periods from 1973Q1 to 1991Q4

$\log(xpmt/xpmt.1)$

= 0.40701 * log(ipius**0.8*ipijap**0.08*pieec**.12/xpmt.1)
(4.83903)

+ 0.41170 * log(ppimmp.8*exrcus.8/pxpmt.8*zxgst)
(3.29087)

+ 0.09019 * step(91,1) - 0.15259
(1.84895) (0.29649)

Sum Sq 0.5586 Std Err 0.0881 LHS Mean 0.0097
R Sq 0.2522 R Bar Sq 0.2210 F 3, 72 8.0932
D.W.(.1) 2.1818 D.W.(4) 1.8944

XPMT=xpmt.1*exp(??)

Real Exports, Autos and Parts

XAP

(imposed)

QUARTERLY data for 88 periods from 1971Q1 to 1992Q4

$d\log(xap)$

=

+ 1.00000 * movavg(2,dlog(uscedmvp))+diff(movavg(12,zxgst-1))+zxap
(NC)

+ 0.00000
(NC)

Sum Sq	NC	Std Err	NC	LHS Mean	NC	Res Mean	NC
R Sq	NC	R Bar Sq	NC	F 0, 0	NC	%RMSE	NC
D.W.(.1)	NC	D.W.(.4)	NC				

XAP=xap.1*exp(??)

Real Exports, Machinery

XMCH
Ordinary Least Squares
QUARTERLY data for 79 periods from 1972Q2 to 1991Q4

log(xmch/xmch.1)

= 0.35117 * log(usipe/xmch.1)
(5.60637)

+ 0.27338 * movavg(4,log(ppimae.2*exrcus.2/pxmch.2*zxgst))
(2.07978)

+ 0.04731 * step(89,1) + 0.02913 * step(90,1) + 0.00181 * zxmch
(1.42843) (0.88122) (1.22223)

- 0.12512
(0.23766)

Sum Sq	0.1909	Std Err	0.0511	LHS Mean	0.0241
R Sq	0.3063	R Bar Sq	0.2587	F 5, 73	6.4450
D.W.(.1)	2.2484	D.W.(.4)	1.9969		

XMCH=xmch.1*exp(??)

Real Exports, Chemical and Fertilizer

XCF
Ordinary Least Squares
QUARTERLY data for 80 periods from 1972Q1 to 1991Q4

log(xcf/xcf.1)

= 0.48634 * log(ipius**0.8*ipijap**0.06*ipieec**0.14/xcf.1)
(5.26525)

+ 0.25952 * log(ppicap.4*exrcus.4/pxcf.4*zxgst) + 0.00926 * zxcf
(2.89548) (4.49128)

+ 0.19673
(0.57609)

Sum Sq	0.5059	Std Err	0.0816	LHS Mean	0.0152
R Sq	0.2692	R Bar Sq	0.2404	F 3, 76	9.3338
D.W.(.1)	2.1586	D.W.(.4)	1.9772		

XCF=xcf.1*exp(??)

Real Exports, Other Manufacturing

XOMF
Ordinary Least Squares
QUARTERLY data for 83 periods from 1971Q2 to 1991Q4

$\log(xomf/xomf.1)$

$$\begin{aligned} &= 0.32160 * \log(ipius^{**}.8 * ipijap^{**}.1 * pleec^{**}.1) - \log(xomf.1) \\ &\quad (5.03272) \\ &+ 0.48314 * \log(ppi.1 * excus.1 / pxomf.1 * zxgst) + 0.01342 * zxomf \\ &\quad (2.81438) \quad (3.91881) \\ &- 27.3979 \\ &\quad (4.18845) \end{aligned}$$

Sum Sq 0.2060 Std Err 0.0511 LHS Mean 0.0197
R Sq 0.2490 R Bar Sq 0.2205 F 3, 79 8.7311
D.W.(.1) 2.1089 D.W.(4) 1.9425

$XOMF = \exp(??) * xomf.1$

Real Exports, Goods

XG
(Identity)

xg

$$= xag + xoil + xgas + xcoal + xmin + xfbt + xwood + xpp + xpmt + xap + xmch + xcf + xomf + xelec + xadj$$

Real Exports, Services

XS
Ordinary Least Squares
QUARTERLY data for 48 periods from 1981Q1 to 1992Q4

$\log(xs/xs.1)$

$$\begin{aligned} &= 0.40834 * 0.8 * \log(usgdp) + 0.2 * \log(ipijap) - \log(xs.1) \\ &\quad (3.78959) \\ &- 0.15045 * \text{movavg}(2, \log(pxs / (pdiimser * excus / zxgst))) + 0.17579 \\ &\quad (1.62153) \quad (0.46587) \end{aligned}$$

Sum Sq 0.0565 Std Err 0.0354 LHS Mean 0.0055
R Sq 0.2448 R Bar Sq 0.2113 F 2, 45 7.2941
D.W.(.1) 1.8530 D.W.(4) 1.8205

$XS = xs.1 * \exp(??)$

Real Exports, Total Goods and Services

X
(Identity)

x

$$= xg + xs$$

Real Imports, Fabricated Materials

IMFM

Ordinary Least Squares

QUARTERLY data for 68 periods from 1975Q1 to 1991Q4

$\log(\text{imfm}/\text{imfm}.1)$

$$= 0.45012 * \log(\text{movavg}(2, \text{ygdpc})) - \log(\text{imfm}.1) \\ (6.00312)$$

$$- 0.42631 * \text{movavg}(12, \log(\text{pimfm}/\text{pgdpc})) + 0.00301 * \text{zimfm} \\ (2.08709) \quad (2.16895)$$

$$+ 0.69598 * \log(\text{ygdpc}/\text{ygdpcn}) \\ (2.60835)$$

$$- 0.06811 * \text{step}(75,2) - \text{step}(74,2) \\ (1.21137)$$

$$- 0.12069 * \text{step}(80,2) - \text{step}(79,2) - 1.53717 \\ (4.23959) \quad (5.76406)$$

Sum Sq 0.1427 Std Err 0.0484 LHS Mean 0.0111
R Sq 0.4295 R Bar Sq 0.3734 F 6, 61 7.6553
D.W.(.1) 1.8684 D.W.(4) 2.1098

IMFM=imfm.1*exp(??)

Real Imports, Machinery and Equipment

IMME

Ordinary Least Squares

QUARTERLY data for 83 periods from 1971Q2 to 1991Q4

$\log(\text{imme}/\text{imme}.1)$

$$= 0.28471 * \log(\text{imeb}/\text{imme}.1) + 0.39372 * \log(\text{ygdpc}/\text{ygdpcn}) \\ (4.37439) \quad (1.68364)$$

$$+ 0.07959 * \text{step}(83,1) - \text{step}(81,1) - 0.00297 * \text{zimme} + 0.11210 \\ (4.53891) \quad (3.37640) \quad (3.85455)$$

Sum Sq 0.1518 Std Err 0.0441 LHS Mean 0.0098
R Sq 0.2820 R Bar Sq 0.2452 F 4, 78 7.6593
D.W.(.1) 1.8046 D.W.(4) 2.3276

IMME=imme.1*exp(??)

Real Imports, Autos and Parts

IMAP

Ordinary Least Squares

QUARTERLY data for 83 periods from 1971Q2 to 1991Q4

$\log(\text{imap}) - \text{movavg}(2, \log(\text{cdap} + \text{xap}))$

$$= 0.05874 * \text{step}(84,1) - \text{step}(81,1) - 0.19710 * \text{step}(80,1) \\ (2.56572) \quad (11.9161)$$

$$\begin{aligned} & - 0.01328 * \text{step}(91,1) - 0.37272 \\ & (0.37025) \quad (32.6046) \end{aligned}$$

Sum Sq 0.3613 Std Err 0.0676 LHS Mean -0.4958
R Sq 0.7239 R Bar Sq 0.7135 F 3, 79 69.0573
D.W.(.1) 0.9453 D.W.(4) 1.6690

$$\text{IMAP} = \exp(\text{movavg}(2, \log(\text{cdap} + \text{xap})) + ??)$$

Real Imports, Other End Products

IMOEP
Ordinary Least Squares
QUARTERLY data for 68 periods from 1975Q1 to 1991Q4

$$\log(\text{imoep}/\text{imoep}.1)$$

$$\begin{aligned} & = 0.30398 * \log((\text{c-cs} + \text{ircb} + \text{vcb})/\text{imoep}.1) \\ & (3.72373) \end{aligned}$$

$$\begin{aligned} & - 0.20287 * \log(\text{exrcus}.4 * \text{ulcmus}.4 / \text{ulcmc}.4 * \text{zimgst}) \\ & (2.61586) \end{aligned}$$

$$\begin{aligned} & + 0.00652 * \text{zimoep} - 1.07974 \\ & (3.76211) \quad (3.66574) \end{aligned}$$

Sum Sq 0.0878 Std Err 0.0370 LHS Mean 0.0275
R Sq 0.1930 R Bar Sq 0.1551 F 3, 64 5.1006
D.W.(.1) 1.9066 D.W.(4) 2.0637

$$\text{IMOEP} = \text{imoep}.1 * \exp(??)$$

Real Imports, Food, Beverages and Tobacco

IMFBT
Ordinary Least Squares
QUARTERLY data for 44 periods from 1981Q1 to 1991Q4

$$\log(\text{imfbt}/\text{movavg}(2, \text{c-csrent} + \text{xfbt}))$$

$$\begin{aligned} & = - 0.68020 * \text{movavg}(12, \log(\text{exrcus}.4 * \text{ulcmus}.4 / \text{ulcmc}.4 * \text{zimgst})) \\ & (7.14779) \end{aligned}$$

$$\begin{aligned} & + 0.00155 * \text{zimfbt} - 3.77053 \\ & (3.33611) \quad (154.501) \end{aligned}$$

Sum Sq 0.0344 Std Err 0.0290 LHS Mean -3.6094
R Sq 0.8087 R Bar Sq 0.7993 F 2, 41 86.6485
D.W.(.1) 1.3013 D.W.(4) 2.4521

$$\text{IMFBT} = \text{movavg}(2, \text{c-csrent} + \text{xfbt}) * \exp(??)$$

Real Imports, Crude Materials

IMCM
Ordinary Least Squares
QUARTERLY data for 84 periods from 1971Q1 to 1991Q4

$$\log(\text{imcm}/\text{movavg}(2, \text{ygdpcf}))$$

$$= -0.20393 * \text{movavg}(12, \log(\text{exrcus}.4 * \text{ulcmus}.4 / \text{ulcmc}.4 * \text{zimgst}))$$

(1.66421)

$$-0.09262 * \text{step}(87,1) - 0.15815 * \text{step}(88,1) - 4.70066$$

(2.30326) (3.50036) (444.696)

Sum Sq 0.4868 Std Err 0.0780 LHS Mean -4.7419
 R Sq 0.5896 R Bar Sq 0.5742 F 3, 80 38.3060
 D.W.(.1) 1.2407 D.W.(.4) 1.8133

$$\text{IMCM} = \text{movavg}(2, \text{ygdpcf}) * \exp(??)$$

Real Imports, Oil

IMOIL
 (imposed)
 QUARTERLY data for 88 periods from 1971Q1 to 1992Q4

imoil

$$= 1.00000 * \text{imoil}.1 * \exp(\text{movavg}(2, \text{dlog}(\text{ygdpcf}))) + 0.00000$$

(NC) (NC)

Sum Sq	NC	Std Err	NC	LHS Mean	NC	Res Mean	NC
R Sq	NC	R Bar Sq	NC	F 0, 0	NC	%RMSE	NC
D.W.(.1)	NC	D.W.(.4)	NC				

Real Imports, Goods

IMG
 (Identity)

img

$$= \text{imcm} + \text{imoil} + \text{imfbt} + \text{imfm} + \text{imme} + \text{imap} + \text{imoep} + \text{imadj}$$

Real Imports, Services

IMS
 Ordinary Least Squares
 QUARTERLY data for 84 periods from 1971Q1 to 1991Q4

log(ims/ims.1)

$$= 0.16732 * \log(\text{ygdpcf}/\text{ims}.1)$$

(2.72043)

$$-0.18123 * \log(\text{pims}/\text{movavg}(8, \text{ywssl}\$/\text{ygdpcf})) - 0.39717$$

(2.41683) (2.58099)

Sum Sq 0.1023 Std Err 0.0355 LHS Mean 0.0112
 R Sq 0.0859 R Bar Sq 0.0633 F 2, 81 3.8046
 D.W.(.1) 1.7411 D.W.(.4) 1.4534

$$\text{IMS} = \text{ims}.1 * \exp(??)$$

Real Imports, Total Goods and Services

IM
 (Identity)

im

= img+ims

Normal Output

YGDPFCN
(Identity)

ygdpcfn

= exp(2.49076+.61*log(le)+(1-.61)*(1-.32)*log(kinrcb.1)+(1-.61)*.32*
log(kimeb.1)-.05925*(step(81,2)-step(83,1))+.0018*ztfp+ztfpa)

Appendix C Annual Equations Without FDI

Real Business Investment, Machinery and Equipment

IMEB

Ordinary Least Squares

ANNUAL data for 14 periods from 1978 to 1991

$$\text{imeb}/\text{kimeb}.1-(1-(1-\text{rdme})^{**4})$$

=

$$+ 0.60490 * (1-.61)^{*0.32} * \text{movavg}(3, \text{ygdpc}) * \text{movavg}(5, \text{pgdpc}/\text{ucme}) / \text{kimeb}.1$$

(4.05404)

$$+ 0.07427 * \text{zimebft} + 0.06930 * \text{zimeb}1 - 0.00917 * \text{zimeb}1^{**2}$$

(4.84121) (4.15396) (4.90813)

$$+ 0.69743 * \log(\text{rprof}.1) - 0.79004$$

(2.33469) (4.93024)

Sum Sq 0.0022 Std Err 0.0165 LHS Mean 0.1203
R Sq 0.9085 R Bar Sq 0.8514 F 5, 8 15.8956
D.W.(.1) 2.8510 D.W.(2) 1.6417

$$\text{IMEB} = \text{kimeb}.1 * ((1-(1-\text{rdme})^{**4}) + ??)$$

Real Business Investment, Non-Residential Construction

INRCB

Ordinary Least Squares

ANNUAL data for 9 periods from 1983 to 1991

$$\text{inrcb}/\text{kinrcb}.1-(1-(1-\text{rdnrc})^{**4})$$

=

$$+ 0.02364 * 0.68 * (1-.61)^{*0.32} * \text{movavg}(4, \text{ygdpc}.1) * \text{movavg}(5, \text{pgdpc}.1/\text{ucnrc}.1) / \text{kinrcb}.1$$

(1.42334)

$$+ 0.00817 * \text{step}(87,1) - \text{step}(86,1)$$

(1.14618)

$$- 0.00836 * \text{movavg}(2, \log(\text{rprof}.1)) - 0.02620$$

(0.07433) (1.00341)

Sum Sq 0.0001 Std Err 0.0053 LHS Mean 0.0217
R Sq 0.6112 R Bar Sq 0.3780 F 3, 5 2.6206
D.W.(.1) 1.9513 D.W.(2) 2.6832

$$\text{INRCB} = \text{kinrcb}.1 * ((1-(1-\text{rdnrc})^{**4}) + ??)$$

Real Exports, Mining

XMIN

(imposed)

ANNUAL data for 22 periods from 1971 to 1992

dlog(xmin)

=

+ 1.00000 * dlog(ipius**0.35*ipijap**0.31*ipieec**0.34)+dlog(movavg(3,zxgst))
(NC)

+ 0.00000
(NC)

Sum Sq	NC	Std Err	NC	LHS Mean	NC	Res Mean	NC
R Sq	NC	R Bar Sq	NC	F 0, 0	NC	%RMSE	NC
D.W.(1)	NC	D.W.(2)	NC				

XMIN=xmin.1*exp(??)

Real Exports, Food, Beverages and Tobacco

XFBT

Ordinary Least Squares

ANNUAL data for 20 periods from 1972 to 1991

log(xfbt/xfbt.1)

= 0.65653 * log(uscenfab)-log(xfbt.1)
(3.20711)

- 0.21928 * log(pxfbt/(ppipff*exrcus)/zxgst) + 0.02264 * zxfbt
(0.49024) (2.91420)

- 44.3936
(2.98982)

Sum Sq	0.0873	Std Err	0.0739	LHS Mean	0.0406
R Sq	0.3922	R Bar Sq	0.2782	F 3, 16	3.4413
D.W.(1)	1.7857	D.W.(2)	2.2906		

XFBT=xfbt.1*exp(??)

Real Exports, Wood

XWOOD

Ordinary Least Squares

ANNUAL data for 21 periods from 1971 to 1991

log(xwood/(uhsone**.8*jauhs**.2))

= 0.08330 * log(pxwood/movavg(3,ulcmc)*zxgst) + 0.05458 * zxwood
(0.33578) (3.85264)

- 0.21630 * spike(75,1) + 0.18427 * step(87,1)-step(86,1)
(2.17795) (1.78576)

+ 0.34301 * step(80,1) + 0.07034 * step(85,1) - 101.044
(3.16964) (1.22297) (3.59773)

Sum Sq	0.1206	Std Err	0.0928	LHS Mean	7.0324
R Sq	0.9533	R Bar Sq	0.9333	F 6, 14	47.6143
D.W.(1)	1.6036	D.W.(2)	2.1778		

XWOOD=(uhsone**.8*jauhs**.2)*exp(??)

Real Exports, Pulp and Paper

XPP

Ordinary Least Squares

ANNUAL data for 21 periods from 1971 to 1991

$\log(xpp/(ipius**.72*ipijap**.09*ipieec**.19))-zxpp$

= 0.29993 * $\log(pxpp/movavg(3,ulcmc)*zxgst)$
(3.74164)

- 0.07034 * spike(75,1) + 0.06290 * step(91,1) + 4.99991
(1.49574) (1.32370) (68.1618)

Sum Sq 0.0343 Std Err 0.0449 LHS Mean 4.7274
R Sq 0.4650 R Bar Sq 0.3706 F 3, 17 4.9260
D.W.(.1) 1.9503 D.W.(.2) 2.7858

XPP=(ipius**.72*ipijap**.09*ipieec**.19)*exp(zxpp+??)

Real Exports, Primary Metals

XPMT

Ordinary Least Squares

ANNUAL data for 19 periods from 1973 to 1991

$\log(xpmt/xpmt.1)$

= 0.50053 * $\log(ipius**.08*ipijap**.08*ipieec**.12/xpmt.1)$
(3.39335)

+ 0.68674 * $\log(ppimmp.2*exrcus.2/pxpmt.2*zxgst)$
(3.26329)

+ 0.09636 * step(91,1) - 1.03829
(1.10254) (1.04421)

Sum Sq 0.0917 Std Err 0.0782 LHS Mean 0.0382
R Sq 0.5239 R Bar Sq 0.4287 F 3, 15 5.5022
D.W.(.1) 2.7794 D.W.(.2) 1.7323

XPMT=xpmt.1*exp(??)

Real Exports, Autos and Parts

XAP

(imposed)

ANNUAL data for 22 periods from 1971 to 1992

dlog(xap)

= 1.00000 * dlog(uscedmvp)+diff(movavg(3,zxgst-1))+zxap + 0.00000
(NC) (NC)

Sum Sq NC Std Err NC LHS Mean NC Res Mean NC
R Sq NC R Bar Sq NC F 0, 0 NC %RMSE NC
D.W.(.1) NC D.W.(.2) NC

XAP=xap.1*exp(??)

Real Exports, Machinery

XMCH

Ordinary Least Squares

ANNUAL data for 20 periods from 1972 to 1991

log(xmch/xmch.1)

= 0.49708 * log(usipe/xmch.1)
(4.46784)

+ 0.68610 * log(ppimae*exrcus/pxmch*zxgst)
(2.78714)

+ 0.13222 * step(89,1) + 0.02383 * step(90,1) - 0.00269 * zxmch
(1.78693) (0.34629) (0.19023)

- 1.43826
(1.23341)

Sum Sq 0.0431 Std Err 0.0555 LHS Mean 0.0984
R Sq 0.7302 R Bar Sq 0.6338 F 5, 14 7.5778
D.W.(1) 2.4162 D.W.(2) 1.9860

XMCH=xmch.1*exp(??)

Real Exports, Chemical and Fertilizer

XCF

Ordinary Least Squares

ANNUAL data for 20 periods from 1972 to 1991

log(xcf/xcf.1)

= 0.90981 * log(ipius**0.8*ipijap**0.06*ipieec**0.14/xcf.1)
(4.93108)

+ 0.46899 * log(ppicap.1*exrcus.1/pxcf.1*zxgst) + 0.06430 * zxcf
(2.32948) (4.04640)

+ 0.43213
(0.54050)

Sum Sq 0.1369 Std Err 0.0925 LHS Mean 0.0580
R Sq 0.6064 R Bar Sq 0.5326 F 3, 16 8.2173
D.W.(1) 1.4950 D.W.(2) 1.6762

XCF=xcf.1*exp(??)

Real Exports, Other Manufacturing

XOMF

Ordinary Least Squares

ANNUAL data for 20 periods from 1972 to 1991

log(xomf/xomf.1)

= 0.62894 * log(ipius**0.8*ipijap**0.1*ipieec**0.1)-log(xomf.1)

(4.89651)

+ 1.20987 * log(ppi*exrcus/pxomf*zxgst) + 0.02321 * zxomf
(2.82993) (2.67958)

- 48.8514
(3.08397)

Sum Sq 0.0671 Std Err 0.0647 LHS Mean 0.0811
R Sq 0.6693 R Bar Sq 0.6073 F 3, 16 10.7944
D.W.(1) 1.7494 D.W.(2) 2.5581

XOMF=exp(??)*xomf.1

Real Exports, Goods

XG
(Identity)

xg

= xag+xoil+xgas+xcoal+xmin+xfbt+xwood+xpp+xpmt+xap+xmch+xcf+xomf+xelec+xadj

Real Exports, Services

XS
Ordinary Least Squares
ANNUAL data for 12 periods from 1981 to 1992

log(xs/xs.1)

= 0.80330 * 0.8*log(usgdp)+0.2*log(ipijap)-log(xs.1)
(4.25023)

- 0.35042 * log(pxs/(pdlmser*exrcus/zxgst)) + 0.08183
(1.62375) (0.08473)

Sum Sq 0.0160 Std Err 0.0421 LHS Mean 0.0187
R Sq 0.6675 R Bar Sq 0.5936 F 2, 9 9.0345
D.W.(1) 1.2560 D.W.(2) 1.1964

XS=xs.1*exp(??)

Real Exports, Total Goods and Services

X
(Identity)

x

= xg+xs

Real Imports, Fabricated Materials

IMFM
Ordinary Least Squares
ANNUAL data for 17 periods from 1975 to 1991

log(imfm/imfm.1)

$$\begin{aligned}
 &= 0.69774 * \log(\text{ygdpc}) - \log(\text{imfm}.1) \\
 &\quad (4.35286) \\
 &- 0.56494 * \text{movavg}(3, \log(\text{pimfm}/\text{pgdpc})) + 0.01884 * \text{zimfm} \\
 &\quad (1.07952) \quad (1.32109) \\
 &+ 0.79206 * \log(\text{ygdpc}/\text{ygdpcn}) \\
 &\quad (0.99608) \\
 &- 0.16274 * \text{step}(80,1) - \text{step}(79,1) - 2.40870 \\
 &\quad (2.20317) \quad (4.19184)
 \end{aligned}$$

Sum Sq 0.0478 Std Err 0.0691 LHS Mean 0.0465
 R Sq 0.7292 R Bar Sq 0.5667 F 6, 10 4.4874
 D.W.(1) 2.2844 D.W.(2) 2.4343

IMFM=imfm.1*exp(??)

Real Imports, Machinery and Equipment

IMME
 Ordinary Least Squares
 ANNUAL data for 20 periods from 1972 to 1991

$$\begin{aligned}
 &\log(\text{imme}/\text{imme}.1) \\
 &= 0.77168 * \log(\text{imeb}/\text{imme}.1) + 1.27415 * \log(\text{ygdpc}/\text{ygdpcn}) \\
 &\quad (4.86524) \quad (1.86395) \\
 &+ 0.16451 * \text{step}(83,1) - \text{step}(81,1) - 0.02909 * \text{zimme} + 0.28091 \\
 &\quad (3.88739) \quad (2.67026) \quad (3.08915)
 \end{aligned}$$

Sum Sq 0.0477 Std Err 0.0564 LHS Mean 0.0385
 R Sq 0.7858 R Bar Sq 0.7287 F 4, 15 13.7565
 D.W.(1) 1.8059 D.W.(2) 2.1360

IMME=imme.1*exp(??)

Real Imports, Autos and Parts

IMAP
 Ordinary Least Squares
 ANNUAL data for 21 periods from 1971 to 1991

$$\begin{aligned}
 &\log(\text{imap}) - \log(\text{cdap} + \text{xap}) \\
 &= 0.06484 * \text{step}(84,1) - \text{step}(81,1) - 0.18996 * \text{step}(80,1) \\
 &\quad (1.58247) \quad (6.45928) \\
 &- 0.01196 * \text{step}(91,1) - 0.38292 \\
 &\quad (0.18634) \quad (18.9808)
 \end{aligned}$$

Sum Sq 0.0623 Std Err 0.0605 LHS Mean -0.5013
 R Sq 0.7869 R Bar Sq 0.7493 F 3, 17 20.9231
 D.W.(1) 1.3020 D.W.(2) 2.3227

IMAP=exp(log(cdap+xap)+??)

Real Imports, Other End Products

IMOEP

Ordinary Least Squares

ANNUAL data for 17 periods from 1975 to 1991

$\log(\text{imoep}/\text{imoep}.1)$

$$= 0.73601 * \log((c\text{-}cs + \text{ircb} + \text{vcb})/\text{imoep}.1) \\ (4.91841)$$

$$- 0.49781 * \log(\text{exrcus}.1 * \text{ulcmus}.1 / \text{ulcmc}.1 * \text{zimgst}) \\ (2.89387)$$

$$+ 0.06283 * \text{zimoep} - 2.65287 \\ (5.06904) \quad (4.83495)$$

Sum Sq 0.0263 Std Err 0.0450 LHS Mean 0.1036
R Sq 0.7019 R Bar Sq 0.6332 F 3, 13 10.2056
D.W.(.1) 1.5826 D.W.(2) 2.2614

$$\text{IMOEP} = \text{imoep}.1 * \exp(??)$$

Real Imports, Food, Beverages and Tobacco

IMFBT

Ordinary Least Squares

ANNUAL data for 11 periods from 1981 to 1991

$\log(\text{imfbt}/(c\text{-}csrent + \text{xfbt}))$

$$= - 0.63254 * \text{movavg}(3, \log(\text{exrcus}.1 * \text{ulcmus}.1 / \text{ulcmc}.1 * \text{zimgst})) \\ (4.44328)$$

$$+ 0.00567 * \text{zimfbt} - 3.76714 \\ (1.84067) \quad (91.5881)$$

Sum Sq 0.0043 Std Err 0.0232 LHS Mean -3.6119
R Sq 0.8934 R Bar Sq 0.8668 F 2, 8 33.5260
D.W.(.1) 2.3256 D.W.(2) 2.2731

$$\text{IMFBT} = (c\text{-}csrent + \text{xfbt}) * \exp(??)$$

Real Imports, Crude Materials

IMCM

Ordinary Least Squares

ANNUAL data for 21 periods from 1971 to 1991

$\log(\text{imcm}/\text{ygdpcf})$

$$= - 0.24654 * \text{movavg}(3, \log(\text{exrcus}.1 * \text{ulcmus}.1 / \text{ulcmc}.1 * \text{zimgst})) \\ (1.29177)$$

$$- 0.09326 * \text{step}(87, 1) - 0.16316 * \text{step}(88, 1) - 4.70605 \\ (1.56773) \quad (2.36176) \quad (291.817)$$

Sum Sq 0.0566 Std Err 0.0577 LHS Mean -4.7444
R Sq 0.7525 R Bar Sq 0.7088 F 3, 17 17.2297
D.W.(.1) 1.7816 D.W.(2) 2.3472

$$\text{IMCM} = \text{ygdpcf} * \exp(??)$$

Real Imports, Oil

IMOIL

(imposed)

ANNUAL data for 22 periods from 1971 to 1992

imoil

$$= 1.00000 * imoil.1 * \exp(dlog(ygdpfc)) + 0.00000$$

(NC) (NC)

Sum Sq	NC	Std Err	NC	LHS Mean	NC	Res Mean	NC
R Sq	NC	R Bar Sq	NC	F 0, 0	NC	%RMSE	NC
D.W.(1)	NC	D.W.(2)	NC				

Real Imports, Goods

IMG

(Identity)

img

$$= imcm+imoil+imfbt+imfm+imme+imap+imoep+imadj$$

Real Imports, Services

IMS

Ordinary Least Squares

ANNUAL data for 21 periods from 1971 to 1991

log(ims/ims.1)

$$= 0.49595 * \log(ygdpfc/ims.1)$$

(2.91854)

$$- 0.47913 * \log(pims/movavg(2,ywssl$/ygdpfc)) - 1.21743$$

(2.48314) (2.77123)

Sum Sq	0.0484	Std Err	0.0519	LHS Mean	0.0394
R Sq	0.3261	R Bar Sq	0.2512	F 2, 18	4.3555
D.W.(1)	0.7562	D.W.(2)	1.0481		

$$IMS=ims.1*\exp(??)$$

Real Imports, Total Goods and Services

IM

(Identity)

im

$$= img+ims$$

Normal Output

YGDPCFN

(Identity)

ygdpfcn

$$= \exp(2.49076 + .61 \cdot \log(\text{le}) + (1-.61) \cdot (1-.32) \cdot \log(\text{kinrcb}.1) + (1-.61) \cdot .32 \cdot \log(\text{kimeb}.1) - .05925 \cdot (\text{step}(81,1) - \text{step}(83,1)) + .0018 \cdot \text{ztfp} + \text{ztfpa})$$

Appendix D Annual Equations With FDI

Real Business Investment, Machinery and Equipment

IMEB

Ordinary Least Squares

ANNUAL data for 17 periods from 1978 to 1994

$$\text{imeb}/\text{kimeb}.1-(1-(1-\text{rdme})^{**4})$$

=

$$+ 0.99770 * .250*(\text{fditot}/\text{kimeb}.1)+.250*(\text{fditot}.1/\text{kimeb}.2)+.500*(\text{fditot}.2/\text{kimeb}.3) \\ (7.58596)$$

$$+ 0.60737 * (1-.61)*0.32*\text{movavg}(3,\text{ygdpcf})*\text{movavg}(5,\text{pgdpfc}/\text{ucme})/\text{kimeb}.1 \\ (8.91408)$$

$$+ 0.05688 * \text{zimebft} + 0.05062 * \text{zimeb1} - 0.00597 * \text{zimeb1}^{**2} \\ (6.24158) \quad (4.90251) \quad (4.96273)$$

$$- 0.77679 \\ (8.93895)$$

Sum Sq 0.0014 Std Err 0.0114 LHS Mean 0.1153
R Sq 0.9463 R Bar Sq 0.9218 F 5, 11 38.7388
D.W.(1) 2.7209 D.W.(2) 2.3889

$$\text{IMEB}=\text{kimeb}.1*((1-(1-\text{rdme})^{**4})+??)$$

Real Business Investment, Non-Residential Construction

INRCB

Ordinary Least Squares

ANNUAL data for 12 periods from 1983 to 1994

$$\text{inrcb}/\text{kinrcb}.1-(1-(1-\text{rdnrc})^{**4})-.02279*0.68*(1-.61)* \\ \text{movavg}(4,\text{ygdpcf}.1)*\text{movavg}(5,\text{pgdpfc}.1/\text{ucnrc}.1)/\text{kinrcb}.1-.00848*(\text{step}(87,1)-\text{step}(86,1))$$

$$= 0.02418 * \text{movavg}(3,\log(\text{fditot}/\text{kimeb}.1)) + 0.03466 \\ (7.13690) \quad (3.65177)$$

Sum Sq 0.0003 Std Err 0.0051 LHS Mean -0.0323
R Sq 0.8359 R Bar Sq 0.8195 F 1, 10 50.9353
D.W.(1) 1.9875 D.W.(2) 2.2489

$$\text{INRCB}=\text{kinrcb}.1*((1-(1-\text{rdnrc})^{**4})+??+.02279*0.68*(1-.61)*\text{movavg}(4,\text{ygdpcf}.1)* \\ \text{movavg}(5,\text{pgdpfc}.1/\text{ucnrc}.1)/\text{kinrcb}.1+.00848*(\text{step}(87,1)-\text{step}(86,1)))$$

Real Exports, Mining

XMIN

Ordinary Least Squares

ANNUAL data for 23 periods from 1972 to 1994

$$\text{dlog}(\text{xmin})-\text{dlog}(\text{ipius}^{**0.35}*\text{ipijap}^{**0.31}*\text{pieec}^{**0.34})+\text{dlog}(\text{movavg}(3,\text{zxgst}))$$

=

$$+ 0.00982 * .50 * \log(\text{fditot}/\text{kimeb}) + .25 * \log(\text{fditot.1}/\text{kimeb.1}) + .25 * \log(\text{fditot.2}/\text{kimeb.2})$$

(1.61952)

Sum Sq 0.1242 Std Err 0.0751 LHS Mean -0.0243 Res Mean 0.0006
 R Sq 0.0095 R Bar Sq 0.0095 F 1, 22 0.2119 %RMSE 151.182
 D.W.(1) 2.5617 D.W.(2) 1.9481

$$\text{XMIN} = \text{xmin.1} * \exp(?? + \text{dlog}(\text{ipius} ** 0.35 * \text{pijap} ** 0.31 * \text{pieec} ** 0.34) + \text{dlog}(\text{movavg}(3, \text{zxgst})))$$

Real Exports, Food, Beverages and Tobacco

XFBT

Ordinary Least Squares

ANNUAL data for 20 periods from 1972 to 1991

$$\log(\text{xftb}/\text{xftb.1})$$

$$= 0.65653 * \log(\text{uscenfab}) - \log(\text{xftb.1})$$

(3.20711)

$$- 0.21928 * \log(\text{pxftb}/(\text{ppipff} * \text{exrcus})/\text{zxgst}) + 0.02264 * \text{zxftb}$$

(0.49024) (2.91420)

$$- 44.3936$$

(2.98982)

Sum Sq 0.0873 Std Err 0.0739 LHS Mean 0.0406
 R Sq 0.3922 R Bar Sq 0.2782 F 3, 16 3.4413
 D.W.(1) 1.7857 D.W.(2) 2.2906

$$\text{XFBT} = \text{xftb.1} * \exp(??)$$

Real Exports, Wood

XWOOD

Ordinary Least Squares

ANNUAL data for 24 periods from 1971 to 1994

$$\log(\text{xwood}/(\text{uhsone} ** .8 * \text{jauhs} ** .2))$$

=

$$+ 0.07544 * .10 * \log(\text{fditot}/\text{kimeb}) + .40 * \log(\text{fditot.1}/\text{kimeb.1}) + .40 * \log(\text{fditot.2}/\text{kimeb.2}) +$$

$$.10 * \log(\text{fditot.3}/\text{kimeb.3})$$

(1.30085)

$$+ 0.18251 * \log(\text{pxwood}/\text{movavg}(3, \text{ulcmc}) * \text{zxgst}) + 0.05588 * \text{zxwood}$$

(1.17248) (4.86692)

$$- 0.22824 * \text{spike}(75, 1) + 0.20276 * \text{step}(87, 1) - \text{step}(86, 1)$$

(2.57856) (2.30137)

$$+ 0.35841 * \text{step}(80, 1) + 0.10712 * \text{step}(85, 1) - 103.369$$

(4.34675) (2.00248) (4.55363)

Sum Sq 0.1095 Std Err 0.0827 LHS Mean 7.0764
 R Sq 0.9623 R Bar Sq 0.9458 F 7, 16 58.3892
 D.W.(1) 1.8214 D.W.(2) 2.0335

XWOOD=(uhsone**.8*jauhs**.2)*exp(??)

Real Exports, Pulp and Paper

XPP

Ordinary Least Squares

ANNUAL data for 24 periods from 1971 to 1994

$\log(xpp/(ipius**.72*ipijap**.09*ipieec**.19))-zxpp$

= 0.03297 * log(fditot/kimeb)
(1.60402)

+ 0.28661 * log(pxpp/movavg(3,ulcmc)*zxgst)
(3.99127)

- 0.04157 * spike(75,1) + 0.13356 * step(91,1) + 5.06487
(0.89298) (3.90412) (64.6691)

Sum Sq 0.0322 Std Err 0.0412 LHS Mean 4.7346
R Sq 0.5683 R Bar Sq 0.4774 F 4, 19 6.2535
D.W.(.1) 1.9008 D.W.(2) 2.6185

$XPP=(ipius**.72*ipijap**.09*ipieec**.19)*exp(zxpp+??)$

Real Exports, Primary Metals

XPMT

Ordinary Least Squares

ANNUAL data for 22 periods from 1973 to 1994

$\log(xpmt/xpmt.1)$

= 0.04865 * movavg(3,log(fditot/kimeb))
(0.77194)

+ 0.48741 * log(ipius**0.8*ipijap**0.08*ipieec**.12/xpmt.1)
(3.47057)

+ 0.68713 * log(ppimmp.2*exrcus.2/pxpmt.2*zxgst)
(3.37832)

+ 0.08301 * step(91,1) - 0.98287
(1.12367) (1.04406)

Sum Sq 0.0943 Std Err 0.0745 LHS Mean 0.0382
R Sq 0.5156 R Bar Sq 0.4016 F 4, 17 4.5239
D.W.(.1) 2.7163 D.W.(2) 1.5883

$XPMT=xpmt.1*exp(??)$

Real Exports, Autos and Parts

XAP

(Imposed)

ANNUAL data for 34 periods from 1961 to 1994

dlog(xap)

= 1.00000 * dlog(uscedmvp)+diff(movavg(3,zxgst-1))+zxap + 0.00000

(NC)

(NC)

Sum Sq	NC	Std Err	NC	LHS Mean	NC	Res Mean	NC
R Sq	NC	R Bar Sq	NC	F 0, 0	NC	%RMSE	NC
D.W.(1)	NC	D.W.(2)	NC				

XAP=xap.1*exp(??)

Real Exports, Machinery

XMCH

Ordinary Least Squares

ANNUAL data for 23 periods from 1972 to 1994

log(xmch/xmch.1)

=

+ 0.12955 * .25*log(fditot/kimeb)+.25*log(fditot.1/kimeb.1)+.25*log(fditot.2/kimeb.2)+
.25*log(fditot.3/kimeb.3)

(2.05524)

+ 0.54597 * log(usipe/xmch.1)

(5.64125)

+ 0.96819 * log(ppimae*exrcus/pxmch*zxgst)

(4.34346)

+ 0.14916 * step(89,1) + 0.06293 * step(90,1) - 0.00701 * zxmch

(2.42820)

(1.09213)

(0.61666)

- 2.25337

(2.36085)

Sum Sq 0.0352 Std Err 0.0469 LHS Mean 0.1123

R Sq 0.8228 R Bar Sq 0.7564 F 6, 16 12.3863

D.W.(1) 2.4616 D.W.(2) 1.8337

XMCH=xmch.1*exp(??)

Real Exports, Chemical and Fertilizer

XCF

Ordinary Least Squares

ANNUAL data for 23 periods from 1972 to 1994

log(xcf/xcf.1)

= 0.07644 * log(fditot/kimeb)

(2.40758)

+ 0.80783 * log(ipius**0.8*ipijap**0.06*ipieec**0.14/xcf.1)

(5.07957)

+ 0.58247 * log(ppicap.1*exrcus.1/pxcf.1*zxgst) + 0.05922 * zxcf

(3.84057)

(4.44307)

- 0.22136

(0.37376)

Sum Sq 0.1063 Std Err 0.0768 LHS Mean 0.0603
 R Sq 0.6985 R Bar Sq 0.6315 F 4, 18 10.4260
 D.W.(1) 1.6092 D.W.(2) 1.2073

XCF=xcf.1*exp(??)

Real Exports, Other Manufacturing

XOMF

Ordinary Least Squares

ANNUAL data for 23 periods from 1972 to 1994

log(xomf/xomf.1)

= 0.03107 * log(fditot/kimeb)
 (1.13368)

+ 0.54876 * log(ipius**.8*ipijap**.1*ipieec**.1)-log(xomf.1)
 (4.40811)

+ 1.40761 * log(ppi*exrcus/pxomf*zxgst) + 0.01950 * zxomf
 (3.97096) (2.53832)

- 42.7490
 (3.00424)

Sum Sq 0.0673 Std Err 0.0612 LHS Mean 0.0877
 R Sq 0.6807 R Bar Sq 0.6098 F 4, 18 9.5942
 D.W.(1) 1.7402 D.W.(2) 2.1611

XOMF=exp(??)*xomf.1

Real Exports, Goods

XG

(Identity)

xg

= xag+xoil+xgas+xcoal+xmin+xfbt+xwood+xpp+xpmt+xap+xmch+xcf+xomf+xelec+xadj

Real Exports, Services

XS

Ordinary Least Squares

ANNUAL data for 12 periods from 1981 to 1992

log(xs/xs.1)

= 0.80330 * 0.8*log(usgdp)+0.2*log(pljap)-log(xs.1)
 (4.25023)

- 0.35042 * log(pxs/(pdiimser*exrcus/zxgst)) + 0.08183
 (1.62375) (0.08473)

Sum Sq 0.0160 Std Err 0.0421 LHS Mean 0.0187
 R Sq 0.6675 R Bar Sq 0.5936 F 2, 9 9.0345
 D.W.(1) 1.2560 D.W.(2) 1.1964

XS=xs.1*exp(??)

Real Exports, Total Goods and Services

X
(Identity)

x

= xg+xs

Real Imports, Fabricated Materials

IMFM

Ordinary Least Squares

ANNUAL data for 20 periods from 1975 to 1994

$\log(\text{imfm}/\text{imfm}.1)$

= 0.06213 * $\log(\text{fditot}/\text{kimeb}.1)$
(2.26062)

+ 0.53678 * $\log(\text{movavg}(1, \text{ygdpcf})) - \log(\text{imfm}.1)$
(3.89030)

- 1.02143 * $\text{movavg}(3, \log(\text{pimfm}/\text{pgdpfc}))$
(5.22346)

- 0.12145 * $\text{step}(80,1) - \text{step}(79,1) - 1.47314$
(1.87832) (3.20969)

Sum Sq 0.0541 Std Err 0.0600 LHS Mean 0.0551
R Sq 0.7107 R Bar Sq 0.6335 F 4, 15 9.2115
D.W.(1) 1.6800 D.W.(2) 2.2306

IMFM=imfm.1*exp(??)

Real Imports, Machinery and Equipment

IMME

Ordinary Least Squares

ANNUAL data for 20 periods from 1972 to 1991

$\log(\text{imme}/\text{imme}.1)$

= 0.77168 * $\log(\text{imeb}/\text{imme}.1) + 1.27415 * \log(\text{ygdpcf}/\text{ygdpcfn})$
(4.86524) (1.86395)

+ 0.16451 * $\text{step}(83,1) - \text{step}(81,1) - 0.02909 * \text{zimme} + 0.28091$
(3.88739) (2.67026) (3.08915)

Sum Sq 0.0477 Std Err 0.0564 LHS Mean 0.0385
R Sq 0.7858 R Bar Sq 0.7287 F 4, 15 13.7565
D.W.(1) 1.8059 D.W.(2) 2.1360

IMME=imme.1*exp(??)

Real Imports, Autos and Parts

IMAP

Ordinary Least Squares

ANNUAL data for 24 periods from 1971 to 1994

$\log(\text{imap}) - \text{movavg}(1, \log(\text{cdap} + \text{xap}))$

$$= 0.05123 * \log(\text{fditot}/\text{kimeb}.1) \\ (2.00397)$$

$$+ 0.05381 * \text{step}(84,1) - \text{step}(81,1) - 0.17732 * \text{step}(80,1) \\ (1.48249) \quad (6.68822)$$

$$+ 0.04416 * \text{step}(91,1) - 0.27294 \\ (1.04795) \quad (4.73395)$$

Sum Sq 0.0534 Std Err 0.0530 LHS Mean -0.5114
R Sq 0.8287 R Bar Sq 0.7927 F 4, 19 22.9848
D.W.(.1) 1.1483 D.W.(.2) 2.3208

IMAP=exp(movavg(1,log(cdap+xap))+??)

Real Imports, Other End Products

IMOEP

Ordinary Least Squares

ANNUAL data for 17 periods from 1975 to 1991

$\log(\text{imoep}/\text{imoep}.1)$

$$= 0.73601 * \log((\text{c-cs} + \text{ircb} + \text{vcb})/\text{imoep}.1) \\ (4.91841)$$

$$- 0.49781 * \log(\text{exrcus}.1 * \text{ulcmus}.1 / \text{ulcmc}.1 * \text{zimgst}) \\ (2.89387)$$

$$+ 0.06283 * \text{zimoep} - 2.65287 \\ (5.06904) \quad (4.83495)$$

Sum Sq 0.0263 Std Err 0.0450 LHS Mean 0.1036
R Sq 0.7019 R Bar Sq 0.6332 F 3, 13 10.2056
D.W.(.1) 1.5826 D.W.(.2) 2.2614

IMOEP=imoep.1*exp(??)

Real Imports, Food, Beverages and Tobacco

IMFBT

Ordinary Least Squares

ANNUAL data for 11 periods from 1981 to 1991

$\log(\text{imfbt}/\text{movavg}(1, \text{c-csrent} + \text{xfbt}))$

$$= - 0.63254 * \text{movavg}(3, \log(\text{exrcus}.1 * \text{ulcmus}.1 / \text{ulcmc}.1 * \text{zimgst})) \\ (4.44328)$$

$$+ 0.00567 * \text{zimfbt} - 3.76714 \\ (1.84067) \quad (91.5881)$$

Sum Sq 0.0043 Std Err 0.0232 LHS Mean -3.6119
R Sq 0.8934 R Bar Sq 0.8668 F 2, 8 33.5260
D.W.(.1) 2.3256 D.W.(.2) 2.2731

IMFBT=movavg(1,c-csrent+xfbt)*exp(??)

Real Imports, Crude Materials

IMCM

Ordinary Least Squares

ANNUAL data for 24 periods from 1971 to 1994

$\log(\text{imcm}/\text{movavg}(1,\text{ygdpfc}))$

= 0.03635 * movavg(2, $\log(\text{fditot}/\text{kimeb}.1)$)
(1.11273)

- 0.39701 * movavg(3, $\log(\text{exrcus}.1*\text{ulcmus}.1/\text{ulcmc}.1*\text{zimgst})$)
(1.93650)

- 0.08943 * step(87,1) - 0.15748 * step(88,1) - 4.62918
(1.56230) (2.38641) (64.9582)

Sum Sq 0.0584 Std Err 0.0554 LHS Mean -4.7610
R Sq 0.7909 R Bar Sq 0.7469 F 4, 19 17.9702
D.W.(1) 1.8990 D.W.(2) 2.2622

IMCM=movavg(1,ygdpfc)*exp(??)

Real Imports, Oil

IMOIL

Ordinary Least Squares

ANNUAL data for 23 periods from 1972 to 1994

$\log(\text{imoil}/\text{imoil}.1)-\text{movavg}(1,\text{dlog}(\text{ygdpfc}))$

= 0.01247 * movavg(2, $\log(\text{fditot}/\text{kimeb})$)
(1.08044)

Sum Sq 0.4626 Std Err 0.1449 LHS Mean -0.0371 Res Mean -0.0051
R Sq-0.0155 R Bar Sq -0.0155 F 1, 22 NC %RMSE 125.569
D.W.(1) 0.9724 D.W.(2) 1.4421

IMOIL=imoil.1*exp(??+movavg(1,dlog(ygdpfc)))

Real Imports, Goods

IMG

(Identity)

img

= imcm+imoil+imfbt+imfm+imme+imap+imoep+imadj

Real Imports, Services

IMS

Ordinary Least Squares

ANNUAL data for 21 periods from 1971 to 1991

$\log(\text{ims}/\text{ims}.1)$

= 0.49595 * $\log(\text{ygdpfc}/\text{ims}.1)$

(2.91854)

- 0.47913 * log(pims/movavg(2,ywssl\$/ygdpc)) - 1.21743
(2.48314) (2.77123)

Sum Sq 0.0484 Std Err 0.0519 LHS Mean 0.0394
R Sq 0.3261 R Bar Sq 0.2512 F 2, 18 4.3555
D.W.(1) 0.7562 D.W.(2) 1.0481

IMS=ims.1*exp(??)

Real Imports, Total Goods and Services

IM
(Identity)

im

= img+ims

Total Factor Productivity

ZTFPA
Ordinary Least Squares
ANNUAL data for 28 periods from 1967 to 1994

ztfpa

= 0.00480 * movavg(6,log(fditot)) - 0.02810
(1.05314) (0.72473)

Sum Sq 0.0009 Std Err 0.0060 LHS Mean 0.0127
R Sq 0.0409 R Bar Sq 0.0040 F 1, 26 1.1091
D.W.(1) 0.8624 D.W.(2) 1.4321

Appendix E

An Alphabetic Listing of Variables

C	- Consumer Expenditure, Total, Canada
CDAP	- Consumer Expenditure, Autos, Parts and Repairs, Canada
CS	- Consumer Expenditure, Services, Canada
CSRENT	- Consumer Expenditure, Paid and Imputed Rent, Canada
EXRCUS	- C\$/U.S.\$ Exchange Rate
FDITOT	- Total Real Foreign Direct Investment in Canada
IM	- Real Imports, Total
IMADJ	- Real Imports, Special Transactions and Other BOP Adjustments
IMAP	- Real Imports, Autos and Parts
IMCM	- Real Imports, Crude Materials
IMEB	- Machinery & Equipment Investment
IMFBT	- Real Imports, Food Beverages Tobacco
IMFM	- Real Imports, Fabricated Materials
IMG	- Real Imports, Goods
IMME	- Real Imports, Machinery and Equipment
IMOEP	- Real Imports, Other End Products
IMOIL	- Real Imports, Oil
IMS	- Real Imports, Services
INRCB	- Non-Residential Construction Investment
IPIEEC	- EEC Industrial Production Index
IPIJAP	- Japan Industrial Production Index
IPIUS	- US Industrial Production Index
IRCB	- Residential Construction Expenditures, Canada
JAUHS	- Japanese Housing Starts
KIMEB	- Capital Stock, Machinery and Equipment
KINRCB	- Capital Stock, Non-Residential Construction
LE	- Employment
PDIIMSER	- U.S. Implicit Price Deflator Imports, Services
PGDPFC	- Deflator, GDP at Factor Cost
PIMFM	- Import Deflator, Fabricated Materials
PIMS	- Import Deflator, Services
PPI	- U.S. PPI, All Commodities
PPICAP	- U.S. PPI, Chemicals
PPIMAE	- U.S. PPI, Machinery & Equipment
PPIMMP	- U.S. PPI, Metals & Metal Products
PPIPF	- U.S. PPI, Processed Foods & Feeds
PXCF	- Export Deflator, Chemical and Fertiliser
PXFBT	- Export Deflator, Food Beverages Tobacco
PXMCH	- Export Deflator, Machinery
PXOMF	- Export Deflator, Other Manufacturing
PXPMT	- Export Deflator, Primary Metal
PXPP	- Export Deflator, Pulp and Paper
PXS	- Export Deflator, Services
PXWOOD	- Export Deflator, Wood
RDME	- Depreciation Rate, Machinery and Equipment
RDNRC	- Depreciation Rate, Non-Residential Construction

RPROF	- Profitability Ratio
UCME	- User Cost of Capital, Machinery and Equipment, Canada
UCNRC	- User Cost of Capital, Non-Residential Construction, Canada
UHSONE	- US Housing Starts, Singles
ULCMC	- Unit Labour Cost, Manufacturing
ULCMUS	- U.S. Unit Labour Cost--Manufacturing
USCEDMVP	- Real Consumer Expenditures, Motor Vehicle and Parts, United States
USCENFAB	- Real Consumer Expenditures, Food and Beverages, United States
USGDP	- US GDP
USIPE	- Fixed Investment, Non-Residential, Durable Equipment
VCB	- Value of Change in Business Inventories
X	- Real Exports, Total
XADJ	- Real Exports, Special Transactions and Other BOP Adjustments
XAG	- Real Exports, Agriculture
XAP	- Real Exports, Autos and Parts
XCF	- Real Exports, Chemical and Fertiliser
XCOAL	- Real Exports, Coal
XELEC	- Real Exports, Electricity
XFBT	- Real Exports, Food Beverages Tobacco
XG	- Real Exports, Goods
XGAS	- Real Exports, Natural Gas
XMCH	- Real Exports, Machinery
XMIN	- Real Exports, Mining
XOIL	- Real Exports, Oil
XOMF	- Real Exports, Other Manufacturing
XPMT	- Real Exports, Primary Metal
XPP	- Real Exports, Pulp and Paper
XS	- Real Exports, Services
XWOOD	- Real Exports, Wood
YGDPPFC	- Gross Domestic Product at Factor Cost
YGDPPFCN	- Normal Output
YWSSL\$	- Wages, Salaries & Supplementary Labour Income
ZIMEB1	- Dummy variable - M & E investment
ZIMEBFT	- Dummy variable - M & E investment
ZIMFBT	- Time Trend used in IMFBT Equation
ZIMFM	- Time Trend used in IMFM Equation
ZIMGST	- Dummy variable - Effect of GST on Imports
ZIMME	- Time Trend used in IMME Equation
ZIMOEP	- Time Trend used in IMOEP Equation
ZTFP	- Time Trend - total factor productivity
ZTFPA	- Adjustment Factor - total factor productivity
ZXAP	- Time Trend Used in XAP Equation
ZXCF	- Time Trend Used in XCF Equation
ZXFBT	- Time Trend Used in XFBT Equation
ZXGST	- Dummy Variable - Effect of GST on exports
ZXMCH	- Time Trend Used in XMCH Equation
ZXOMF	- Time Trend Used in XOMF Equation
ZXPP	- Time Trend Used in XPP Equation
ZXWOOD	- Time Trend Used in XWOOD Equation

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