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THE COMPOSITION OF OFFICIAL INTERNATIONAL RESERVES

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EFFECTS OF WAGE-PARITY AND PRICE SYNCRONIZATION BETWEEN CANADA AND THE UNITED STATES ON CANADIAN ECONOMIC GROWTH: SIMULATION EXPERIMENTS WITH A MACRO-MODEL

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Effects of Wage-Parity and Price Syncronization between Canada and the United States on Canadian Economic Growth: Simulation Experiments with a Macro-Model*

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I. Introduction

Traditionally in international economics factor-price equalization and propagation of business cycles among countries have been explained within the framework of the market mechanism. In view of the increasing coordination of international trade unions and the recent growth of multi-national corporations, however, this traditional market mechanism approach seems to be inadequate to explain the price equalization process in international trade and to analyze the growth of national economies. This seems to be the case particularly in the economic relationship between Canada and the United States.

For example, in 1968 and in 1970 the United Auto Workers demanded wage-parity between Canadian and American workers in the automobile industry, and a similar demand was put forth by the air pilots union in 1968 in its wage negotiations with Air Canada. The question arises, if wage-parity is introduced, what will be its effects on Canadian prices and on Canadian economic growth ? In addition, one of the characteristics of Canadian industries is the dominance of American ownership, and it is often observed that management policies of Canadian subsidiaries in such areas as pricing and marketing have been strongly syncronized with those of the parent companies. If the pricing policy is geared to those of the parent company, how severly will this affect Canadian prices and Canadian economic growth ? Does the usual Keynesian monetary and fiscal policy to control inflation work in these conditions ?

The present paper attempts to give some answers to these questions. Recently the author built a four-sector macro-model of the Canadian economy based on the revised national income accounts [9]. The four sectors are

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(1) agriculture, fishing and forestry, (2) mining and manufacturing, (3) construction, and (4) utilities, transportation, trade, finance, public administration and other services. Using the model, simulation experiments are conducted to examine possible effects of wage-parity and syncronized pricing policy on Canadian economic growth and price levels.

Section II presents the model and Section III evaluates the estimated behavioral equations. Section IV compares the simulation results with a basic forecast exercise. The period of simulation is from 1971 to 1975. In general the simulation results indicate that wage-parity and pricing syncronization tend to slow down economic growth and to keep price levels high. The results also indicate that when either wage-parity or pricing syncronization is at work, the application of normal Keynesian monetary and fiscal policies tends to be ineffective to control inflation.

II. The Model

On the basis of annual data from 1947 to 1969,(1) the behavioral equations of the model are estimated by such methods as the two-stage least squares (2SLS), the modified Sargan's two-stage least squares procedure (MS2SLS) given by Amamiya [1], and nonlinear least squares (NLLS) given in [8]. In an earlier stage of the estimation it was found that a large number of disturbance terms tended to be autocorrelated judged by the values of the Durbin-Watson test statistics. MS2SLS was used to cope with this problem.(2) The equations involving only exogenous variables were estimated by Dhrymes' scanning method [4]. $\bar{R}^2$ denotes the coefficient of determination adjusted for degrees of freedom, and DW indicates the Durbin-Watson test statistic. The figure just below a coefficient is the estimated standard error of the coefficient. $\frac{1}{Z}$ in front of each gamma distributed lag makes the sum of the lag coefficients equal to unity, i.e., $Z = \Sigma\, k^{s-1} e^{-k}$.

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(1) Thid soes not include the lagged observations necessary for the estimation of distributed lags.

(2) For MS2SLS one needs an estimate of the coefficient of the first-order autocorrelation. We used Dhrymes' scanning method [4] to estimate the coefficient. As Amamiya suggests it may be better to use an iterative method to estimate the autocorrelation coefficient of a structural equation. Since this method is costlier in time and computational procedure than the one we employed here, we did not use the iterative method.

List of Variables

A variable with an asterisk on the upper left hand side is endogenous to the system.

AUTO = the dummy variable to allow for the Canadian-American automobile agreement; 1.0 for 1966-1969, and 0 otherwise

B_g = unamortized government bonds, millions of current dollars

$^*C$ = total consumption, millions of 1961 dollars

$^*C_d$ = durable consumption, millions of 1961 dollars

$^*C_{nd}$ = nondurable consumption, millions of 1961 dollars

$^*C_s$ = consumption of services, millions of 1961 dollars

$^*C_{sd}$ = semi-durable consumption, millions of 1961 dollars

$^*D$ = depreciation, millions of current dollars

D_I = net direct foreign investment, millions of current dollars

DTDL= day-to-day loans, millions of current dollars

$^*F$ = total imports, millions of 1961 dollars

$^*F_i'$ = interest and dividend payments to nonresidents of Canada, millions of current dollars

$^*F_m$ = imports of mining and manufacturing goods, millions of 1961 dollars

$^*F_s$ = imports of other goods and services, millions of 1961 dollars

G_I = government investment expenditures, millions of current dollars

*GNP = gross national product, millions of current dollars

G_s = government expenditures on services, millions of current dollars

$^*I$ = total gross investment, millions of 1961 dollars

$^*I_h$ = new residential construction, millions of 1961 dollars

$^*I_h^s$ = housing starts, thousands of units

$^*I_p$ = new plant (i.e. nonresidential) construction, new machinery and equipment investment in all sectors, millions of 1961 dollars

$^*I_{pa}$ = plant construction, machinery and equipment investment in agriculture,fishing and forestry, millions of 1961 dollars

$^*I_{pc}$ = plant construction, machinery and equipment investment in construction, millions of 1961 dollars

*IPD = interest on the public debt, millions of current dollars

$^*I_{pm}$ = plant construction, machinery and equipment investment in mining and manufacturing, millions of 1961 dollars

$^*I_{ps}$ = plant construction, machinery and equipment investment in services, millions of 1961 dollars

IVA = inventory value adjustment, millions of current dollars

i_D = discount rate, percentage

$*i_L$ = long-term interest rate, percentage

$*i_s$ = short-term interest rate, percentage

$*\Delta I_i$ = changes in total inventories, millions of current dollars

ΔI_{ia} = changes in farm inventories, millions of current dollars

ΔI_{ig} = changes in government inventories, millions of current dollars

$*\Delta I_{in}$ = changes in nonfarm business inventories, millions of current dollars

$*K_a$ = net capital stock in agriculture, fishing and forestry, millions of 1961 dollars

$*K_c$ = net capital stock in construction, millions of 1961 dollars

$*K_m$ = net capital stock in mining and manufacturing, millions of 1961 dollars

$*K_s$ = net capital stock in services, millions of 1961 dollars

$*k_a^u$ = net capital stock utilized in agriculture, fishing and forestry, millions of 1961 dollars

$*K_c^u$ = net capital stock utilized in construction, millions of 1961 dollars

$*K_m^u$ = net capital stock utilized in mining and manufacturing, millions of 1961 dollars

$*K_s^u$ = net capital stock utilized in services, millions of 1961 dollars

$*L$ = total employment, thousands of persons

$*L_a$ = employment in agriculture, fishing and forestry, thousands of persons

$*L_c$ = employment in construction, thousands of persons

$*L_m$ = employment in mining and manufacturing, thousands of persons

$*L_s$ = employment in services, thousands of persons

$*L^A$ = total available labor force, thousands of persons

$*L_a^A$ = available labor in agriculture, fishing and forestry, thousands of persons

$*L_c^A$ = available labor in construction, thousands of persons

$*L_m^A$ = available labor in mining and manufacturing, thousands of persons

$*L_s^A$ = available labor in services, thousands of persons

$*L_{sup}$ = total labor force in Canada, thousands of persons

M_A = military pay and allowances, millions of current dollars

N = Canadian population, thousands of persons

$*NI$ = net national income, millions of current dollars

$*P$ = price index of gross national product, 1961=1.0

$*P_a$ = price index of agriculture, fishing and forestry, 1961=1.0

$*P_c$ = price index of construction, 1961=1.0

$*P_{cd}$ = price index of durable goods, 1961=1.0

$*P_d$ = price index of personal expenditures on consumer goods, 1961=1.0

P_F = price index of total imports, 1961=1.0

$*P_g$ = price index of government expenditures on services, 1961=1.0

$*P_h$ = price index of residential construction, 1961=1.0

P_I = net portfolio investment, millions of current dollars

$*P_k$ = price index of investment, 1961=1.0

$*P_m$ = price index of mining and manufacturing, 1961=1.0

P_m^F = import price index of mining and manufacturing goods, 1961=1.0

P_m^W = world price index of mining and manufacturing goods, 1961=1.0

$*P_{nd}$ = price index of nondurable goods, 1961=1.0

$*P_s$ = price index of services, 1961=1.0

$*P_{sc}$ = price index of consumption of services, 1961=1.0

$*P_{sd}$ = price index of semi-durable consumption, 1961=1.0

P_s^F = import price index of services, 1961=1.0

P_m^{US} = price index of mining and manufacturing in the United States, 1961=1.0

P_s^{US} = price index of services in the United States, 1961=1.0

$*P_x$ = price index of total exports, 1961=1.0

RI = interest and miscellaneous investment income, millions of current dollars

$*S_c$ = earnings not paid out to persons, millions of current dollars

S_e = residual error of estimate, millions of current dollars

t = time trend, t=1.0 in 1947

TCA = total Canadian and net foreign assets in Canadian chartered banks, millions of current dollars

$*T_I$ = indirect taxes, millions of current dollars

$*T_p$ = personal direct taxes, millions of current dollars

$*T_r$ = transfer payments, millions of current dollars

TRB = treasury bills, millions of current dollars

uf = frictional unemployment rate, percentage

*un = unemployment rate, percentage

*V = gross domestic product, millions of 1961 dollars

$*V_a$ = gross domestic product originating in agriculture, fishing and forestry, millions of 1961 dollars

$*V_a^d$ = domestic demand for gross domestic product originating in agriculture, fishing and forestry, millions of 1961 dollars

$*V_c$ = gross domestic product originating in construction, millions of

1961 dollars

$*V_m$ = gross domestic product originating in mining and manufacturing, millions of 1961 dollars

$*V_m^d$ = domestic demand for gross domestic product originating in mining and manufacturing, millions of 1961 dollars

$*V_s$ = gross domestic product originating in services, millions of 1961 dollars

$*V_a^*$ = capacity production of agriculture, fishing and forestry, millions of 1961 dollars

$*V_c^*$ = capacity production of construction, millions of 1961 dollars

$*V_m^*$ = capacity production of mining and manufacturing, millions of 1961 dollars

$*V_s^*$ = capacity production of services, millions of 1961 dollars

$*W$ = wages, salaries and supplementary labor income, millions of current dollars

$*w_a$ = wage rate in agriculture, fishing and forestry, thousands of current dollars

$*w_c$ = wage rate in construction, thousands of current dollars

WETH= weather adjustment for agricultural output, millions of 1949 dollars

$*w_m$ = wage rate in mining and manufacturing, thousands of current dollars

w_c^{US} = wage rate in United States construction, thousands of current U.S. dollars

w_m^{US} = wage rate in United States mining and manufacturing, thousands of current U.S. dollars

$*X$ = total exports, millions of 1961 dollars

$*X_a$ = exports of agriculture, fishing and forestry, millions of 1961 dollars

$*X_m$ = exports of mining and manufacturing goods, millions of 1961 dollars

Y_A = accrued net income of farm operators, millions of current dollars

Y_{NB} = net income of nonfarm unincorporated business including rent, millions of current dollars

$*Y_d$ = disposable income, millions of current dollars

Y^W = weighted national income of the United States, United Kingdom and Japan: weights being the ratios of Canadian exports to these countries to the total Canadian exports, billions of 1958 dollars

Consumption functions

(2-1)
$$C_d/N \underset{(.0015)}{-.4871}(C_d/N)_{-1} = \underset{(.0162)}{.1548} \{\frac{1}{Z}\sum_{k=1}^{6} k^{s-1}e^{-k}[(Y_d/P_dN)_{-k+1} - .4871(Y_d/P_dN)_{-k}]\} \underset{(.0015)}{-.2885} [(P_{cd}/P_d) - .4871(P_{cd}/P_d)_{-1}]$$

$$+ \underset{(.0010)}{.1243}$$

$s = \underset{(.0162)}{1.7994}$

$\bar{R}^2 = .984$
DW = 1.82
NLLS

(2-2) $$C_{sd}/N - .7895(C_{sd}/N)_{-1} = \underset{(.0113)}{.0611}\,[(Y_d/P_dN) - .7895\,(Y_d/P_dN)_{-1}]$$

$$- \underset{(.0434)}{.1244}\,[(P_{sd}/P_d) - .7895(P_{sd}/P_d)_{-1}] + \underset{(.0116)}{.0408}$$

$\bar{R}^2 = .741$
DW = 2.34
MS2SLS

(2-3) $$C_{nd}/N - .5263(C_{nd}/N)_{-1} = \underset{(.0223)}{.3124}\,[(Y_d/P_dN) - .5263(Y_d/P_dN)_{-1}]$$

$$-\underset{(.1847)}{.2799}[(P_{nd}/P_d) - .5263(P_{nd}/P_d)_{-1}] + \underset{(.1101)}{.1707}$$

$\bar{R}^2 = .961$
DW = 2.25
MS2SLS

(2-4) $$C_s/N - .8421(C_s/N)_{-1} = \underset{(.0303)}{.2356}\,[(Y_d/P_dN) - .8421(Y_d/P_dN)_{-1}] + \underset{(.0079)}{.0267}$$

$\bar{R}^2 = .731$
DW = 1.783
MS2SLS

<u>Investment functions</u>

(2-5) $$I_{pa} - \underset{(.0218)}{.7728}\,I_{pa,-1} = \underset{(.0730)}{.1288}\,\frac{1}{Z}\{\sum_{k=1}^{6} k^{s-1}\,e^{-k}[V_{a,-k+1} - .7728\,V_{a,-k}]\}$$

$$+ \underset{(233.7273)}{183.4960}\,[(V_a/\,V_a^*)_{-1} - .7728(V_a/V_a^*)_{-2}]$$

$$- \underset{(.0025)}{.0024}\,[K_{a,-1} - .7728\,K_{a,-2}] + \underset{(127.9635)}{70.9870}$$

$s = \underset{(1.3064)}{1.6883}$

$\bar{R}^2 = .824$
DW = 1.18
NLLS

(2-6)
$$I_{pm} - \underset{(.2973)}{.5743}\, I_{pm,-1} = \underset{(.4485)}{.6389}\, \frac{1}{Z}\{\sum_{k=1}^{6} k^{s-1}\, e^{-k}[V_{m,-k+1} - .5743\, V_{m,-k}]\}$$

$$+ \underset{(.7059)}{.9861}[(D_I/P_k)_{-1} - .5743(D_I/P_k)_{-2}]$$

$$+ \underset{(512.6645)}{368.4186}[(V_m/V_m^*)_{-1} - .5743(V_m/V_m^*)_{-2}]$$

$$- \underset{(.2869)}{.3200}[K_{m,-1} - .5743\, K_{m,-2}] - \underset{(619.0276)}{512.0464}$$

$s = 1.9991$ (1.8545)

$\bar{R}^2 = .916$
DW = 1.45
NLLS

(2-7)
$$I_{pc} - \underset{(.2790)}{.3840}\, I_{pc,-1} = \underset{(.1069)}{.2598}\, \frac{1}{Z}\{\sum_{k=1}^{6} k^{s-1}\, e^{-k}[V_{c,-k+1} - .3840\, V_{c,-k}]\}$$

$$- \underset{(12.1578)}{32.4689}\,[\, i_L - .3840\, i_{L,-1}]$$

$$- \underset{(.1382)}{.1983}\,[K_{c,-1} - .3840\, K_{c,-2}] + \underset{(20.2037)}{26.7307}$$

$s = 1.8372$ (1.0843)

$\bar{R}^2 = .872$
DW = 1.72
NLLS

(2-8)
$$I_{ps} - \underset{(.1606)}{.4974}\, I_{ps,-1} = \underset{(.3383)}{.4968}\, \frac{1}{Z}\{\sum_{k=1}^{6} k^{s-1}\, e^{-k}[V_{s,-k+1} - .4974\, V_{s,-k}]\}$$

$$+ \underset{(.3800)}{.1684}\,[(D_I/P_k)_{-1} - .4974\,(D_I/P_k)_{-2}]$$

$$+ \underset{(1700.5310)}{1552.0264}[(V_s/V_s^*)_{-1} - .4974(V_s/V_s^*)_{-2}]$$

$$- \underset{(.1583)}{.1839}\,[\, K_{s,-1} - .4974\, K_{s,-2}] - \underset{(727.1682)}{1191.8494}$$

$$s = \underset{(1.1231)}{2.2830} \qquad \bar{R}^2 = .965 \quad DW = 1.08 \quad \text{NLLS}$$

(2-9)
$$I_h - \underset{(.9692)}{.6568}\, I_{h,-1} = \underset{(4.2759)}{21.2887}\{\frac{1}{Z}\sum_{k=1}^{6} k^{s-1}\, e^{-k}[I^s_{h,-k+1} - .6568\, I^s_{h,-k}]\}$$

$$- \underset{(113.9920)}{42.8677}$$

$$s = \underset{(.4541)}{1.5539} \qquad \bar{R}^2 = .920 \quad DW = 1.08 \quad \text{NLLS}$$

(2-10)
$$I^s_h - \underset{(.2329)}{.3689}\, I^s_{h,-1} = \underset{(.0027)}{.0056}\{\frac{1}{Z}\sum_{k=1}^{6} k^{s-1}\, e^{-k}[(Y_d/P_d)_{-k+1} - .3689(Y_d/P_d)_{-k}]\}$$

$$- \underset{(10.6967)}{5.5149}\,[\, i_L - .3689\, i_{L,-1}] + \underset{(15.6112)}{17.6303}$$

$$s = \underset{(1.8399)}{2.5001} \qquad \bar{R}^2 = .774 \quad DW = 1.70 \quad \text{NLLS}$$

(2-11)
$$\Delta I_{in}/P_k - .3684(\Delta I_{in}/P_k)_{-1} = \underset{(.0312)}{.1659}\,[GNP/P - .3684(GNP/P)_{-1}]$$

$$- \underset{(.1597)}{.8194}\,[I_{in,-1} - .3684\, I_{in,-2}] - \underset{(403.2537)}{1889.6145}$$

$$\bar{R}^2 = .569 \quad DW = 1.92 \quad \text{MS2SLS}$$

Exports and import functions

(2-12)
$$X_a - .6842\, X_{a,-1} = \underset{(.6832)}{1.4784}\,[Y^W - .6842\, Y^W_{-1}] + \underset{(94.7110)}{229.6742}$$

$$\bar{R}^2 = .799 \quad DW = 2.08 \quad \text{MS2SLS}$$

$$\text{(2-13)} \quad X_m - .7368\, X_{m,-1} = \underset{(3.6853)}{12.8665}\,[Y^W - .7368\, Y^W_{-1}]$$

$$- \underset{(3129.3154)}{9500.3242}[(P_m/P^W_m) - .7368(P_m/P^W_m)_{-1}]$$

$$+\underset{(1297.9915)}{6924.8906}\,[AUTO - .7368\, AUTO_{-1}] + \underset{(950.1299)}{2836.1592}$$

$\bar{R}^2 = .864$
DW = 1.78
MS2SLS

$$\text{(2-14)} \quad F_m = \underset{(.0317)}{.1296}(Y_d/P_d) - \underset{(1759.3945)}{4916.0938}(P^F_m/P_m) + \underset{(.1811)}{.4321}\, F_{m,-1} + \underset{(1642.5442)}{4505.1133}$$

$\bar{R}^2 = .965$
DW = 1.56
2SLS

$$\text{(2-15)} \quad F_s = \underset{(.0057)}{.0431}\,(Y_d/P_d) + \underset{(170.6692)}{1519.3076}$$

$\bar{R}^2 = .714$
DW = 1.41
2SLS

$$\text{(2-16)} \quad F'_i - .9474\, F'_{i,-1} = \underset{(.0007)}{.0028}\,\{[\sum_{i=0}^{5}(D_I + P_I)_{-k}]\, i_L - .9474[\sum_{i=0}^{5}(D_I+P_I)_{-k-1}]\, i_{L,-1}\}$$

$$+ \underset{(16.7208)}{38.3265}$$

$\bar{R}^2 = .968$
DW =1.41
MS2SLS

<u>Wage equations</u>

$$\text{(2-17)} \quad w_a - .6316\, w_{a,-1} = \underset{(1.0755)}{-1.4656}\,[un - .6316\, un_{-1}] + \underset{(.3701)}{2.6194}[P_d - .6316\, P_{d,-1}]$$

$$+ \underset{(.0324)}{.0734}[(V_a/L_a) - .6316(V_a/L_a)_{-1}] \underset{(.1036)}{-.6999}$$

$\bar{R}^2 = .923$
DW = 1.65
MS2SLS

(2-18) $$w_m - .8421\ w_{m,-1} = \underset{(2.8089)}{-.4080}[un - .8421\ un_{-1}]$$

$$+ \underset{(.0981)}{.1345}[(V_m/L_m) - .8421(V_m/L_m)_{-1}]$$

$$+ \underset{(.1225)}{.7539}[w_m^{US} - .8421\ w_{m,-1}^{US}] - \underset{(.1143)}{.1023}$$

$\bar{R}^2 = .770$
DW = 1.62
MS2SLS

(2-19) $$w_c - .4737\ w_{c,-1} = \underset{(2.7259)}{-8.7213}[un - .4737\ un_{-1}]$$

$$+ \underset{(.1049)}{.4568}[(V_c/L_c) - .4737(V_c/L_c)_{-1}] + \underset{(.0733)}{.7542}[w_c^{US} - .4737\ w_{c,-1}^{US}]$$

$$- \underset{(.1084)}{1.1418}$$

$\bar{R}^2 = .982$
DW = 1.58
MS2SLS

(2-20) $$w_s - .7895\ w_{s,-1} = \underset{(.0735)}{.3941}[(V_s/L_s) - .7895(V_s/L_s)_{-1}]$$

$$+ \underset{(.6062)}{6.9484}[P_d - .7895\ P_{d,-1}] - \underset{(.1394)}{1.2476}$$

$\bar{R}^2 = .910$
DW = 1.45
MS2SLS

Price equations

(2-21) $$P_a - .5789\ P_{a,-1} = \underset{(.5570)}{1.0743}[(w_aL_a/V_a) - .5789(w_aL_a/V_a)_{-1}]$$

$$+ \underset{(.1745)}{.4889}[(V_a/V_a^*) - .5789(V_a/V_a^*)_{-1}] + \underset{(.1207)}{.1530}$$

$\bar{R}^2 = .912$
DW =1.86
MS2SLS

(2-22)

$$P_m - .4737\, P_{m,-1} = \underset{(.2176)}{.4729}[(w_m L_m/V_m) - .\text{-}737(w_m L_m/V_m)_{-1}]$$

$$+ \underset{(.1062)}{.2772}[(V_m/V_m^*) - .4737(V_m/V_m^*)_{-1}]$$

$$+ \underset{(.2191)}{.7571}[P_m^{US} - .4737\, P_{m,-1}^{US}] - \underset{(.0932)}{.1624}$$

$\bar{R}^2 = .860$
DW =1.67
MS2SLS

(2-23)

$$P_c - .4211\, P_{c,-1} = \underset{(.0427)}{1.1736}[(w_c L_c/V_c) - .4211(w_c L_c/V_c)_{-1}]$$

$$+ \underset{(.1131)}{.3640}[(V_c/V_c^*) - .4211(V_c/V_c^*)_{-1}] - \underset{(.0688)}{.1175}$$

$\bar{R}^2 = .973$
DW =1.60
MS2SLS

(2-24)

$$P_s - .5789\, P_{s,-1} = \underset{(.1228)}{.8042}[(w_s L_s/V_s) - .5789(w_s L_s/V_s)_{-1}]$$

$$+ \underset{(.0668)}{.1634}[(V_s/V_s^*) - .5789(V_s/V_s^*)_{-1}]$$

$$+ \underset{(.0075)}{.3139}[P_s^{US} - .5789\, P_{s,-1}^{US}] + \underset{(.0265)}{.0350}$$

$\bar{R}^2 = .975$
DW =2.46
MS2SLS

(2-25)

$$P_{cd} - .6316\, P_{cd,-1} = \underset{(.1087)}{.4291}[P_m - .6316\, P_{m,-1}] + \underset{(.0407)}{.2062}$$

$\bar{R}^2 = .916$
DW = 2.52
MS2SLS

(2-26) $$P_{sd} - .8947\,P_{sd,-1} = \underset{(.1584)}{.3601}[P_m - .8947\,P_{m,-1}] + \underset{(.0202)}{.0852}$$

$\bar{R}^2 = .928$
DW =1.74
MS2SLS

(2-27) $$P_{nd} - .3684\,P_{nd,-1} = \underset{(.0502)}{.8898}\{[wgt_1 P_s + wgt_2\,P_m]$$

$$-.3684[wgt_1\,P_s + wgt_2\,P_m]_{-1}\} + \underset{(.0313)}{.0743}$$

$\bar{R}^2 = .916$
DW = 2.28
MS2SLS

where $wgt_1 = \dfrac{C_s}{C_s + C_{nd}}$, and $wgt_2 = 1 - wgt_1$

(2-28) $$P_{sc} - .5263\,P_{sc,-1} = \underset{(.0671)}{1.1674}[P_s - .5263\,P_{s,-1}] \underset{(.0320)}{-.0894}$$

$\bar{R}^2 = .932$
DW = 1.98
MS2SLS

(2-29) $$P_h - .3158\,P_{h,-1} = \underset{(.0697)}{1.1038}[P_c - .3158\,P_{c,-1}] \underset{(.0510)}{-.0935}$$

$\bar{R}^2 = .956$
DW =1.71
MS2SLS

(2-30)* $$P_k - .8947\,P_{k,-1} = \underset{(.1092)}{.4236}[(.4697\,P_m + .5303\,P_c)$$

$$-.8947(.4697\,P_m + .5303\,P_c)_{-1}] + \underset{(.0147)}{.0748}$$

$\bar{R}^2 = .983$
DW = 2.32
MS2SLS

* The weight of .4697 is the ratio of new machinery and equipment to I_p in 1967.

$$(2\text{-}31)\quad P_g - .4736\, P_{g,-1} = \underset{(.0761)}{1.7927}[P_s - .4736\, P_{s,-1}] - \underset{(.0401)}{.4234}$$

$\bar{R}^2 = .962$
DW =2.75
MS2SLS

Labor force participation and production functions

$$(2\text{-}32)\quad L_{sup}/N - .9474(L_{sup}/N)_{-1} = \underset{(.0021)}{.0106}[t - .9474(t-1)] + \underset{(.0035)}{.0024}$$

$\bar{R}^2 = .922$
DW = 1.36
SCAN

$$(2\text{-}33)\quad \ln(V_a/L_a) - .2105\ \ln(V_a/L_a)_{-1} = \underset{(.0411)}{.6704}[\ \ln(K_a^u/L_a) - .2105\ \ln(K_a^u/L_a)_{-1}]$$

$$- \underset{(.0649)}{.2104}$$

$\bar{R}^2 = .924$
DW = 2.02
MS2SLS

$$(2\text{-}34)\quad \ln(V_m/L_m) - .3684\ \ln(V_m/L_m)_{-1} = \underset{(.1204)}{.2545}[\ \ln(K_m^u/L_m) - .3684\ \ln(K_m^u/L_m)_{-1}]$$

$$+ \underset{(.0120)}{.0208}[\ t - .3684(t-1)] + \underset{(.3187)}{.6736}$$

$\bar{R}^2 = .900$
DW = 2.04
MS2SLS

$$(2\text{-}35)\quad \ln(V_c/L_c) - .4737\ \ln(V_c/L_c)_{-1} = \underset{(.1508)}{.5160}[\ln(K_c^u/L_c) - .4737\ \ln(K_c^u/L_c)_{-1}]$$

$$+ \underset{(.0073)}{.0122}[t - .4737(t-1)] + \underset{(.0344)}{.4699}$$

$\bar{R}^2 = .911$
DW =1.50
MS2SLS

$$\text{(2-36)} \quad \ln V_s - .0526 \ln V_{s,-1} = \underset{(.1528)}{.2304}[\ln L_s - .0526 \ln L_{s,-1}]$$

$$+ \underset{(.0717)}{.6800}[\ln K^u_s - .0526 \ln K^u_{s,-1}] + \underset{(.5008)}{.9518}$$

$\bar{R}^2 = .994$
DW = 1.92
MS2SLS

Capacity production functions

$$\text{(2-37)} \quad \ln(V^*_a/L^A_a) = .6704[\ln(K_a/L^A_a) - .2105 \ln(K_a/L^A_a)_{-1}]$$

$$- .2104 + .2105 \ln(V^*_a/L^A_a)_{-1}$$

$$\text{(2-38)} \quad \ln(V^*_m/L^A_m) = .2545[\ln(K_m/L^A_m) -.3684 \ln(K_m/L^A_m)_{-1}]$$

$$+ .0208[t -.3684(t-1)] + .6736 + .3684 \ln(V^*_m/L^A_m)_{-1}$$

$$\text{(2-39)} \quad \ln(V^*_c/L^A_c) = .5160[\ln(K_c/L^A_c) -.4737 \ln(K_c/L^A_c)_{-1}]$$

$$+ .0122[t -.4737(t-1)] + .4699 + .4737 \ln(V^*_c/L^A_c)_{-1}$$

$$\text{(2-40)} \quad \ln V^*_s = .2304[\ln L^A_s - .0526 \ln L^A_{s,-1}] + .6800[\ln K_s - .0526 \ln K_{s,-1}]$$

$$+ .9518 + .0526 \ln V^*_{s,-1}$$

Short-term and long-term interest rate equations

$$\text{(2-41)} \quad i_s - .0526\, i_{s,-1} = \underset{(.0705)}{.7082}[i_D - .0526\, i_{D,-1}]$$

$$+ \underset{(14.1112)}{20.8038}\left[\frac{TRB + DTDL}{TCA} - .0526\left(\frac{TRB + DTDL}{TCA}\right)_{-1}\right] \underset{(.1843)}{-.8335}$$

$\bar{R}^2 = .953$
DW =1.99
SCAN

(2-42) $$i_L - .1053\ i_{L,-1} = \underset{(.0789)}{.7673}[i_s - .1053\ i_{s,-1}] + \underset{(.2246)}{2.9464}$$

$\bar{R}^2 = .810$
DW =1.92
MS2SLS

Sectoral domestic product equations

(2-43) $$V_a^d - .9474\ V_{a,-1}^d = \underset{(.0247)}{.0618}[(GNP/P) - .9474(GNP/P)_{-1}]$$

$$+ \underset{(.2320)}{.1870}[(\Delta I_{ia}/P_a)_{-1} - .9474(\Delta I_{ia}/P_a)_{-2}]$$

$$+ \underset{(.8348)}{1.0852}[WETH - .9474\ WETH_{-1}] \underset{(.2995)}{-.3953}[V_{a,-1}^d - .9474\ V_{a,-2}^d]$$

$$\underset{(94.7889)}{-105.2157}$$

$\bar{R}^2 = .511$
DW =1.80
MS2SLS

(2-44) $$V_m^d - .5789\ V_{m,-1}^d = \underset{(.0502)}{.0517}[(C_d + C_{nd} + C_{sd} + I_p) - .5789(C_d + C_{nd}$$

$$+ C_{sd} + I_p)_{-1}] + \underset{(373.2939)}{1227.9045}$$

$\bar{R}^2 = .760$
DW = .883
MS2SLS

$$(2\text{-}45)\quad V_c - .4211\, V_{c,-1} = \underset{(.0518)}{.2377}[(I_p + I_h + G_I/P_k) - .4211(I_p + I_h + G_I/P_k)_{-1}]$$

$$- \underset{(45.0763)}{28.8488}$$

$\bar{R}^2 = .990$
DW =1.39
MS2SLS

$$(2\text{-}46)\quad V_s - .4211\, V_{s,-1} = \underset{(.0515)}{.8169}[(Y_d/P_d) - .4211(Y_d/P_d)_{-1}]$$

$$+ \underset{(.2315)}{.2935}[(G_s/P_g) - .4211(G_s/P_g)_{-1}] - \underset{(275.9453)}{2178.2693}$$

$\bar{R}^2 = .992$
DW = 2.19
MS2SLS

Depreciation, corporate savings and interest payment equations

$$(2\text{-}47)\quad D - .9474\, D_{-1} = \underset{(.0517)}{.2139}[(P_k I) - .9474(P_k I)_{-1}] + \underset{(67.1091)}{340.2783}$$

$\bar{R}^2 = .994$
DW = .58
MS2SLS

$$(2\text{-}48)\quad S_c - .4737\, S_{c,-1} = \underset{(.0060)}{.1132}[(P_m V_m + P_c V_c + P_s V_s) - .4737(P_m V_m +$$

$$P_c V_c + P_s V_s)_{-1}] + \underset{(118.4498)}{76.0361}$$

$\bar{R}^2 = .988$
DW =1.87
MS2SLS

$$(2\text{-}49)\quad IPD - .1053\, IPD_{-1} = \underset{(16.7907)}{214.9810}[\, i_L - .1053\, i_{L,-1}]$$

$$+ \underset{(.0137)}{.1684}[B_g - .1053\ B_{g,-1}] \ \underset{(129.0202)}{-2255.9343}$$

$\bar{R}^2 = .986$
DW =1.85
MS2SLS

Taxes, and transfer payment equations

$$(2\text{-}50) \quad T_p - .1053\ T_{p,-1} = \underset{(.0142)}{.2376}[(W+M_A + Y_A + Y_{NB} + RI) - .1053(W + M_A + Y_A + Y_{NB} + RI)_{-1}] - \underset{(28.2673)}{1339.3035}$$

$\bar{R}^2 = .992$
DW =1.88
MS2SLS

$$(2\text{-}51) \quad T_I - .7368\ T_{I,-1} = \underset{(.0034)}{.1425}[\ GNP - .7368\ GNP_{-1}] - \underset{(46.0138)}{164.9404}$$

$\bar{R}^2 = .988$
DW = 2.32
MS2SLS

$$(2\text{-}52) \quad T_r - .6842\ T_{r,-1} = \underset{(5308.9453)}{4148.2148}[\ un -.6842\ un_{-1}]$$

$$- \underset{(1156.8137)}{1702.5637}[\ \frac{\Delta GNP}{GNP} - .6842(\frac{\Delta GNP}{GNP})_{-1}]$$

$$+ \underset{(.0060)}{.0820}[\ GNP - .6842\ GNP_{-1}] - \underset{(128.7598)}{190.5596}$$

$\bar{R}^2 = .900$
DW = 1.92
MS2SLS

Identities

(2-53) $$L^A = L \frac{1 - uf}{1 - un}$$

(2-54) $$L_i^A = L^A \frac{L_i}{L} \quad , i=a,m, c, s$$

(2-55) $$K_i = \sum_{j=0}^{20} (.934)^j I_{pi,-j} \quad , i=a,m,c,s$$

(2-56) $$K_i^u = \frac{L_i}{L_i^A} K_i \quad , i=a,m,c,s$$

(2-57) $$P_x = (P_a X_a + P_m X_m)/(X_m + X_a)$$

(2-58) $$C = C_d + C_{sd} + C_{nd} + C_s$$

(2-59) $$I_p = I_{pa} + I_{pm} + I_{pc} + I_{ps}$$

(2-60) $$P_k I = P_k I_p + P_h I_h + G_I$$

(2-61) $$I = I_p + I_h + G_I/P_k$$

(2-62) $$\Delta I_i = \Delta I_{in} + \Delta I_{ia} + \Delta I_{ig}$$

(2-63) $$I_{in} = I_{in,-1} + \Delta I_{in}/P_k$$

(2-64) $$X = X_a + X_m$$

(2-65) $$P_x X = P_a X_a + P_m X_m$$

(2-66) $$F = F_m + F_s + F_i'/P_F$$

(2-67) $$P_F F = P_m^F F_m + P_s^F F_s + F_i'$$

(2-68) $$GNP/P = C + I + (\Delta I_{in}/P_k + \Delta I_{ig}/P_k + \Delta I_{ia}/P_a) + X - F + G_s/P_g + S_e/P$$

(2-69) $W = w_a L_a + w_m L_m + w_s L_s$

(2-70) $un = (L_{sup} - L)/ L_{sup}$

(2-71) $L = L_a + L_m + L_c + L_s$

(2-72) $V = V_a + V_m + V_c + V_s$

(2-73) $GNP = P_{cd} C_d + P_{sd} C_{sd} + P_{nd} C_{nd} + P_{cs} C_s + P_k I + \Delta I_i + P_x X - P_F F + G_s + S_e$

(2-74) $NI = GNP - T_I - D - S_e$

(2-75) $Y_d = NI - T_p + T_r + IPD - S_c$

(2-76) $P_d = (P_{cd} C_d + P_{sd} C_{sd} + P_{nd} C_{nd} + P_{cs} C_s)/ C$

(2-77) $P = GNP/(GNP/P)$

(2-78) $V_a = V_a^d + X_a$

(2-79) $V_m = V_m^d + X_m$

III. Evaluation of the Behavioral Equations

Consumption functions: The consumption sector is organized to follow the revised national account classification of durables, semi-durables, nondurables, and services. Per capita consumption is estimated for each category. The per capita consumption functions are simply based on real per capita income and on relative prices. Since the model is based on annual data it may be reasonable to say that current real income and relative price are the major determinant of current consumption except for durable goods. The consumption of durable goods is likely to be influenced by the current as well as past income in some distributed lag form. To determine the lag structure, we introduced gamma distributed lags as proposed in [10], and for this purpose we used the nonlinear least squares estimation technique given in [8]. The estimated time form of lags for durable consumption is presented in Table 1.(3)

Table 1 The Distributed Lag Coefficients of the Durable Consumption Function

Lagged Periods	Coefficients
0	.4482
1	.2870
2	.1460
3	.0676
4	.0297
5	.0127
6	.0053

Investment functions: "Business gross fixed capital formation" in the national income accounts are divided into residential construction, I_h, and plant (i.e. nonresidential) construction, machinery and equipment, I_p. The latter is further broken down to four sectors. If we denote net investment by IN,, and if we introduce an overall stock adjustment of such form as given in [6: p.25], then IN will be given as

$$\text{(3-1)} \qquad IN = \lambda[K^* - K_{-1}] + \gamma C_{p,\ -1}$$

where λ, K^*, K_{-1} and $C_{p,-1}$ are respectively, an adjustment coefficient, expected capital stock, lagged capital stock, and lagged capacity utilization rate. Gross investment, IG, is related to net investment, IN, by the following identity, if we assume a depreciation rate of δ,

(3) The gamma distributed lags a priori specify the k-th coefficient of the distributed lags, β_k , by $\{\beta_k = k^{s-1}\ e^{-k}\} \quad s > 0$.

The Koyck lag can be shown to be a special case of the gamma distributed lags, which can represent a family of unimodal distributed lag patterns by a single unknown coefficient s which is a real number.

To estimate the gamma distributed lags one needs to specify the length of lags, and the strategy of choosing this length is discussed in [10]. In this study we used the maximum length of lag which was available from our data.

(3-2) $$IG = IN + \delta K_{-1}$$

Substituting (3-2) into (3-1), we obtain

(3-3) $$IG = \lambda K^* - (\lambda-\delta)\ K_{-1} + \gamma C_{p,\ -1}\ .$$

We make a hypothesis that expected capital stock, K*, is determined by(4)

(3-4) $$K^* = \alpha \sum_{j=1}^{m} q_j V_{-j+1} + \beta F$$

where V and F are , respectively, output and financial variable, and the distributed lag coefficients $\{q_j\}$ are given by the gamma distributed lags:

$$q_j = j^{s-1}\ e^{-j}$$

Substitution of (3-4) into (3-3) gives rise to

(3-5) $$IG = \alpha\lambda \sum_{j=1}^{m} q_j V_{-j+1} + \beta\lambda F \ + \delta C_{p,-1} - (\lambda - \delta)K_{-1}.$$(5)

---

(4) The hypothesis given by equation (3-4) implies that the investment decision makers expect existence of lags between output, V, and expected capital stock, K*. At the micro level, the theory of investment relates K* to the marginal productivity of capital. This relationship, even if it holds for the firm, may become less clear at a macro level, due partly to an aggregation process. Consequently, rather than rigidly extending the micro theory of investment into macro, we have proposed equation (3-4) as a hypothesis which has to be tested by data.

Equation (3-1) is the usual adaptive adjustment process frequently used in quantitative works. Recently, this formulation is challenged by the theory of investment which uses control theory [2], [3], and [11], among others. The application of control theory to the theory of investment is an interesting attempt. However, here again it is applicable at the firm level when one is certain that the decision maker is behaving to obtain an optimal trajectory of, say, profits. At a macro level one faces the frustration of not knowing whether the micro formulation carries over to the macro level or not.

(5) In an earlier stage of estimation, the Durbin-Watson test statistics indicated the possible existence of first order autocorrelation. Hence the equation (3-5) was transformed into

$$IG - \rho IG_{-1} = \alpha\lambda \sum_{j=1}^{m} q_j (V_{-j+1} - \rho V_{-j}) + \beta\lambda(F - \rho F_{-1}) + \gamma(C_{p,-1} - \rho C_{p,-2})$$
$$- (\lambda-\delta)[K_{-1} - \rho K_{-2}]$$

where ρ is the coefficient of first order autocorrelation. The above equation was estimated by the nonlinear least squares method.

Equation (3-5) is used to estimate investment of the four sectors. The manufacturing and service sectors use net direct foreign investment, D_I/P_k, as a financial variable, while the construction sector uses the long-term interest rate, i_L. All sectors except construction retain the capacity utilization variables which are not statistically significant but have the right sign.

The estimated time forms of gamma distributed lags for the investment functions of each sector are presented in Table 2. All the distributed lag coefficients decline as a Koyck lag does.

Table 2 Gamma Distributed Lag Coefficients: Investment

Lagged Periods	I_{pa}	I_{pm}	I_{pc}	I_{ps}
0	.4751	.3999	.4390	.3324
1	.2817	.2940	.2886	.2976
2	.1370	.1622	.1491	.1842
3	.0614	.0795	.0698	.0980
4	.0264	.0366	.0309	.0480
5	.0110	.0161	.0133	.0223
6	.0045	.0069	.0056	.0100

Residential construction, I_h, is determined by housing starts, I_h^s, which in turn are determined by disposable income, Y_d, and the long-term interest rate, i_L, in distributed lag fashion. As shown in Table 3 below, the distributed lags of housing starts in the residential construction equation are short: the current and one year lagged housing starts determine 80 percent of the current residential construction expenditure.

Table 3 Gamma Distributed Lag Coefficients: Residential Construction and Housing Starts

Lagged Periods	I_h	I_h^s
0	.5074	.2834
1	.2740	.2949
2	.1262	.1993

(Table 3 continued)

3	.0544	.1129
4	.0227	.0580
5	.0092	.0281
6	.0037	.0130

A change in nonfarm inventories is explained by the real gross national product, GNP/P, and the stock of inventories in the previous period, $I_{in,-1}$. The stock of inventories has an arbitrary origin of zero in 1947.

Exports and imports: Exports are divided into two groups-- exports of agricultural, fishing and forestry products, X_a, and exports of mining and manufacturing products, X_m. The former is determined by the world real income, Y^w. Attempts to introduce relative prices were not successful.

The world income, Y^w, is the weighted average of national income of the United States, the United Kingdom and Japan, weights being the portions of total Canadian exports going to these countries. The world price of mining and manufacturing goods is constructed by the weighted average of price indexes of the three countries above and the weights are the same ones used for Y^w. The relative price variable, P_m/P^w_m, is retained in the equation for exports of mining and manufacturing goods. The dummy variable, AUTO, was introduced to take into account the effect of the Canadian-American automobile agreement from 1966.

Imports are divided into three categories: imports of mining and manufacturing goods, F_m, imports of services, F_s, and interest and dividend payments to nonresidents, F_i'. The first two groups, i.e. F_m and F_s, are explained by real income and relative prices, while the last group, F_i', is explained by a stock of net direct and portfolio investments and the long-term interest rate. The stock of net foreign direct and portfolio investment is constructed by taking a moving sum of such investment over six years, $\sum_0^5 (D_I + P_I)_{-i}$, in view of the fact that no data on the stock of foreign investments are available.

Wages and prices: The wage rate in each sector is defined as the annual wages and supplementary income divided by the total number of persons employed in that sector. The wage rates are determined by the unemployment rate, the average labor productivity, and in the case of mining and manufacturing and of construction, by the wage rates of the United States.[6] Most of the Canadian labor unions are in close contact with their counterparts in the United States and their wage demands may be influenced by how much the U.S. workers may get.

The price equations of the four sectors are the basis of all price equations of the model, since once the sectoral prices are determined, they in turn determine all of the other prices. The four sectoral prices, i.e. P_a, P_m, P_c, and P_s are determined basically by mark-up equations, modified by the rates of capacity utilization and by "price syncronization" between the United States and Canada, because in all sectors except agriculture large Canadian corporations tend to be American subsidiaries and their pricing policies may closely coordinate with those of their parent companies.[7]

Labor force participation and available labor: The aggregate labor participation rate in the model, L_{sup}/N is determined by a time trend. This equation, however, does not catch any short-run fluctuations in the supply of labor due to changes in women's participation in the labor force; nor does it explain a change in the supply of labor due to changes in age composition.

The determination of L^A follows the formulation of Klein and Preston [7]:

$$(3\text{-}6) \qquad L^A = L \frac{1-uf}{1-un}$$

where uf and un are the frictional rate and the national rate of unemployment respectively, and L is total employment. The frictional unemployment rate may be regarded as the rate which determines effective full employment, and it will vary according to institutional arrangements and statistical definitions of the unemployment rate. In our model it is set at two percent, the minimum actual unemployment rate reached in the sample period.

(6) The introduction of the unemployment variable is based on the Phillips curve hypothesis; The wage equations explain the wage rate levels, where the Phillips curve hypothesis is usually formulated in terms of wage changes.

(7) Coordinated pricing policies are possible in those markets in which Canadian and American consumers have similar preferences, and similar sources of information on consumer goods. Furthermore, if the distribution and marketing systems are similar in the two countries, price syncronization may be easily realized.

Once the available labor force, L^A, is determined by equation (3-6), the problem becomes how to distribute it among the industrial sectors. In the model the total available force was distributed to each sector according to the sectoral share of actual labor force:(8)

$$(3\text{-}7) \qquad L_i^A = L^A \frac{L_i}{L} .$$

Production functions: The production functions in the model follow the general Cobb-Douglas form. The two sectors, i.e., construction, and mining and manufacturing, employ a disembodied technological process using a time trend. In these cases the production functions are constrained by constant returns to scale, since the introduction of a time trend, when the production function parameters were unconstrained, tended to give poor estimation results due to the fact that labor and capital data have their own time trends.

In estimating the production for agriculture, fishing and forestry, we restricted the production function to follow constant returns to scale without a disembodied technological change. This is because the estimated coefficient of labor in the unrestricted production function tended to be negative and insignificant. Moreover, the estimated coefficient of time trend with the constraint of constant returns to scale was negative and insignificant. Employment in this sector has been declining over the years and thus it has a negative correlation with output.

Since we do not have reasonable data on capital stock which are consistent with the investment series of national income accounts, we reated capital stock for sector i, K_i, by

$$(3\text{-}8) \qquad K_i = \sum_{k=0}^{20} (.934)^k I_{pi,-k}$$

(8) From equations (3-6) and (3-7) we obtain $L_i^A = L_i(1\text{-}uf)/(1\text{-}un)$. This implies that the unemployment situation is uniformely shared by each sector. This may be the case where labor mobility is high across different regions and industries and where business conditions are more or less the same in each sector. If the practice of labor hoarding in a recession is different in each sector and if business cycle affects each sector differently, then equation (3-7) has to be changed. If we have data on unemployment rates or vacancy rates by industry, then we may construct industrial available labor, L_i^A using them. In view of the fact that these data are not available for the time period 1947-1969, we resorted to the formulation of equation (3-7).

where I_{pi} is gross investment in sector i, and the depreciation rate .934 was taken from the estimate of the depreciation rate in the manufacturing industries.(9)

Once the capital stock series are constructed, we assumed that the utilization rate of capital is the same as that of labor:

$$\text{(3-9)} \qquad \frac{K_i^u}{K_i} = \frac{L_i}{L_i^A}$$

where K_i^u is the utilized capital. From equation (3-9) we constructed the K_i^u series. The production functions were estimated using L_i, K_i^u , and V_i.

The capacity production functions follow the Klein and Preston formulation [7]. The parameters estimated with L_i, K_i^u , and V_i were used to generate capacity output, V_i^*, by available labor, L_i^A, and capital stock K_i.

<u>Short- and long-term interest rates</u>: The short-term interest rate is determined by the discount rate, i_D, and the rate of treasury bills and day-to-day loans to total assets of the chartered banks. The latter variable is included because the 1967 Bank Act instituted the secondary reserve ratio which may be imposed by the Bank of Canada. The secondary reserves consist of bank cash, Canadian treasury bills issued for a term of one year or less and day loans to money-market dealers. Hence, it will be reasonable to expect that as the money situation becomes tight the banks tend to acquire these assets and to forego longer commitments. The long-term interest rate is determined by the short-term interest rate and by the lagged long-term interest rate.

<u>Sectoral domestic products</u>: The domestic product by sector is determined in the model by such demand variables as consumption, investment, and government expenditures. Once the domestic product by sector is determined then the production functions are used to find labor requirements to produce the levels

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(9) Dominion Bureau of Statistics, <u>Fixed Capital Flows and Stocks. Manufacturing, Canada, 1926-1960</u>, Ottawa, 1966, P. A1. .934 is the average depreciation between 1947 and 1967. The capital stock series generated by equation (3-8) may underestimate real capital stocks, but in the absence of data on capital stoks, any attempt to generate capital stock series will be subject to under or over estimation. Equation (3-8) indicates that gross investment, I_{pi}, is summed over 21 years: This period of time was determined by the fact that national income accounts (revised) go as far as back to 1926.

of output which meet the demand.

We had difficulties in estimating domestic demand for agricultural, fishing and forestry products, V_a^d , and for mining and manufacturing products, V_m^d. This is mainly because these variables are residually defined as $V_a^d = V_a - X_a$, and $V_m^d = V_m - X_m$ and because the sources of statistics for X_a and X_m are not consistent with those of V_a and V_m.

The determination of V_a^d is done in a synthetic fashion because it has changes in farm inventories, $\Delta I_{ia}/P_a$, and the adjustment for weather condition, WETH.(10) If data on changes in inventories which are consistent with data on domestic product, V_a, are available, then it is desirable to explain inventory changes and supply separately; then demand will be determined from the identity: demand = supply - changes in inventories.

The domestic demand for mining and manufacturing is determined by the sum of consumer durables, C_d, semi-durables, C_{sd}, nondurables, C_{nd}, and plant and equipment investment, I_p, while the demand for gorss domestic product originating in construction, V_c, is determined by the sum of plant and equipment investment, I_p, residential construction, I_h, and government investment, G_I/P_k. The demand for gross domestic product originating in services is determined by disposable income, Y_d/P_d, and government expenditures on services, G_s/P_g.

<u>Depreciation, corporate savings and interest on the public debt</u>: Depreciation allowances will be determined by the level of net capital stock existing in the society at the beginning of the period, K_{-1}: If we have an estimate of K_{-1}, then the real depreciation investment is given by δK_{-1},where δ is the depreciation rate. However, depreciation allowances, D, in the model include value adjustments due to price fluctuations and furthermore the net capital stock of Canada, K_{-1} is not available. Rather than getting a proxy for K_{-1} and determining real depreciation investment, and then adjusting it for price fluctuations, we simply made the current value of depreciation, D, determined by the current values of gross investment, $P_k I$.

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(10) The weather variable, WETH, was constructed at the Economic Council of Canada and it was provided to the author by Mr. L. Auer of Economic Council of Canada.

Earnings not paid out to persons, S_c, is determined by gross domestic product of all sectors except that originating in agriculture, fishing and forestry, while interest on the public debt, IPD, is determined by the long-term interest rate, i_L, and the level of unamortized government bonds, B_g.

Taxes and transfer payments: In the model taxes consist of personal direct taxes, T_p, and indirect taxes, T_I. The former is determined by personal income consisting of total wage bills, W, military pay and allowances, M_A, accrued net income of farm and nonfarm, Y_A and Y_{NB}, and rent, interest and miscellaneous investment income, RI. Indirect taxes, T_I, are determined by gross national product, GNP.

The transfer payments, T_r, will increase as the unemployment rate, un, increases while the gross national product, GNP, indicates the capacity of the economy to provide transfer payments.

IV. Simulation Experiments with Wage-Parity and Price-Syncronization between Canada and the United States

Since the model specifies some equations in nonlinear form, e.g., production functions, and price and wage equations among others, the entire system was solved by a modified Seidel method. As a set of initial values for iteration, the solution of the previous period was used.

Using the set of exogenous variables which are presented in Table 4 we made first a forecast of the Canadian economy from 1971 to 1975. In most econometric models it has been observed that the largest source of prediction errors lies in the assumed exogenous variables, and especially in those key variables which most influence the predicted values. In our model these key variables are American wages and prices, w_m^{US}, w_s^{US}, P_m^{US}, and P_s^{US}; government expenditures, G_I and G_s; and the discount rate, i_D.

For the forecast period from 1971 to 1975 American wages and prices are assumed to grow more slowly than those experienced during 1969 and 1970. For example, the wage rate of construction, w_c^{US}, is assumed to grow at 7.2 percent per year (its average growth rate during 1969 and 1970 was 8.5 percent); the price level of mining and manufacturing, P_m^{US}, is assumed to grow at 2.7 percent

Table 4 The Values of Exogenous Variables Used for the Simulation Experiments

Variables	1971	1972	1973	1974	1975
N	21646	21860	22032	22177	22296
w_m^{US}	8.536	9.005	9.499	10.021	10.571
w_c^{US}	9.860	10.569	11.329	12.144	13.017
P_m^{US}	1.178	1.210	1.243	1.277	1.311
P_s^{US}	1.426	1.495	1.567	1.643	1.723
P_m^F	1.234	1.268	1.304	1.340	1.378
P_s^F	1.426	1.476	1.529	1.583	1.639
D_I/P_K	351	388	416	437	451
P_I	735	964	1081	1138	1165
i_L^{US}	5.42	5.28	5.27	5.26	5.26
G_I	3235	3477	3738	4018	4320
G_s	17549	19655	22014	24655	27614
M_A	915	936	956	977	999
Y_A	1379	1374	1373	1372	1364
Y_{NB}	4729	4926	5092	5238	5342
RI	3974	4372	4809	5290	5819
P_m^W	1.251	1.282	1.314	1.347	1.381
P^F	1.220	1.248	1.277	1.306	1.338
Y^W	654	684	716	749	784
B_g	19760	20273	20801	21341	21896

Notes: 1. w_m^{US} grows 5.5 percent per annum, and w_c^{US} grows 7.2 percent per annum.

2. P_m^{US} grows 2.7 percent per annum, and P_s^{US} grows 4.8 percent per annum.

3. P_m^F grows 2.8 percent per annum, and P_s^F grows 3.5 percent per annum.

4. N, D_I/P_k, P_I, Y_A, and Y_{NB} are the solution values of the Four Sector Econometric Model of Canada [9] which treates them as endogenous variables.

5. i_L^{US} is assumed to be always 2 percentage point below i_L.

6. G_I grows at 7.5 percent per annum, and G_s grows at 12.8 percent per annum.

7. M_A grows 2.2 percent per annum and RI grows 1.0 percent per annum.

8. P_m^W grows 2.5 percent per annum, and P^F grows 2.3 percent per annum.

9. Y^W grows 4.6 percent per annum, and B_g grows 2.6 percent per annum.

10. The following variables are kept constant at their 1970 values:

$WETH = 80$; $\Delta I_{ia} = -161$; $\Delta I_{ig} = 3$; $S_e = 1232$; $IVA = 236$

11. The discount rate, i_D, is kept constant at 6.0 percent per annum.

per year (its average growth rate during 1969 and 1970 was 3.5 percent).[11]

Government expenditure is divided into gross fixed capital formation by government, G_I, and current expenditure on goods and services, G_s. The former is assumed to grow steadily at 7.5 percent per year, and the latter at 12.8 percent per year. During 1969 and 1970 the government resorted to the usual Keynesian fiscal policy of reducing government expenditure to combat inflation: government investment, G_I, fell from $3204 million in 1968 to $2993 million in 1969 (6.6 percent reduction), and it only grew by 1/2 percent from 1969 to 1970. Under this government austerity program current expenditure on goods and services by government, G_s, nevertheless, grew steadily by about 11 percent in 1968 and 14 percent per year in 1969, and in 1970. In the light of the current indication by the federal government to spend 8 percent more in the 1971-1972 fiscal year, the assumption on the growth rates of G_I and G_s seems plausible. Furthermore, the discount rate is assumed to be 6 percent during the forecast period, indicating the end of the tight-money policy of 1969 and 1970.

The forecast values of the Gross National Expenditure (GNE) account, wages, employment, unemployment rate and prices are presented in Table 5 as the basic forecast. With the set of exogenous variables given in Table 4, one finds that the average rate of growth of GNE from 1971 to 1975 is 3.6 percent, and the average rate of unemployment in the same period is 4.8 percent. The pattern of price rises is different among sectors: the prices of the mining and manufacturing and construction sectors tend to rise faster than those of other sectors. The average rate of increase of the GNE deflator, P, in this period is 1.5 percent per year. The rise in construction wages, w_c, is the fastest in all sectors.

Let us now turn to wage-parity simulations. First we define wage-parity as the situation in which the Canadian worker receives annually the same amount of money income which his U.S. counterpart receives, without allowing for the exchange rate differential. Under this definition the Canadian wage in sector i, w_i, becomes

$$w_i = w_i^{US}$$

(11) In one of the later simulations we assume continuing U.S. inflation in P_m^{US} and P_s^{US}.

Table 5 Basic Forecast, 1971 - 1975

	1971	1972	1973	1974	1975
I. GNE account (millions of 1961 dollars)					
C	38918	39498	40161	40815	41377
I	13007	13852	14904	15706	16253
I_p	8291	8819	9166	9343	9469
I_h	2419	2949	3481	3868	4114
G_I/P_k	2482	2639	2815	3008	3224
X	18437	18812	19210	19609	19936
F	16496	16778	17101	17390	17617
GNE	65421	67316	69891	72503	74814
% growth of GNE	4.2	2.9	3.8	3.7	3.2
II. Wages					
w_m	7.31	7.60	7.93	8.27	8.57
w_c	8.46	8.72	9.27	9.82	10.37
w_s	5.70	5.73	5.84	5.92	5.99
III. Employment					
L_m	2158	2278	2309	2304	2287
L_c	451	458	479	495	502
L_s	4924	5251	5343	5490	5652
Unemployment Rate	4.7	4.9	4.7	4.9	4.9
IV. Prices					
P_m	1.21	1.26	1.29	1.32	1.35
P_c	1.52	1.55	1.60	1.66	1.70
P_s	1.39	1.43	1.45	1.47	1.50
P_k	1.30	1.32	1.33	1.34	1.34
P_h	1.54	1.58	1.60	1.64	1.68
P_d	1.30	1.33	1.35	1.36	1.38
P	1.34	1.37	1.40	1.41	1.43

where w_i^{US} is the United States wage rate in sector i. Table 6 below compares the annual wages in Canada and the United States in 1970.

Table 6 Average Wage Rates in Canada and United States in 1970 (thousands of dollars)

	Canada	United States
Mining and Manufacturing	7.0	8.1
Construction	8.0	9.2
Services	5.7	7.5

Now let us suppose that wage-parity is enforced in two sectors, mining and manufacturing and construction, starting from 1971. The impact of wage-parity on Canadian economic growth, prices and employment may depend on the way wage-parity is introduced. We set up two hypotheses: (1) wage-parity is to be 100 percent effective in 1971 and after, and (2) full wage-parity is to be reached in 1972 and after. In order to achieve full parity in 1972 the wage rate in mining and manufacturing has to increase by 14.3 percent in 1971, whereas in construction a 16.2 percent increase in 1971 will bring full wage parity in 1972.

The simulation results for these two hypotheses are presented in Tables 7 and 8.(12) We note that in both cases wage-parity tends to bring slower economic growth, and higher prices and unemployment than the absence of wage-parity as demonstrated in the basic forecast of Table 5. Stepwise wage-parity (Table 8) tends to excert a less severe impact on the economy than the enforcement of 100 percent wage-parity in 1971 (Table 7).(13)

Let us examine the patterns of parice rises in the two sectors (i.e. mining and manufacturing, and construction) in which wage-parity is enforced. Table 9 below compares percentage increase in these price levels in the absence of wage-parity with increases under full wage-parity in 1971 and after.

(12) For these simulations we used the same exogenous variables as those used in the basic forecast.

(13) We made a simulation experiment assuming that wage-parity is enforced also in the service sector from 1971 on. The results predict an average unemployment rate of 15.8 percent; an average annual growth rate of 1.2 percent and an annual increase in the implicit GNE deflator of 5 percent.

Table 7 Wage-Parity Experiment: Full Parity in 1971 and After

	1971	1972	1973	1974	1975
I. GNE account (millions of 1961 dollars)					
C	38371	39100	39636	40160	40699
I	12876	13499	14444	15170	15658
I_p	8131	8557	8851	8994	9117
I_h	2419	2945	3464	3835	4069
G_I/P_k	2357	2476	2621	2782	2968
X	17960	18267	18630	18998	19299
F	16664	17098	17437	17717	17951
GNE	64329	65725	67926	70276	72428
% growth of GNE	2.4	2.2	3.4	3.5	3.1
II. Wages					
w_m	8.54	9.00	9.50	10.02	10.57
w_c	9.86	10.57	11.33	12.14	13.02
w_s	5.87	5.86	5.98	6.08	6.16
III. Employment					
L_m	2108	2213	2242	2236	2218
L_c	446	444	460	473	479
L_s	4737	5215	5264	5364	5520
Unemployment Rate	7.5	6.4	6.1	6.8	7.0
IV. Prices					
P_m	1.27	1.33	1.37	1.41	1.45
P_c	1.75	1.85	1.94	2.04	2.13
P_s	1.38	1.43	1.44	1.48	1.51
P_k	1.37	1.40	1.43	1.44	1.46
P_h	1.82	1.92	1.99	2.07	2.13
P_d	1.32	1.35	1.37	1.39	1.41
P	1.38	1.42	1.46	1.48	1.50

Table 8 Wage-Parity Experiment: Stepwise Increases in Wages to Attain Full Parity in 1972 and After

	1971	1972	1973	1974	1975
I. GNE account (millions of 1961 dollars)					
C	38601	39097	39600	40187	40730
I	12897	13579	14489	15186	15666
I_p	8193	8618	8865	8999	9127
I_h	2414	2937	3456	3830	4067
G_I/P_k	2400	2481	2624	2784	2970
X	18179	18378	18659	19016	19315
F	16582	16983	17383	17706	17962
GNE	64829	66205	68173	70438	72563
% growth of GNE	3.2	2.1	3.0	3.3	3.0
II. Wages					
w_m	8.01	9.00	9.50	10.02	10.57
w_c	9.29	10.57	11.33	12.14	13.02
w_s	5.74	5.81	5.95	6.06	6.13
III. Employment					
L_m	2128	2234	2250	2239	2220
L_c	446	448	463	475	480
L_s	4824	5163	5229	5376	5555
Unemployment Rate	5.7	6.2	6.5	6.9	6.8
IV. Prices					
P_m	1.25	1.33	1.37	1.41	1.45
P_c	1.66	1.86	1.95	2.04	2.14
P_s	1.39	1.43	1.45	1.48	1.51
P_k	1.35	1.40	1.42	1.44	1.45
P_h	1.73	1.91	1.99	2.07	2.14
P_d	1.31	1.34	1.37	1.39	1.41
P	1.36	1.41	1.45	1.48	1.50

Table 9 Comparison of Increases in P_m and P_c
Basic Forecast vs. Wage-Parity in 1971 and After
(percentage)

	1971	1972	1973	1974	1975	Average
	A. Basic Forecast					
P_m	5.2	4.1	2.4	2.3	2.3	3.3
P_c	3.4	2.0	3.2	3.8	2.4	3.0
	B. Full Wage-Parity in 1971 and After					
P_m	10.4	4.7	3.0	2.9	2.8	4.8
P_c	19.0	5.7	4.9	5.2	4.4	7.8

We note two points form Table 9: (1) the impact of wage-parity on prices in these two sectors is characterized by an initial thrust in the year wage-parity is enforced; a long run lingering impact is caused by the momentum of the system trying to adjust to this thrust. (2) The price level of construction seems to be more sensitive to wage-parity than that of mining and manufacturing.

Point (1) above results from the nature of the wage-parity hypothesis which is introduced in the simulation experiments: Wage-parity is defined to be $w_i = w_i^{US}$, and in the simulation experiment it is assumed that w_m^{US} grows at 5.5 percent per year, while w_c^{US} grows at 7.2 percent per year. Consequently, once the Canadian wages, w_m and w_c, are adjusted with an initial thrust to those of the United States in 1971, they grow steadily from 1972 to 1975. If the American wages, w_m^{US} and w_c^{US}, increase faster than the rates assumed above, then the impact of wage-parity on prices will be much more severe than that which is shown in Table 9.

To interpret point (2) above, we need to examine the elasticities of certain variables which are presented in Table 10 below. We note that the elasticity of P_m with respect to w_m, $E[P_m|w_m]$, is .3 whereas that of P_c with respect to w_c, $E[P_c|w_c]$, is .77. We assumed that w_m^{US} grows at 5.5 percent per year, while w_c^{US} grows at 7.2 percent per year. Given the elasticities of .3 and .7 respectively, the 5.5 percent rise of w_m will lead to, *ceteris paribus*, a 1.6 percent rise in P_m, while the 7.2 percent rise of w_c will lead to, *ceteris paribus*, a 5.5 percent rise in P_c. This will partly explain the fact that the price level of the construction sector, P_c, tends to be more sensitive than that of the mining and manufacturing sector, P_m, as given in Table 9.

Table 10 Estimates of Elasticities at the Point of Sample Means*

$E[P_m \mid w_m]$	.30	$E[C_s \mid Y_d/P_d]$	.69
$E[P_c \mid w_c]$	.77	$E[C_{nd}/N \mid P_{nd}]$	-.55
$E[P_s \mid w_s]$	.45	$E[C_d/N \mid P_{cd}]$	-1.82
$E[P_m \mid P_m^{US}]$	.75	$E[C_{sd}/N \mid P_{sd}]$	-1.95
$E[P_s \mid P_s^{US}]$	.30	$E[L_m \mid V_m]$	1.34
$E[C_{nd} \mid Y_d/P_d]$	.85	$E[L_c \mid V_c]$	2.07
$E[C_d \mid Y_d/P_d]$	1.20	$E[L_s \mid V_s]$	4.34
$E[C_{sd} \mid Y_d/P_d]$	.56		

* $E[Y \mid X]$ indicates the elasticity of Y with respect to X.

If the effects of wage-parity are slower economic growth, higher prices, and a higher unemployment rate, one may wonder if there is any way to reduce the impact of wage-parity. We have observed above that as far as the price levels are concerned the initial impact in the year in which wage-parity is enforced tends to be the predominant one and that the long-run effects are caused by the momentum of the system trying to adjust to the initial shock of wage-parity.

Given this observation, let us suppose that the pricing behaviors of the two sectors into which wage-parity is introduced change in such a way that the price levels of the basic forecast are maintained in the year wage-parity is introduced. This change in pricing behavior can be voluntary on the part of the industry, caused by a fear of decrease in market power which higher prices would bring, or it can be imposed through government price controls. To maintain the price levels of P_m and P_c at the levels of those given in the basic forecast in 1971, the constant terms of the equations (2-22) and (2-23) have to be reduced by -.064 and -.23 respectively.

The result of this simulation experiment is presented in Table 11. Due to price control policies introduced as the shifts in the price equations (2-22) and (2-23), price rises are maintained roughly at those of the basic forecast. For example, the average annual price rise of P_m in this simulation over 1971-1975 is 3.2 percent (compared with 3.3 percent in the basic forecast); that of P_c is 3.7 percent (3.0 percent in the basic forecast); and that of the GNE implicit deflator is 1.4 percent (1.5 percent in the basic forecast).

The average annual growth rate of GNE over the 1971-1975 forecast period is 3.5 percent and this is practically the same as the 3.6 percent growth rate shown in the basic forecast. The price control policy, then, seems to restore the economic growth and price rises to the levels obtained in the absence of wage-parity. However, the cost one has to pay is a higher unemployment rate which averages at 6.5 percent per year compared to 4.8 percent in the basic forecast. If the price control policy were to create a higher unemployment rate, then one may suggest the need for government programs to absorb the unemployment caused by the price control policy.

The simulation results presented above are based on the exogenous variables which are given in Table 4. We have assumed that the U.S. price level of the mining and manufacturing sector, P_m^{US}, grows at 2.7 percent per year and that of the services sector, P_s^{US}, grows at 4.8 percent per year, representing slower rates of increase than those experienced during 1969 and 1970. If inflation in the United States were to persist, and if it is to be transmitted to Canada through the price syncronization mechanism given in the price equations (2-22) and (2-24), one may wonder what will be the consequence of continuing U.S. inflation on the Canadian economy.

To answer this question let us assume that P_m^{US} and P_s^{US} rise by 5.5 percent and 7.0 percent per year in the period of the forecast, 1971-1975.

Table 11 Wage-Parity: Shifts in the Constant Terms in the Price Equations of P_m and P_c (Price Controls)

	1971	1972	1973	1974	1975
I. GNE account (millions of 1961 dollars)					
C	38627	39144	39708	40260	40761
I	12965	13735	14735	15499	16014
I_p	8217	8683	9006	9161	9274
I_h	2414	2932	3448	3819	4053
G_I/P_k	2477	2642	2810	2986	3186
X	18345	18819	19269	19680	20001
F	16490	16665	16884	17101	17296
GNE	64989	66930	69616	72256	74558
% growth of GNE	3.5	3.0	4.0	3.8	3.2
II. Wages					
w_m	8.54	9.00	9.50	10.02	10.57
w_c	9.86	10.57	11.33	12.14	13.02
w_s	5.75	5.76	5.85	5.92	5.98
III. Employment					
L_m	2142	2271	2312	2310	2293
L_c	450	454	473	487	494
L_s	4808	5102	5163	5285	5440
Unemployment Rate	5.9	6.4	6.5	6.8	6.8
IV. Prices					
P_m	1.21	1.24	1.27	1.30	1.34
P_c	1.52	1.53	1.58	1.67	1.76
P_s	1.39	1.42	1.44	1.46	1.49
P_k	1.31	1.32	1.33	1.35	1.36
P_h	1.55	1.58	1.61	1.67	1.73
P_d	1.30	1.32	1.34	1.35	1.37
P	1.35	1.37	1.39	1.40	1.42

Table 12 presents the result. We see that the transmition of continuing U.S. inflation through price syncronization yields results very similar to the wage-parity experiments; slower economic growth, higher levels of prices and unemployment. The elasticity of P_m with respect to P_m^{US} is .75, while that of P_s with respect to P_s^{US} is .3; a 5.5 percent rise in P_m^{US} will lead to, ceteris paribus, 4.1 percent rise in P_m, whereas a 7.0 percent rise in P_s^{US}, ceteris paribus, will lead to a 2.1 percent rise in P_s.

One may wonder what will be the effects of wage-parity and continuing U.S. inflation on the Canadian economy. To anser this question we have combined for simulation full wage-parity in 1971 and after with the continuing U.S. inflation as given above.

Table 13 gives the result. As expected wage-parity coupled with continuing U.S. inflation presents the worst effects of all the simulation experiments.

In summary, we compare in Table 14 below the pattern of growth rate, price rise and unemployment rate among the simulation experiments presented above: (1) basic forecast, (2) full wage-parity in 1971 and after, (3) stepwise increase in wages to attain full parity in 1972 and after; (4) price control policies, (5) continuing U.S. inflation, and (6) full wage-parity in 1971 and after coupled with continuing U.S. inflation.

Table 14 Comparison of Six Simulation Experiments (Percentage)

	1971	1972	1973	1974	1975	Average
(1) Basic Forecast						
Growth Rate of GNP	4.2	2.9	3.8	3.7	3.2	3.6
Price Rise of GNP	1.3	2.0	1.9	1.3	1.0	1.5
Unemployment Rate	4.7	4.9	4.7	4.9	4.9	4.8
(2) Full Wage-Parity in 1971 and After						
Growth Rate of GNP	2.4	2.2	3.4	3.5	3.1	2.9
Price Rise of GNP	4.1	3.0	2.5	1.8	1.4	2.6
Unemployment Rate	7.5	6.4	6.1	6.8	7.0	6.8
(3) Stepwise Increases in Wages to Attain Full Parity in 1972 and After						
Growth Rate of GNP	3.2	2.1	3.0	3.3	3.0	2.9

(Table 14 continued)

Price Rise of GNP	2.5	3.4	3.1	2.1	1.4	2.5
Unemployment Rate	5.7	6.2	6.5	6.9	6.8	6.4
(4) Price Control Policies						
Growth Rate of GNP	3.5	3.0	4.0	3.8	3.2	3.5
Price Rise of GNP	1.8	1.5	1.3	1.1	1.0	1.4
Unemployment Rate	5.9	6.4	6.5	6.8	6.8	6.5
(5) Continuing U.S. Inflation						
Growth Rate GNP	3.6	2.3	3.2	3.2	2.7	3.0
Price Rise of GNP	2.0	2.9	2.7	2.1	1.6	2.3
Unemployment Rate	5.1	5.7	6.0	6.6	7.0	6.1
(6) Full Wage-Parity in 1971 and After Coupled with Continuing U.S. Inflation						
Growth Rate of GNP	1.8	1.7	2.7	2.9	2.6	2.3
Price Rise of GNP	5.0	3.7	3.3	2.6	1.9	3.3
Unemployment Rate	8.0	7.2	7.4	8.5	9.0	8.0

Comparing the summary results presented in Table 14, one may conclude that (1) wage-parity or/and continuing U.S. inflation tend to slow down the Canadian economic growth and to sustain high levels of prices and unemployment, and (2) price control policies, if properly managed, could tend to mitigate these effects at the cost of a higher unemployment rate. It seems that the normal Keynesian fiscal and monetary policy instruments to combat inflation may create a high unemployment rate, if they are introduced in the absence of any effort to regulate monopolistic activities in the product and factor markets.

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Table 12 Continuing U.S. Inflation: U.S. Prices, P_m^{US} and P_s^{US}, Rise by 5.5 and 7 Percent Per Year Respectively

	1971	1972	1973	1974	1975
I. GNE account (millions of 1961 dollars)					
C	38804	39337	39915	40485	40986
I	12989	13763	14742	15474	15963
I_p	8244	8698	8964	9061	9126
I_h	2418	2944	3469	3846	4084
G_I/P_k	2473	2623	2791	2977	3187
X	18277	18539	18819	19120	19372
F	16566	16927	17328	17684	17967
GNE	65063	66556	68659	70829	72776
% growth of GNE	3.6	2.3	3.2	3.2	2.7
II. Wages					
w_m	7.31	7.59	7.93	8.26	8.57
w_c	8.45	8.67	9.19	9.72	10.24
w_s	5.75	5.83	5.98	6.10	6.20
III. Employment					
L_m	2141	2251	2270	2256	2231
L_c	450	455	474	487	493
L_s	4882	5189	5241	5346	5478
Unemployment Rate	5.1	5.7	6.0	6.6	7.0
IV. Prices					
P_m	1.23	1.31	1.37	1.42	1.48
P_c	1.52	1.54	1.59	1.64	1.68
P_s	1.40	1.45	1.48	1.52	1.56
P_k	1.31	1.33	1.34	1.35	1.36
P_h	1.54	1.57	1.59	1.63	1.66
P_d	1.31	1.35	1.37	1.40	1.42
P	1.35	1.39	1.43	1.46	1.48

Table 13 Wage-Parity and Continuing U.S. Inflation

	1971	1972	1973	1974	1975
I. GNE account (millions of 1961 dollars)					
C	38249	38945	39391	39834	40285
I	12849	13403	14278	14935	15367
I_p	8076	8431	8647	8760	8776
I_h	2417	2939	3452	3813	4039
G_I/P_k	2348	2461	2599	2753	2933
X	17789	17993	18239	18508	18734
F	16730	17225	17628	17965	18246
GNE	63904	64963	66721	68648	70452
% growth of GNE	1.8	1.7	2.7	2.9	2.6
II. Wages					
w_m	8.54	9.00	9.50	10.02	10.57
w_c	9.86	10.57	11.33	12.14	13.02
w_s	5.93	5.96	6.13	6.27	6.38
III. Employment					
L_m	2087	2186	2204	2188	2163
L_c	445	441	454	465	469
L_s	4691	5152	5160	5221	5349
Unemployment Rate	8.0	7.2	7.4	8.5	9.0
IV. Prices					
P_m	1.30	1.38	1.45	1.51	1.58
P_c	1.75	1.85	1.93	2.03	2.12
P_s	1.39	1.46	1.49	1.53	1.57
P_k	1.38	1.41	1.44	1.46	1.47
P_h	1.82	1.92	1.99	2.06	2.12
P_d	1.33	1.37	1.40	1.43	1.45
P	1.39	1.44	1.49	1.53	1.56

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