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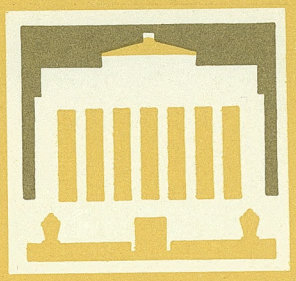

# THE STRUCTURE OF RDX1

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*This study was prepared as part of the econometric research program of the Research Department of the Bank of Canada. The views expressed are the personal views of the authors and no responsibility for them should be attributed to the Bank.*

Revised to July 15, 1969.

# PREFACE

The RDX1 Model (Research Department "Xperimental" Model – version 1) is a preliminary result of a larger econometric research program sponsored by the Research Department of the Bank of Canada. This program also involves detailed partial studies of various sectors of the Canadian economy, several of which have provided equations used in RDX1.

This paper is a progress report on the structure of RDX1 as it stands at present. It goes without saying that much further work remains to be done in improving the design of the model before any great confidence can be placed in the answers it gives to practical questions concerning economic behaviour and policy. Even at this early stage in the model's evolution, however, it may be of interest to report on the general structure and dynamic properties as these have emerged so far. This paper is, therefore, a description of the general structure of RDX1. A report on its dynamic properties as revealed by a series of simulation experiments, will appear in a succeeding paper.

The RDX1 model has been under the principal direction of the authors. The results reported here, however, rest on the work of a larger group. The following people devoted varying but substantial proportions of their time to RDX1 over the construction period: Robert Evans, Fred Gorbet, Claude Huot, Jules Hurtubise, Peter Miles, Diane Nymark, Lynne Orman, Lawrence Smith, and Donald Stephenson. Several other colleagues have also made valuable contributions during many discussions and seminars in the Research Department.

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# THE STRUCTURE OF RDX1

## 1. Introduction

RDX1 is an intermediate-sized aggregate quarterly model of the Canadian economy. It has 101 equations, including 50 stochastic behavioural equations and 51 technical relationships and identities. Since the ultimate object of its design is to improve our understanding of the consequences of monetary and fiscal policy actions, we tried to incorporate explicitly instruments of economic policy, such as tax rates and bank reserves. Particular attention has been paid to the financial and government sectors, where policy instruments have their direct and immediate impact on variables that affect, directly or indirectly, various components of aggregate demand or supply, or both.

In its basic format the model is designed along the lines of existing macroeconomic models depicting the economy as a dynamic process involving the successive generation of income, aggregate demand, output, wages and prices. The model does, however, try to capture certain distinctive features of the Canadian economy. The most striking and important of these characteristics is the extreme sensitivity of the Canadian economy to economic influences generated in other countries, particularly the United States. This openness involves both the real and financial sides of the economy. Thus foreign output, prices, and interest rates enter as important variables in several sectors of the model. As one would expect, this openness has a marked impact (through various leakages) on the nature of the feasible economic targets of Canadian economic policy. The structure of the model centers around the determination (given the constraints implied by foreign economic influences) of real gross private expenditure, real private output, and of employment along with the associated prices. Since the entire government sector (as well as farm inventory investment) is treated in current dollars, our key price variable (PGNE) is the implicit price index for real private sector expenditures (YGPK). The key features of the model are portrayed in Chart 1.

Our strategy and approach in constructing this model are

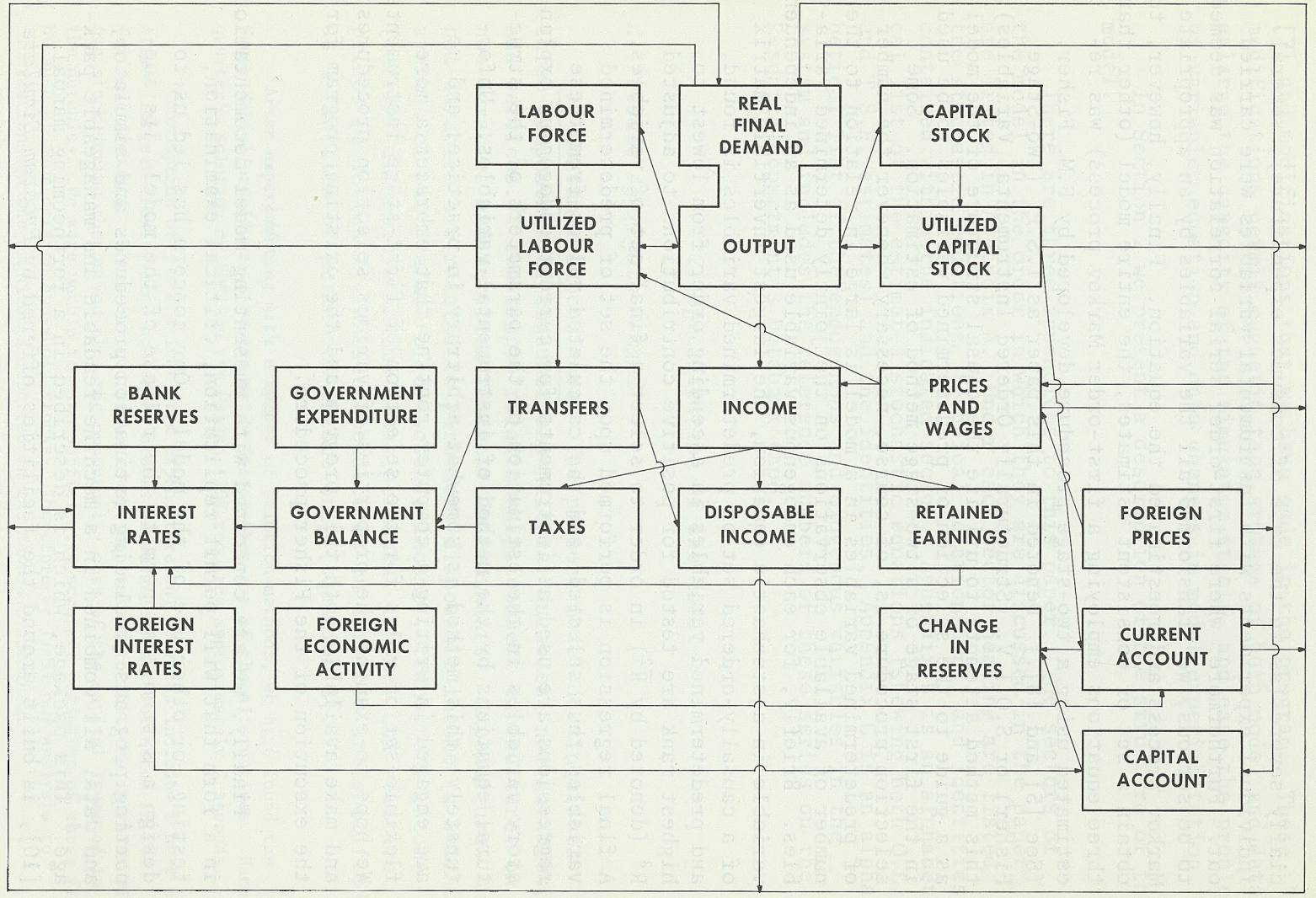
somewhat different from those of previous builders of large aggregative models. Rather than aim at 'perfection' in the specification of each individual relationship, by extensively testing in isolation the validity of different theories of consumption, investment, wage determination, etc., we decided to concentrate on the analysis of the dynamic properties of a complete system, although its initial specification was not really satisfactory in some cases. We believed that an early examination of the interactions and feed-backs of the various sectors of the model would yield the most valuable insights regarding future improvements in its specification and would clearly indicate, before all resources and energy were spent, which sectors (or which parameters) required special attention. What we are presenting here is the set of structural equations that we have chosen to call RDX1. Some of these equations were selected prior to any dynamic experiments with a complete model, while others reflect alterations suggested by the results of our first round of simulation tests.

RDX1 is a quarterly model whose parameters were estimated from data generated over the period 1952-1965. Due to data limitations, the parameters of certain relationships were estimated on the basis of shorter sample periods, but no period was less than 36 quarters. The data generated by the economy in 1966 and 1967 were reserved to test the predictive power of the individual equations and of the entire system. Data not adjusted for seasonality were used throughout and seasonal adjustments made by constructing independent variables incorporating the degree of seasonality appropriate for each equation. The quarterly data themselves are of rather uneven quality. While the trade statistics are very good, investment figures involve the use of activity measures to make quarterly allocation of annual surveys of equipment put in place. The financial data are fairly satisfactory apart from the absence of sectoral balance sheet and certain deposit and loan rate series. Our specification is also constrained by the lack of a quarterly breakdown of consumer durable expenditure into its major components. Important work remains to be done to improve the data base for a model of this nature. The forthcoming decennial revisions of the *National Accounts* [1] may materially change the data on which RDX1 is based.

Our preliminary parameter estimates were derived by ordinary least squares (O.L.S.), although where simultaneity seemed espe-

Chart 1

# A SIMPLIFIED VERSION OF RDX1



cially severe (as in the case of consumer expenditure), several individual experiments with instrumental variables were carried out. Furthermore, where first-order serial correlation was deemed to be serious, we transformed all the variables by an appropriate Markov process and reestimated the equation. Finally, however, to obtain a set of consistent estimates, the entire model (other than three equations employing a first-order Markov process) was re-estimated using a two-stage procedure developed by F.M. Fisher. (See [5] and [8].) Denoted in this paper as T.S.F. (Two-Stage Fisher) or S.O.I.V. (Structurally Ordered Instrumental Variables), this method attempts to utilize the causal structure of the model as a guide to the selection of predetermined variables to be used in the first stage of a two-stage method of estimation. Some selection procedure is, of course, necessary whenever the number of predetermined variables in a model is large in relation to the number of available observations on the jointly determined variables. Briefly, for each endogenous variable used as an independent variable in a stochastic equation, the largest invertible matrix of a causally-ordered set of predetermined variables is found, and predetermined variables in ascending order from lowest to highest rank are tested for positive contributions to adjusted $R^2$ (denoted by $\overline{R}^2$) in order to select a final set of variables. A final regression is performed upon the set of predetermined variables thus selected, and the calculated values from these regressions are used as instruments for current endogenous explanatory variables in the estimation of the parameters of the structural equations by the method of instrumental variables. Unfortunately, this method is somewhat arbitrary in practice, and we are engaged in writing a computer routine that embraces a more flexible set of rules for the selection of first-stage instruments. We hope to examine the properties of various selection procedures and make available both this program and the existing program for the execution of the Fisher procedure.

Finally, we are concerned with presenting model-documentation in a form that will permit replication, critical examination, testing, or other use of the model. Our concern has led us to design a system that permits the release of the model, its supporting programs (including estimation procedures and simulator) and data, all combined in a machine-readable and manageable package. This package, which is described in a forthcoming manual [10], is built around the facilities offered by *Program Simulate II*

[7] and modifications that we have made in the program. These modifications permit magnetic tape storage of both model and data, enlarge the capacity of the simulator itself, and ease the problems of variable, equation and data changes in model experimentation.[1]

In Section 2 we present a description of the structure of the model.

There are three appendices to this paper. The sectors of the model in the order in which they are discussed in the paper are listed in Appendix A. Under each sector heading are listed the stochastic equations, technical relationships, and identities contained within the indicated sector. Appendix B is an alphabetical list of the estimated stochastic equations (showing both O.L.S. and T.S.F. estimates) and the identities. Appendix C is an alphabetical list of the endogenous and exogenous variables in the system and includes the reference numbers of these series on the Research Department's Databank tape.

## 2. Specification of the Model

### *A. Private Aggregate Demand*

1. Consumer Expenditure - The present model distinguishes three components of consumer expenditure: durables, non-durables, and services.[2] Two simple relationships connect expenditures on non-durables and services to their determinants. Expenditures on non-durables are related to permanent disposable income (a weighted average of past values of disposable income), transitory income (current disposable income minus permanent income) and relative prices (equation 7), while expenditures on services are specified as a function of permanent income only (equation 8).

[1]After experimenting with a number of solution methods, we have found the Gauss-Seidel procedure to be generally faster than any of the alternatives. Each quarter's solution of RDX1 on the Univac 1108 requires approximately 2 seconds.

[2]Consumption of (as distinct from expenditure on) services includes a host of items (largely flowing from household stocks of durables) not reflected in the *National Accounts*. These omitted services are equivalent to the loss in value of the stock during the period plus the opportunity cost of the capital invested in the durables. We were unable to make sufficiently accurate estimates of these flows because of poor data on household stocks. Therefore we limit our analysis to fluctuations in the magnitudes reported in the *National Accounts*.

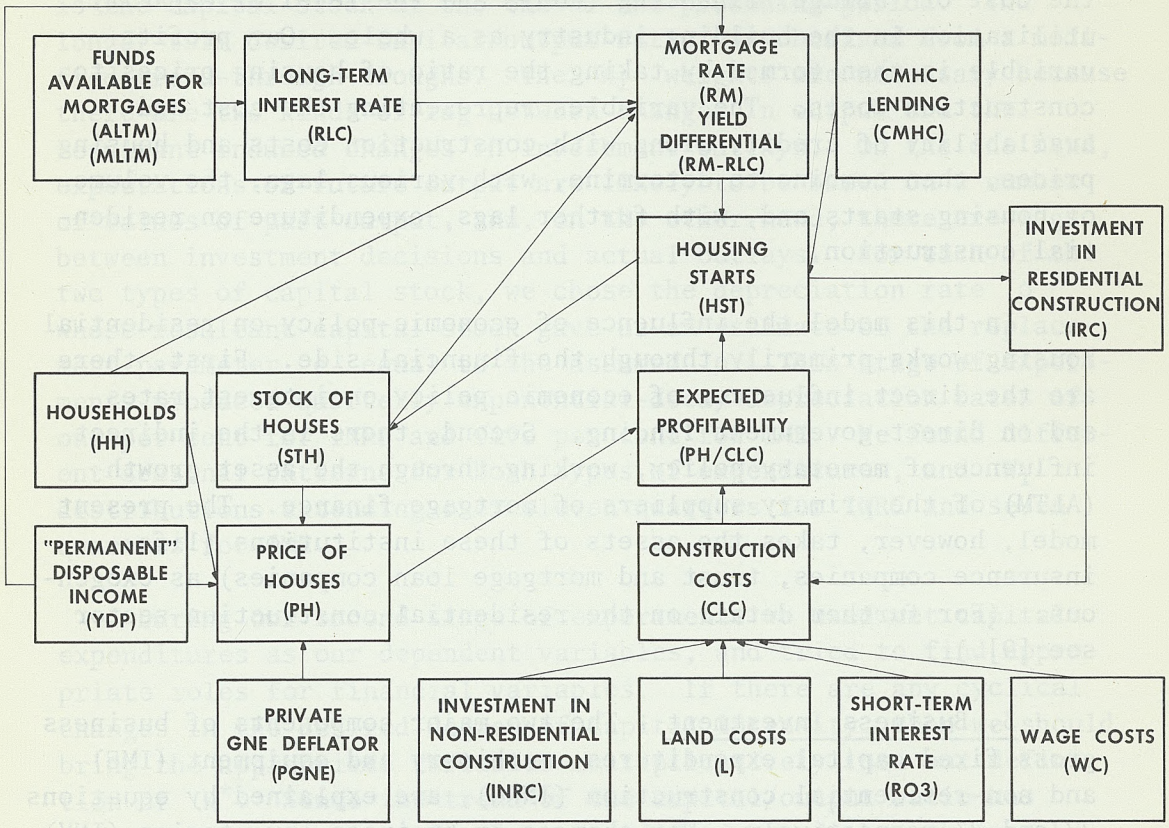
Expenditures on consumer durables are related to permanent income, transitory income, relative prices, and long-term interest rates (equation 2). Thus monetary (interest-rate) effects are transmitted directly to this component of aggregate demand. Interest rates enter this equation with a considerable lag (three quarters), reflecting the slow adjustment of consumer credit markets to changes in overall credit conditions. Although systematic tests are underway to try to determine the effects on consumer durable expenditures of additional variables related to consumer credit markets, the results of these experiments are preliminary and not reflected in this model. Government expenditure and taxation policies, of course, have a major influence on all types of consumer expenditure through their effects on disposable income. At this stage, however, our consumption functions do not isolate any separate expenditure effects of transfer income (such as unemployment insurance and old age pensions). Also missing from the current model is a mechanism that relates the prices of consumer goods and services to changes in sales and excise taxes.

2. Residential Construction - Our model of residential construction activity centers around the determination of three basic variables: the volume of housing starts, the ratio of housing prices to construction costs, and the interest rate on mortgages. Actual expenditure on residential construction is then related directly to current and past levels of housing starts (equation 26). The general structure of this sector is illustrated in Chart 2.

The volume of housing starts (HST) is determined by the expected profitability of building homes, measured by the ratio of housing prices to construction costs (PH/CLC), and the cost and availability of mortgage credit (equation 21). The cost of mortgage credit (RM) is measured as a simple average of the conventional mortgage rate (RC) and the rate on NHA (government-guaranteed) mortgages. On the other hand, the 'availability' of mortgage credit is represented by two distinct variables. The first is a flow variable (CMHC) representing the actual purchases of residential mortgages by the government housing agency, Central Mortgage and Housing Corporation, and the second is the yield spread (RM - RLC) between mortgages and long-term government bonds. This latter variable is meant to serve as a proxy for variations in the non-price terms of the mortgage contract. For any given

Chart 2

## FLOW CHART OF HOUSING AND MORTGAGE MARKETS




yield on mortgages, the smaller this spread the less 'available' is mortgage finance in the model. The yield on conventional mortgages (RC) is determined by a 'reduced form' equation derived by solving the demand and supply equations for mortgages for the mortgage rate. The resulting relationship (equation 63) relates the yield on conventional mortgages to other factors governing the demand for mortgage finance (income (YDP), number of households (HH), stock of houses (STH), etc.) and the supply of mortgage finance, (assets of trust, mortgage, and life insurance companies (ALTM), long-term bond rates (RLC), etc.). The mechanism determining the price of houses (PH) is represented by a single relationship (equation 57), which regresses housing prices on variables representing the demand for housing (disposable permanent income (YDP), number of households (HH), etc.), the supply of housing (existing stock of houses (STH), etc.) and the general

price level (PGNE). In equation 61 building costs (CLC) are related to the wages of construction workers (WC), land prices (L), the cost of 'bridge' financing (R03), and the level of capacity utilization in the building industry as a whole. Our profits variable is then formed by taking the ratio of housing prices to construction costs. The variables representing the cost and availability of credit, along with construction costs and housing prices, then combine to determine, with various lags, the volume of housing starts and, with further lags, expenditure on residential construction.

In this model the influence of economic policy on residential housing works primarily through the financial side. First, there are the direct influences of economic policy on interest rates and on direct government lending. Second, there is the indirect influence of monetary policy, working through the asset growth (ALTM) of the primary suppliers of mortgage finance. The present model, however, takes the assets of these institutions (life insurance companies, trust and mortgage loan companies) as exogenous. (For further detail on the residential construction sector see [9].)

3. Business Investment - The two major components of business gross fixed capital expenditures, machinery and equipment (IME) and non-residential construction (INRC), are explained by equations 22 and 23 respectively. Net changes in business inventories (INV) are explained by equation 25.

Our capital expenditures equations are based on the capital-stock adjustment principle, with financial variables allowed the opportunity of influencing both the desired capital/output ratio and the time path over which the gap between actual and desired capital stock is removed. (For a full description of the capital expenditure equations see [4].) In the first phase of our research we dealt solely with gross investment equations whose primary purposes were to identify the lag structure on the accelerator variable and to isolate the correct depreciation rate used in constructing the capital stock series. At our first stage of experiments the estimated equations were of the form:

$$I^{g}_{t} = a + b \sum_{i=0}^{n} W_i (K^{*}_{t-i} - K_{t-i-1}) + cK_{t-1}$$

where $I_t^g$ is quarterly gross investment, $K_t^*$ is domestic non-farm output (Y) multiplied by a desired capital/output ratio, and $K_{t-1}$ is the capital stock at the end of the preceding period. The longer-term desired capital/output ratio was obtained from a modified trend-through-troughs. The $W_i$ weights are necessary because there are two kinds of lag between changes in output and the resultant induced changes in investment outlays. On the one hand, expectations of future output are likely to be based on a number of values of past output, and, on the other hand, there are lags between investment decisions and actual outlays. For each of the two types of capital stock, we chose the depreciation rate $\rho$ whose resultant capital stock gave us an estimate of the replacement parameter $c$ equal to the assumed $\rho$. This stage of experiments produced quarterly exponential-decay depreciation rates of one per cent for INRC and five per cent for IME. We found different seasonal patterns for both types of expenditures, and $W_i$ distributions extending over eleven quarters for INRC and seven quarters for IME.

During our second stage of experiments we used net capital expenditures as our dependent variables, and tried to find appropriate roles for financial variables. If there are any cyclical changes in the desired degree of capital intensity, then we should bring the appropriate variables multiplicatively into our definition of $K^*$. Since the trend of the capital/output ratio has already been accounted for by our modified trend-through-troughs fitting, any corresponding trends in the financial variables must also be removed. In any event, we could scarcely hope (with only thirteen years of quarterly data) to disentangle the various longer-term changes in asset prices, yields, and technology responsible for any trend in the desired capital/output ratio. Most of our experiments, therefore, supposed that financial variables enter in one or both of the two following ways:

$$I_t^n = a + b \sum_{i=0}^{n} W_i (F_{t-i} K^*_{t-i} - K_{t-i-1})$$

$$I_t^n = a + b \sum_{i=0}^{n} W_i (K^*_{t-i} - K_{t-i-1}) + d \sum_{j=0}^{m} V_j F_{t-j}$$

where F is a financial variable expressed as a ratio to trend, $I_t^n$ is net capital expenditures, and the $V_j$ are weights, summing to one, which may or may not correspond to the $W_i$. The first specification shows F influencing the desired capital/output ratio, but not the timing of response. If F enters as in the second specification, or in both ways, then not only may the response lag differ for changes in F and output, but the time pattern of response of investment to changes in output may depend on the values of F. It was this sort of influence that we were anxious to make our equations able to capture.

In our final equations, chosen after a comprehensive range of experiments, the INRC equation has the ratio of cash flow to trend entering multiplicatively to influence $K^*$, and has the interest rate index entering as in the second specification above with the $V_j$ equal to the $W_i$. The IME equation has the cash flow ratio entering as in the second specification; with $V_0 = 1$. Both equations fit well, and forecast within and beyond the sample period as well as alternative equations. The INRC equation is superior to the IME equation by all tests, and allows financial variables to enter in a more plausible way than does the IME equation.

The inventory-investment equation is based on a model [3] that assumes a constant marginal ratio of inventories to sales, supposes a lagged response of actual to desired inventories, and also allows inventories to play the role of a 'buffer stock'. Our O.L.S. parameter estimates imply relatively good sales forecasting, relatively slow adjustment, and a marginal stock/sales ratio of about 1.4, compared to the average stock/sales ratio of 1.6. In simultaneous estimation, however, the coefficients on sales, on the change in sales, and on the lagged stock, drop so low as to be not significantly different from zero. In neither O.L.S. nor in simultaneous equation estimation were we able to find any influence of financial variables, even though we ran experiments using a considerable number of alternative variables and specifications. We did, however, find a pronounced relationship between the rate of unemployment and inventory accumulation. The preferred specification of the variable, which we assume to be a proxy for changes in business confidence, is a ratio form, with the current number of unemployed divided by a moving average of the unemployed over the preceding twelve quarters.

4. Foreign Trade - Imports and exports of goods are determined both by demand conditions (activity variables and relative prices) and by the level of capital utilization in Canada. Imports (equation 40) depend first on domestic real expenditure. We define a variable (AM) as a weighted sum of the components of domestic expenditure, where the weights are based on input/output coefficients. The use of this activity variable permits differing marginal propensities for the various expenditure items.

$$AM = .20\,(CD + CND) + .21\,(IME + INRC + IRC) + .11\,(XG) + .09\,(GNW/PGNE) + .17\,(INV)$$

However, the influence of domestic real expenditure on imports is modified by the effect of capital utilization on the propensity to import. Capital utilization is measured as the ratio of real domestic non-farm product (Y) to its capacity level (YC). As capital utilization (Y/YC) increases, imports also increase, because there is less Canadian productive capacity available to satisfy the demand of any given level of expenditure.

The price variable in the import equation is the ratio of the price index of imports of goods (PMG) to the deflator of private (net of farm inventory investment) gross national expenditure (PGNE). The numerator (PMG) is the price index actually used to convert current-dollar to constant-dollar merchandise imports and the denominator (PGNE) is the principal price variable in the RDX1 system. Since PGNE represents the price of import-competing goods, the ratio itself is expected to have a negative effect on imports. Because the major part of Canadian imports comes from the United States, the activity variables are unlagged, reflecting the close economic relationships between the two countries (short distance, corporate links, etc.). On the other hand, one expects the price variable to have an effect that is distributed over time, because the price effect involves a decision to alter the relative importance of imports and home production as sources of supply distinct from increasing or decreasing imports in line with expenditure.

The activity variable explaining exports (equation 87) is a

weighted average of the indices of industrial production (or appropriate proxy series) in 75 countries (AWI). For a particular country the weight is proportional to the value of Canadian exports to that country in 1964 and 1965. The United States and United Kingdom have the largest weights (.55 and .14, respectively). The non-U.S. part of AWI is lagged one quarter, but U.S. activity enters currently once more reflecting the factors of distance and close economic links of Canada to the United States. As well, we also define a new capacity variable by removing exports of goods and services from the measure of actual output, i.e.:

$$\frac{Y - XG - XS/PXS}{YC}$$

The productive capacity for additional exports decreases as capacity utilization increases. Therefore we use the above measure as an explanatory variable, with an expected negative effect. The variable does not interact with the activity variable because the capacity measure involved is that for Canada, the supplier of the goods, as distinct from the demanders (the rest of the world). The price variable in the export equation is the ratio of the price index of exports of goods (PXG) to a price index of world exports (PWXG) with the latter expressed in Canadian currency for consistency with PXG. The price variable has the same interpretation here as in the import equation.

Unlike merchandise trade, we explain the service balance of payments item in current rather than constant dollars. While the price deflators for imports and exports of goods are reasonable and carefully constructed measures, those for services are understandably much less reliable. To explain imports of services net of dividend payments (equation 41), we use only an activity variable, namely, gross national expenditure (YGNE). The flow of services under consideration consists of many heterogeneous items – tourism, freight and shipping, interest, business services, etc. A price variable as in the merchandise equations makes little sense, given the nature of the components of services and the paucity of price data for flows that can be priced. We do not break down exports of services into dividend receipts and the rest of the flow. Instead we have just one relationship (equation 88), in which the activity variable (AWS) is a reweighted average of the foreign activity variable used in the equation for exports

of goods, with the weights now based on Canadian exports of services rather than of goods. We were able to achieve this reweighting for the United States, United Kingdom, and all other countries as a group. In the result the weight of the U.S. increases to .66, while that of the U.K. remains at .14.

*B. Income Distribution, Employment and Prices*

1. Employment and Hours - The Supply and Demand for Labour

We regard paid man-hours as the basic labour input to the aggregate production function, and we have separate, but interdependent, explanations for the level of private-sector employment and average weekly hours worked by each paid employed person. Since the labour market usually operates so as to leave a number of would-be workers involuntarily unemployed, we have separate supply and demand equations for workers, and we determine the number of unemployed as a residual. Average weekly hours, on the other hand, are explained by a single quasi-reduced-form equation whose structure suggests that short term changes in the number of hours worked per week are influenced mainly by demand considerations.

Changes in the aggregate labour force participation rate $(\frac{NL}{POP})$, according to our formulation (equation 45), are predominantly determined by the composition of the population and slowly changing attitudes towards work. The relevant effects of the changing composition of the population are captured by a variable measuring the proportion of the population going to school $(\frac{SP}{POP})$. Of the various trends operating on the participation rate, the positive trend induced by the increasing participation of women appears to dominate such negative influences as early retirements from the labour force; because the sum of our quarterly constant terms indicates an annual trend increase of over three per cent in the participation rate. The fairly weak cyclical variance in the aggregate labour force participation rate is captured by a variable measuring changes in constant-dollar per capita private expenditures, whose positive coefficient indicates that there is a net increase in labour force participation when aggregate demand increases.

The process governing changes in the demand for labour is rather more complex. An increase in the aggregate demand for the output of the private sector leads to increases in both the number of paid workers (NEPP) and average weekly hours (HAW), but the

dynamics of the response are quite different. The quarterly level of man-hours (= (NEPP)(HAW)(13)) adjusts with a slight lag to increases in output, but the response comes in the first instance mainly from increases in average hours. Thus, during the quarter in which demand increases, employment changes by less than its equilibrium response while average hours adjust by more than the final response, as the estimated parameters of their adjustment processes indicate.

The equilibrium level of paid private employment is determined (as shown in equation 43) by the level of output $(YGPK + \frac{GNW}{PGNE})$, and the trend value of average hours worked (HAWT). The deviation of current average hours worked from its trend value (HAWT - HAW) is also specified in this relationship. This variable measures the attempts of employers to restore average hours to their trend value. The parameter estimates reflect a less than complete substitution of men for hours. Thus any reduction in HAWT, for a given level of output, is accompanied by an overall reduction in the total number of man-hours worked.

Changes in average weekly hours (equation 17) depend upon differences between the current and the desired HAW, while the desired level of HAW depends on the level of output, the unemployment rate, the hourly wage rate (WPH), and a time trend reflecting the longer term reductions in the length of the working week. Low unemployment rates indicate a relative scarcity of workers, and lead to increases in HAW in order to obtain the necessary man-hours. Increases in the average hourly wage rate lead to reductions in HAW and, indirectly, in NEPP, presumably facilitated by the substitution of capital for labour.

The production function implied by the demand for labour equations suggests that marginal labour requirements are less than average requirements. For example, if aggregate demand increases by one per cent (of its mean value), the equilibrium increase in labour inputs in terms of man-hours is about 0.7 per cent, one-sixth of which is due to an increase in average weekly hours and the rest to an increase in the number of workers. This sort of labour requirement may be appropriate when there is a considerable amount of underemployment of paid workers, but is too optimistic for full employment extrapolation. As for changes in productivity, if output is held constant the labour require-

ment in terms of man-hours drops by about 0.2 per cent per year. This drop is comprised of a 0.9 per cent decrease in HAW, which is not quite offset by a 0.7 per cent increase in NEPP. The net decrease is closely matched by movements in the aggregate capital/output ratio, which rose during the data period by 0.2 per cent per year.

2. Wages - The wage-adjustment relationship (equation 85) is based on a number of hypotheses. First, the hourly money wage rate can be expected to respond to the level of excess demand in the labour markets (represented by the unemployment rate). The money-wage rate is expected to rise more with low unemployment rates than with high unemployment rates. In addition, the change in money wages will also be governed by recent increases in the price level as workers attempt to maintain their real incomes. Our coefficient on the price index of consumer non-durables (which we use as an approximation to the presumably more relevant Consumer Price Index) suggests that money-wage rates have almost unit elasticity with respect to price changes, and hence that wages respond fairly quickly and fully to changes in the price of non-durables. Finally, we introduce a variable representing the share of income allocated to profits to reflect the hypothesis that workers attempt to retain or increase their share of income. This variable may also reflect the willingness of firms to grant wage increases. The process by which wages adjust to changes in profits and unemployment rates is not assumed to be instantaneous; rather the effects of these variables are specified to filter into wages over a period of four quarters. As well, our estimated relationship shows the constraining effect of recent wage increases on further gains in money wages.

3. Prices - Our basic price variable (PGNE) is the implicit national accounts deflator linking current-dollar to constant-dollar gross private demand. Current-dollar private aggregate demand is, therefore, by definition equal to (PGNE)(YGPK). There are four main driving variables for PGNE (equation 56). They are total private wages (WP), total wages weighted by productivity changes (unit labour costs), the price of imported goods, and the difference between the actual and trend values of an inventory stock/sales ratio. Total wages enter in current form, while the other variables have polynomial lag distributions. The non-zero

values spread over 7 quarters (starting in t-2) for the price of imports, and over 5 quarters for unit labour costs (starting in t). The stock/sales variable has a polynomial lag distribution on a four-quarter moving average. The fact that private wages (WP) enter currently as well as in the unit labour-cost variable, in both cases with a positive coefficient, indicates that changes in the wage component of unit labour costs are more likely to have a direct influence on price formation than are changes in labour productivity. The moving average component of the unit labour cost variable represents an attempt to remove from private employment (NEPP) workers not engaged in producing the goods used to meet private sector demand (YGPK). The stock/sales ratio has the expected negative coefficient, indicating that greater sales have less effect on prices when inventory stocks are at high levels.

Despite our early resolve to limit drastically the separate price variables explained in RDX1, the appearance of important relative price effects in several equations forced us to explain some price indices in addition to PGNE. We also found that the price of consumer non-durables (PND) fitted much better than PGNE in the wage rate equation. Relative price-terms are particularly important in the equations for imports and exports of goods, consumer expenditures on durable and non-durable goods, and residential housing starts. The price of imports, given the exchange rate, may fairly safely be treated as exogenous, while the price of exports is more likely to be influenced by domestic prices. Our equation for the price of merchandise exports (equation 60) shows the implicit price index of goods exports (PXG) responding only partially to changes in PGNE (internal influences) and to the world price of exports (external influences). The world price index has an effect both because Canadian exporters may raise or lower their prices to meet foreign competition, and because of international commodity agreements. The price of exports-of-services (equation 61) responds partially to changes in PXG and more than 100 per cent to changes in PGNE. PXG enters as a second variable to represent the fact that the deflator of some components of current-dollar exports of services is actually the deflator for exports of goods. The price of consumer non-durables (PND) (equation 58) is a function of the same variables as PGNE, but shows half as great a response to wage changes, and twice as great a response to import prices. PND is not affected by the inventory stock/sales ratio. The price of consumer durables (PD)

proved impossible to explain accurately. Consumer durable expenditures are the only major element of the *National Accounts* whose detailed price indices are adjusted for quality improvement. As a result, the variable has no upward trend during the data period, and its considerable variance is not closely related to any of the variables directly affecting PGNE. Our equation shows changes in PD influenced only by quarterly dummy variables and changes in PGNE.

4. Corporate Profits and Dividends - Our original experiments with data generated over the period 1953-1965 produced a well-fitting corporate profits equation based on sales, the change in sales, the degree of capital utilization, the real hourly-wage rate, and changes in PGNE. The equation passed all the standard statistical tests, but failed to forecast profits accurately for 1966 and 1967. During those years there was a profits squeeze of a sort not experienced in the data period, so that the fitted equation overestimated profits throughout the forecast period. In this case we thought that the equation was important enough to justify further experiments in which forecasting performance would be used as a criterion in selecting a final specification. Even though the actual parameter estimates are still based only on the 1953-1965 data, this procedure has given us a profits equation for whose specification the 1966-1967 forecasting results do not provide a truly independent test. By introducing a four-quarter moving average of non-farm output per private employed worker (Y/NEPP), we found only sales and hourly money wages needed to be retained in order to produce an equation that fits the 1953-1965 data as well as the previous equation, and provides good forecasts outside the estimation period. Apparently the proximate cause of the 1966-1967 profits squeeze was a decline in productivity per employed worker. In view of the untypically low levels of unemployment and high rates of labour force growth at that time, the result seems very plausible. On the other hand, forthcoming revisions in the *National Accounts* series for corporate profits may show much of the 'profits squeeze' in 1966 and 1967 to have been a statistical artifact.

RDX1 has two equations (10 and 11) explaining dividends paid by Canadian corporations to residents and non-residents, respectively. The principal explanatory variable for each of these equations is the corporate cash flow, defined as the sum of cor-

porate profits and capital cost allowances less income tax accruals. Instead of taking current cash flow alone, we use a distributed lag over four quarters and an additional explanatory variable for dividend payments abroad. This is a dichotomous variable to represent increased taxation of dividends paid by foreign-owned or controlled subsidiaries in Canada to parent companies abroad.

RDX1 does not have stochastic equations to explain all income flows. We do explain the private component of wages, salaries, and supplementary labour income (see equation 86), indirect taxes, and corporate profits. The remaining components of national income, with the exception of dividend payments, are exogenous to the present model.

*C. The Government Sector*

In the government sector both expenditures and revenues are treated solely in current-dollar terms because taxes and transfers are defined in current dollars rather than constant dollars, and government expenditure decisions appear to be at least as easily described in money as in real terms. In any event, all government expenditures are treated as exogenous policy variables in RDX1. Although we have constructed models of all the major federal, provincial and municipal revenues and transfer payments [6], we decided to limit the scale of the government sector of RDX1 by including as endogenous variables only the revenues and transfer payments that either depend in an important way on other endogenous variables of the model or contain policy parameters that have been used or could be used by the federal government. Thus we include explicitly equations for the major federal tax revenues and for unemployment insurance fund income and revenue. Most of the other federal revenues and transfer payments may be treated safely as exogenous to RDX1, since our equations for them depend mainly on other predetermined variables and therefore may be used for forecasting outside the simultaneous model. These equations have been omitted primarily to ease the task of identifying the dynamic structure of RDX1, which contains 24 equations for government revenues and transfer payments. The personal income tax model has 12 equations, the unemployment insurance fund has 5, and there are 7 other tax equations.

In addition to the personal tax model, we have stochastic equations for corporate tax accruals (equation 73), customs duties (74), excise duties (76), and federal sales taxes (80). The model of the unemployment insurance fund (equations 5, 13, 24, 81 and 82) has also been included because, of all transfer payments, it responds most to changes in the levels of economic activity. The unemployment insurance fund is not only an important automatic stabilizing device, but one whose payments and receipts might from time to time be adjusted for policy reasons. Most of the other transfer payments are less dependent on current levels of economic activity; thus their equations may be fairly safely run outside the aggregate model and the results used as predetermined variables. Since our government sector is quite different from those in existing macro-models, we outline below the structure of the personal income tax model as an example of our procedures.

There are three main steps in the construction of our personal income tax model. The first step involves finding the total number of taxpayers in each income class (equations 46 - 50) and relationships between total personal income and income assessed for taxation purposes (equations 90 - 94). We have used four income classes in order to make proper allowance for progressive tax rates. The usual way of dealing with progressivity in the rate structure is to measure the income elasticity of the tax with respect to past changes in total income, and then assume that the same elasticity will apply with respect to future changes in income. This assumption is inappropriate if the rate structure is not evenly progressive, or if aggregate income changes are not distributed over time in a stable way among income classes. It is worthwhile in any case to have a personal income tax model disaggregated by income level so that the model may be used to simulate the aggregate effects of a wider variety of changes in the level and structure of tax rates. A policy-oriented model of the personal income tax should also identify the nature and amount of exemptions and deductions by income class so that the revenue consequences of changes in these allowances can be assessed more accurately.

The second step in the construction of the tax model is to determine tax accruals (equation 1) on the basis of assessed income, exemptions, and tax rates in each income class. The third step is to estimate the process (equation 79) by which a given

time series of tax accruals gives rise to tax collections and refunds. At all these stages our specifications depend heavily on the nature of the tax regulations, and we naturally spell them out to make explicit the various policy parameters. Since the various fixed and variable lags involved in the tax payment process are explained by our model, it provides a suitable vehicle for testing the dynamic stabilizing properties of the personal income tax.

In later versions of RDX we hope to include our provincial and municipal revenue equations plus expenditures equations, and, in addition, equations that explain the important items linking the government balance on a national accounts basis with government borrowing requirements. In the present model, however, we do take account of the major impact of government financing on financial markets, for we include the government national accounts balance (GBAL) as part of the demand-for-funds variable, which has an important impact on the short-term interest rate (R03).

*D. The Financial Sector*

The primary role of the financial sector in the RDX1 model is to try to explain financial variables that, according to our conceptual framework, affect directly certain components of aggregate demand or supply or both. In this process additional financial variables, which may or may not be of interest in themselves, are also generated. The incorporation into the model of a financial sector — even though at this stage imperfectly developed — is a first step toward permitting quantitative analysis of the effects of alternative monetary policy actions. An attempt is made, therefore, to incorporate explicitly the cash reserve mechanism through which the Bank of Canada operates. Although there is need for much further study of the possible mechanisms through which central bank operations in financial markets may affect the components of aggregate demand and supply, the present version of RDX1 reflects the view that the influence of these operations is transmitted to the various components of aggregate demand mainly through changes in the yields of various kinds of financial obligations. An explanation of the fluctuations in these yields, therefore, is the primary task of the

financial sector.[3] Credit rationing could in principle also affect every component of aggregate demand. At present, however, such rationing effects are not represented independently of interest rates.

A marketable security's interest yield is the yield implied by the price that achieves a zero excess demand for this particular security. In Canada, as in other countries with developed financial markets, different marketable securities are generally regarded as close substitutes for each other, so that the interest yield on any particular security is influenced by the forces of supply and demand in other markets as well as in its own market. As a result, there is a strong tendency for all interest yields to rise and fall together. Under such conditions it might be helpful to view the determination of various interest rates as occurring in two steps. The first step may be thought of as the determination of a 'key' interest yield. Which rate is chosen to play this role is somewhat arbitrary, and can be determined by the availability of appropriate data or some other 'convenience' criterion. For this model we have selected a short-term money-market rate (the average yield on federal government securities with 3 years or less to maturity) to play this part. We chose this rate for careful examination because central bank operations tend to have their most direct impact on the short-term money market. The main instrument of monetary policy influencing yields in the money market is the level of cash reserves (given the reserve requirements on Canadian deposit liabilities of the chartered banks). Having established the level of this 'key' rate or its determinants, the second step is to take explicit account of investors' preferences and expectations concerning the effect of future security price movements in determining the relative levels of other rates. All interest yields are, of course, jointly determined. However, the above procedure may help to highlight a number of separate factors affecting the general level of bond prices, as well as the configuration of relative yields on different kinds of securities.

[3]No attempt has been made to explain changes in equity yields, as this involves an explanation of the changing value of corporate shares. Fluctuating security prices have important effects on the net worth of the household sector. These 'wealth' effects ought in principle to have significant influences on consumer spending. Unfortunately, there are no reliable estimates of household net worth in Canada and the model, therefore, cannot deal explicitly with this problem.

Our specification of many of the key relationships in financial markets takes account of the openness of the Canadian economy. The financial sector of the model does this by introducing U.S. interest rates as variables in the relationships that describe the formation of Canadian interest rates. As well, the actions of the central bank in supplying cash reserves are undoubtedly heavily influenced by the state of credit in the United States.[4]

In the present model variations in Canadian long-term interest rates are related directly to fluctuations in U.S. long-term rates and to changes in Canadian short-term interest rates (equation 64).[5] The short rate is determined by movements in the U.S. short rate and by variables representing the excess demand for credit (equation 62). These latter variables are (a) the excess of gross private fixed investment over current corporate saving and the national accounts surplus and (b) the rate of expansion of banks' earning liquid assets. The rate of expansion of banks' earning liquid assets is determined by the rate of growth of total bank assets (defined as a multiple of the reserve base),[6] the portfolio-allocation of bank assets between loans (equations 35 and 38) and earning liquid assets.

Both the demand and supply of the chartered banks' deposit liabilities are assumed to be generated by various types of partial-adjustment models whose equilibrium levels are governed by the level of general economic activity, the current and past levels of a whole configuration of interest rates, and the amount of bank reserves provided by the Bank of Canada. There is an independent equation for demand deposits (equation 9), while the

[4]The central bank's actions might be viewed as reflecting some sort of 'reaction function' relating policy tools to targets. Although an explicit function of this kind does not appear in our model, it is clear that the monetary authorities are not indifferent to the size of foreign capital inflows (outflows) and, therefore, are sensitive to foreign (particularly U.S.) interest rates.

[5]Our model does not include a specific treatment of the market for government securities. Thus the quantities of securities never enter the picture. The effects of a government deficit, however, are felt through its contribution to aggregate demand and via its effects on the excess demand for credit. (See equation 62.)

[6]This feature will need to be re-examined as experience accumulates under the differential-reserve requirements of the new Bank Act. Our preliminary hypothesis is that during our sample period the banks continuously strove (over a period as long as a quarter) to maintain close to a zero excess-reserve position.

sum of non-personal term and notice deposits plus personal savings deposits is determined in the model (equation 59) according to the requirement that total bank assets must equal total bank liabilities.

*E. International Capital Flows*

The model contains specific stochastic relationships for net private short-term and net long-term capital inflows. Government short-term capital movements (mainly changes in official reserves) are explained as a residual in the balance of payments identity (equation 67).[7] In our formulation, the model treats this change in reserves as an endogenous variable, with the foreign exchange rate predetermined. This is a good approximation to reality only during the period of the pegged exchange rate, i.e. after April 1962. Under the fluctuating exchange rate the relationships were in fact reversed – the exchange rate was endogenous and the change in official reserves determined exogenously by the government. Although the fluctuating rate system existed for the larger part of our sample period, the current system is based on a pegged exchange rate and we geared the model to the present regime to increase the relevance of RDX1 to contemporary problems. Similarly, the foreign price variables (PWXG, PMG and PMS) were not really predetermined in the period of the fluctuating exchange rate. Since they are converted to Canadian dollars by the use of the current exchange rate, some of their variance should be regarded as endogenous during the flexible-rate period. Nevertheless, we treat these prices as predetermined throughout the time period.

The principal explanatory variable in both capital-account equations is an interest-rate differential. In view of the preponderant importance of the United States in capital movements involving Canada, the differential is a Canadian-U.S. one. For long-term capital, we should like to use long-term federal government interest rates. However, the lack of either active trading

[7]The balance-of-payments flows comprising this residual include, in addition to changes in official reserves, Columbia River Treaty receipts, Government of Canada loans and subscriptions, and "other long-term capital movements" as defined in the balance of payments. See [2].

in, or new issues of, U.S. federal long-term securities makes their yields unrepresentative of U.S. interest rates. Therefore we couple the average yield on long-term Canada bonds with a U.S. corporate-bond yield. For short-term capital, treasury bill rates are used. The interest-rate differential is tried in both current and distributed-lag form. Furthermore, both the differential itself and its first difference are employed alternatively. Regardless of the form, we expect a positive interest effect, or, in the case of a complicated distributed lag, at least a net positive effect. In fact the current interest differential (the pure 'flow' theory of capital movements, with immediate adjustment) produces equations with the highest explanatory power.

In addition to the interest differential, two dichotomous variables enter the equation determining net long-term-capital inflow (equation 39). One refers to the time period of the U.S. interest equalization tax (3Q63 onward) and the other to the Canadian-U.S. agreement on deferment of deliveries of new issues of securities sold to U.S. residents (4Q65). Both effects should be negative. It is true that an important exemption from the interest equalization tax was provided for new (though not outstanding) issues of Canadian securities. However, we view the dichotomous variable as representing (albeit in an oversimplified manner) the fundamental change in the balance-of-payments policy of the U.S. government – the shift to capital controls, voluntary and involuntary, in addition to the interest equalization tax itself. As far as portfolio capital movements are concerned, perhaps the most sensitive indicator of the demand for funds is the amount of net new issues of provincial and municipal securities because provinces and municipalities are the chief users of foreign capital markets (principally the New York capital market).

Thus far we have analyzed long-term capital as if it were all portfolio investment. To take account of direct investment, we use the following activity variable:

$$(IME + INRC)PGNE$$

In addition to the activity variable itself, we find its interaction with a time trend is a significant explanatory variable with a negative effect. This suggests that over time there has been a decreasing resort to external funds to finance fixed investment in Canada.

The equation explaining short-term capital movements (equation 69) specifies the uncovered short-term interest differential between Canada and the United States, as well as the change in the exchange rate. This latter variable is interpreted as an expectations variable (concerning future movements in the exchange rate) affecting short-term speculative flows of capital. The formulation of the relationship, however, allows for the differential effect of this variable during the fluctuating rate period (1Q53 - 2Q61), during the period of uncertainty in the foreign exchange market (3Q61 - 2Q62), (which witnessed a large-scale government intervention in that market) and during the period of the fixed exchange rate (starting in 3Q62). In order to explain the U.S. balance-of-payments guidelines inaugurated February 10, 1965, we use a dichotomous variable with the value 1 in the period 1Q65 - 4Q65 and 0 otherwise. One would expect the direct effect of the guidelines to be negative, lessening the outflow of capital from the United States. However, at this same time, the Canadian chartered banks were moving substantial blocks of short-term funds from Europe to Canada. The latter movement was large enough to swamp the movement from Canada to the U.S., so that the dummy variable takes a positive coefficient.

To take account of direct substitution between short-term and long-term capital movements, we include the long-term capital flow as an explanatory variable in the equation for short-term capital movements. With the inclusion of long-term capital as an explanatory variable, we regard the positive effects of the dichotomous variable as temporary and restrict this variable in simulation to be zero outside our estimation period.

## 3. Conclusion

The equations which we have described in the preceding pages together comprise the structure of RDX1. Although we have done a number of simulation experiments with this and earlier versions of the complete model in order to ensure that the system has plausible dynamic properties, the performance of the model is still not fully satisfactory in several respects. As we state in the preface, these deficiencies are considered in some detail in a companion paper. In that paper we will also present the results of a wide range of simulation experiments showing how the model

might be used to help expose the consequences of the alternatives open to Canadian economic policy.

We are publishing the structure of RDX1 now, along with its data base and associated computer programs, so that other researchers can test alternative specifications, and adapt the model for their own purposes. Though the equations of RDX1 fit the 1953-1965 data fairly well, there is no guarantee that the model as a whole pictures well enough those aspects of the economic structure that will interest particular users. There is even less chance that the model will continue to fit the data generated since 1965, for several of the changes that have occurred in the structure of the economy during the last four years would affect materially the appropriate specification of aggregate equations.

The next version of RDX (whose data will include 1966 and 1967), will undoubtedly be much different in several respects. In the meantime, we hope the ready availability of RDX1 will encourage others to offer criticisms, suggestions, and improvements that will help to make RDX2 a better model than we could construct unaided.

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# A P P E N D I X  A

## SECTORAL BREAKDOWN OF RDX1

A. PRIVATE AGGREGATE DEMAND

1. Consumer Expenditures
    1. Consumer Expenditure, Durables (CD) - Equation 2
    2. Consumer Expenditure, Non-Durables (CND) - Equation 7
    3. Consumer Expenditure, Services (CS) - Equation 8

2. Residential Construction
    1. Construction Costs (CLC) - Equation 6
    2. Housing Starts (HST) - Equation 21
    3. Investment, Residential Construction (IRC) - Equation 26
    4. Stock of Houses (STH) - Equation 68
    5. Conventional Mortgage Rate (RC) - Equation 63
    6. Price of Houses (PH) - Equation 57

    *Technical Relationships and Identities*
    1. Estimated Logarithm of Investment in Non-Residential Construction (LINE) - Equation 36
    2. Estimated Logarithm of Investment in Residential Construction (LIRE) - Equation 37
    3. Mortgage Rate (RM) - Equation 66

3. Gross Private Business Investment
    1. Investment, Machinery and Equipment (IME) - Equation 22
    2. Investment, Non-Residential Construction (INRC) - Equation 23
    3. Change in Non-Farm Business Inventories (INV) - Equation 25

    *Technical Relationships and Identities*
    1. Cash Flow Ratio (CFR) - Equation 3
    2. Trended Cash Flow Ratio (CFRT) - Equation 4
    3. Stock of Non-Farm Inventories (H) - Equation 16
    4. Stock of Machinery and Equipment (KME) - Equation 27
    5. Desired Stock of Machinery and Equipment (KMED) - Equation 28
    6. Gap between Desired and Actual Stock of Machinery and Equipment (KMEG) - Equation 29
    7. Trended Stock of Machinery and Equipment (KMEY) - Equation 30
    8. Stock of Non-Residential Construction (KNR) - Equation 31
    9. Desired Stock of Non-Residential Construction (KNRD) - Equation 32
    10. Gap between Desired and Actual Stock of Non-Residential Construction (KNRG) - Equation 33
    11. Trended Stock of Non-Residential Construction (KNRY) - Equation 34
    12. Undistributed Corporate Profits (PCRT) - Equation 53
    13. Long-Term Interest Rate Index (RLCI) - Equation 65
    14. Real Domestic Product less Agriculture (Y) - Equation 89
    15. Capacity Real Domestic Product less Agriculture (YC) - Equation 95

4. Foreign Trade
    1. Imports of Goods (MG) - Equation 40
    2. Imports of Services (MS) - Equation 41
    3. Exports of Goods (XG) - Equation 87
    4. Exports of Services (XS) - Equation 88

B. EMPLOYMENT, PRICES, AND INCOME DISTRIBUTION

1. Employment, Labor Force and Hours
    1. Average Hours Worked, Paid Non-Agricultural Workers (HAW) - Equation 17
    2. Paid Workers, Private Industry (NEPP) - Equation 43
    3. Employed, Unpaid Workers (NEUP) - Equation 44
    4. Labor Force (NL) - Equation 45

    *Technical Relationships and Identities*
    1. Trended Average Hours Worked (HAWT) - Equation 18
    2. Paid Workers, Total (NEP) - Equation 42
    3. Total Unemployed (NU) - Equation 51

2. Wages
    1. Private Wage Rate Per Man-hour (WPH) - Equation 85

    *Technical Relationships and Identities*
    1. Government Wage Expenditure (GW) - Equation 15
    2. Private Wages (WP) - Equation 84
    3. The Wage Bill (WSSL) - Equation 86

3. Prices
    1. Implicit Price Index, Consumer Durable Expenditure (PD) - Equation 55
    2. Implicit Private GNE Deflator (PGNE) - Equation 56
    3. Implicit Price Index, Consumer Non-Durable Expenditure (PND) - Equation 58
    4. Price Index, Goods Exports (PXG) - Equation 60
    5. Price Index, Service Exports (PXS) - Equation 61

    *Technical Relationships and Identities*
    1. Inventory Stock/Sales Ratio (HSL) - Equation 19
    2. Trended Inventory Stock/Sales Ratio (HSLT) - Equation 20
    3. Private Unit Labour Costs (ULC) - Equation 83

4. Income Components
    1. Dividends Paid to Canadians (DIVC) - Equation 10
    2. Dividends Paid to Foreigners (DIVF) - Equation 11
    3. Corporate Profits (PC) - Equation 52

    *Technical Relationships and Identities*
    1. Real Disposable Personal Income (YD) - Equation 96
    2. Permanent Real Disposable Personal Income (YDP) - Equation 97
    3. Gross National Expenditure (YGNE) - Equation 98
    4. Private Non-Farm Real Gross National Expenditure (YGPK) - Equation 99
    5. Personal Income (YP) - Equation 100
    6. Simulated Income-Expenditure Residual (YRES) - Equation 101

C. THE GOVERNMENT SECTOR

1. Person Direct Taxes Sub-Model
    1. Total Number of Taxable Persons (NT) - Equation 46
    2. Total Personal Direct Taxes (TP) - Equation 79
    3. Assessed Taxable Income (YAS) - Equation 90

    *Technical Relationships and Identities*
    1. Accrued Personal Income Tax (AY) - Equation 1
    2. Number of Taxable Persons, Assessed Incomes between 0 and $3,000 (NT03) - Equation 47
    3. Number of Taxable Persons, Assessed Incomes between $3,000 and $5,000 (NT35) - Equation 48
    4. Number of Taxable Persons, Assessed Incomes between $5,000 and $10,000 (NT51) - Equation 49
    5. Number of Taxable Persons, Assessed Incomes over $10,000 (NT10) - Equation 50
    6. Assessed Taxable Income between 0 and $3,000 (YAS1) - Equation 91
    7. Assessed Taxable Income between $3,000 and $5,000 (YAS2) - Equation 92
    8. Assessed Taxable Income between $5,000 and $10,000 (YAS3) - Equation 93
    9. Assessed Taxable Income over $10,000 (YAS4) - Equation 94

2. Other Tax Equations

    *Government Revenue*
    1. Corporate Tax Accruals (TCA) - Equation 73
    2. Customs Duties (TCUS) - Equation 74
    3. Excise Taxes (TEX) - Equation 76
    4. Federal Sales Tax (TS) - Equation 80

    *Technical Relationships and Identities*
    1. Government Balance (GBAL) - Equation 14
    2. Total Indirect Taxes (TI) - Equation 77
    3. Taxable Corporate Profits (PCT) - Equation 54

3. Unemployment Insurance Fund Sub-Model
    1. Claimants Insured by Unemployment Insurance Fund (CL) - Equation 5
    2. Average Level of Enrolment in Unemployment Insurance Fund (INS) - Equation 24
    3. Unemployment Insurance Benefits (UIB) - Equation 81
    4. Unemployment Insurance Receipts (UIR) - Equation 82

    *Technical Relationships and Identities*
    1. Employed Contributors to Unemployment Insurance Fund (EMPS) - Equation 13

D. THE FINANCIAL SECTOR

1. Chartered Banks' Demand Deposits (DD) - Equation 9
2. Chartered Banks' Loans to Business (LB) - Equation 35
3. Chartered Banks' Loans to Persons (LP) - Equation 38
4. Short-Term Interest Rate (R03) - Equation 62
5. Long-Term Interest Rate (RLC) - Equation 64
6. Chartered Banks' Total Loan Authorizations over $100,000 (TA) - Equation 70

*Technical Relationships and Identities*

1. Chartered Banks' More Liquid Assets (ELA) - Equation 12
2. Chartered Banks' Personal Savings Deposits and Non-Personal Term Deposits (PNPS) - Equation 59
3. Chartered Banks' Total Major Assets (TBA) - Equation 71
4. Chartered Banks' Trended Total Major Assets (TBAT) - Equation 72
5. Chartered Banks' Total Deposits (TD) - Equation 75
6. Chartered Banks' Total Loans (TL) - Equation 78

E. INTERNATIONAL CAPITAL FLOWS

1. Net Long-Term Capital Inflows (LTK) - Equation 39
2. Net Private Short-Term Capital Inflows (STK) - Equation 69

*Technical Relationships and Identities*

1. Change in Reserves as Defined by the Balance of Payments (RSR) - Equation 67

# A P P E N D I X  B

## RDX1 STRUCTURAL EQUATIONS

O.L.S. = Ordinary least squares

T.S.F. = Two-stage Fisher

$\overline{R}^2$ = Adjusted coefficient of determination

SEE = Standard error of estimate

COV = Coefficient of variation, as a percentage

D/W = Durbin/Watson statistic

O.L.S. coefficients above, T.S.F. below

t-statistics are in brackets

1. Accrued Personal Income Tax, 1Q50 - 4Q65

$$AY = \sum_{i=1}^{i=4} RW_i \, (YAS_i - NT_i YEX_i) - RDC \, (DIVC)$$

2. Consumer Expenditure, Durables, 1Q52 - 4Q65

$$CD = \underset{(3.06)}{340.6} - \underset{(8.31)}{0.0211}\, Q1(YDP) + \underset{(3.38)}{0.0077}\, Q2(YDP) - \underset{(7.11)}{0.0318}\, Q3(YDP) + \underset{(11.68)}{0.3500}\, YDP$$

$$\underset{(1.91)}{373.0} - \underset{(8.20)}{0.0211} \qquad \underset{(3.30)}{0.0076} \qquad - \underset{(6.73)}{0.0315} \qquad \underset{(7.00)}{0.3584}$$

$$+ \underset{(2.47)}{0.0662}\left(\frac{YD}{PGNE} - YDP\right) - \underset{(4.52)}{0.2551}\, YDP\left(\frac{PD}{PGNE}\right) - \underset{(2.86)}{44.62}\, RLC_{t-3}$$

$$\underset{(2.33)}{0.0627} \qquad - \underset{(2.70)}{0.2721} \qquad - \underset{(1.92)}{41.53}$$

O.L.S. $\bar{R}^2 = 0.962$, SEE = 33.83, COV = 5.107, D/W = 1.97

T.S.F. $\bar{R}^2 = 0.962$, SEE = 33.87, COV = 5.11, D/W = 1.95

3. Cash Flow Ratio

$$CFR = \left(\frac{CCAC + PCRT}{PGNE}\right)/CFRT$$

4. Trended Cash Flow Ratio, 1Q50 - 4Q65

$$CFRT = \underset{(9.01)}{272.1} + \underset{(13.88)}{8.698}\, T$$

O.L.S. $\bar{R}^2 = 0.752$
SEE = 92.61
COV = 14.05
D/W = 1.48

5. Claimants on the Unemployment Insurance Fund, 1Q52 - 4Q65

$$CL = \underset{(2.32)}{-0.2128} - \underset{(3.30)}{0.00328}\, T + \underset{(3.00)}{0.1064}\, INS + \underset{(22.42)}{1.218}\, Q1(NU) + \underset{(13.78)}{1.0621}\, Q2(NU)$$

$$\underset{(1.98)}{-0.2548} - \underset{(2.77)}{0.00372} \qquad \underset{(2.45)}{0.1225} \qquad \underset{(21.14)}{1.218} \qquad \underset{(13.43)}{1.066}$$

$$+ \underset{(6.76)}{0.7248}\ Q3(NU) + \underset{(11.71)}{1.020}\ Q4(NU)$$

$$\underset{(6.64)}{0.7318} \qquad \underset{(11.30)}{1.025}$$

O.L.S. $\bar{R}^2 = 0.953$, SEE = 0.0416, COV = 11.26, D/W = 1.92

T.S.F. $\bar{R}^2 = 0.953$, SEE = 0.0417, COV = 11.28, D/W = 1.91

6. Construction Costs, 3Q55 - 4Q65

$$\ln CLC - \ln CLC_{t-4} = \underset{(.61)}{-0.00356} + \underset{(1.93)}{0.0418}\ (\ln INRC - LINE)_{t-1}$$

$$\underset{(.49)}{-0.00315} \qquad \underset{(1.90)}{0.0445}$$

$$+ \underset{(3.88)}{0.0902}\ (\ln 1RC - L1RE)_{t-1} + \underset{(1.09)}{0.1246}\ (\ln WC - \ln WC_{t-4})$$

$$\underset{(3.45)}{0.0850} \qquad \underset{(.63)}{0.0781}$$

$$+ \underset{(2.60)}{0.1122}\ (\ln L - \ln L_{t-4}) + \underset{(3.34)}{0.0311}\ (\ln R03 - \ln R03_{t-4})$$

$$\underset{(2.26)}{0.1249} \qquad \underset{(3.40)}{0.0377}$$

$$+ \underset{(5.03)}{0.0279}\ DVST$$

$$\underset{(5.15)}{0.0298}$$

O.L.S. $\bar{R}^2 = 0.741$, SEE = 0.0136, D/W = 1.56

T.S.F. $\bar{R}^2 = 0.735$, SEE = 0.0138, D/W = 1.52

7. Consumer Expenditure, Non-Durables, 1Q52 - 4Q65

$$CND = \underset{(8.92)}{705.7} - \underset{(30.58)}{0.1010}\ Q1(YDP) - \underset{(26.18)}{0.0779}\ Q2(YDP) - \underset{(14.76)}{0.0845}\ Q3(YDP) + \underset{(12.73)}{0.9796}\ YDP$$

$$\underset{(5.49)}{589.8} - \underset{(30.00)}{0.1012} \qquad - \underset{(25.38)}{0.0775} \qquad - \underset{(14.65)}{0.0830} \qquad \underset{(7.82)}{0.8580}$$

$$+ \underset{(1.94)}{0.0673}\left(\frac{YD}{PGNE} - YDP\right) - \underset{(6.20)}{0.5556}\ YDP\left(\frac{PND}{PGNE}\right)$$

$$\underset{(1.63)}{0.0559} \qquad \underset{(3.23)}{- 0.4128}$$

O.L.S. $\bar{R}^2 = 0.992$, SEE = 44.39, COV = 1.63, D/W = 2.34

T.S.F. $\bar{R}^2 = 0.992$, SEE = 45.54, COV = 1.67, D/W = 2.13

8. Consumer Expenditure, Services, 1Q52 - 4Q65

$$CS = \underset{(5.84)}{-149.7} - \underset{(.19)}{0.000403}\ Q1(YDP) + \underset{(3.97)}{0.00856}\ Q2(YDP) - \underset{(5.32)}{0.0113}\ Q3(YDP) + \underset{(82.47)}{0.3813}\ YDP$$

$$\underset{(5.94)}{-152.1} - \underset{(.19)}{0.000403} \qquad \underset{(3.98)}{0.00857} \qquad - \underset{(5.32)}{0.0113} \qquad \underset{(82.51)}{0.3818}$$

O.L.S. $\bar{R}^2 = 0.992$, SEE = 32.29, COV = 1.64, D/W = .91

T.S.F. $\bar{R}^2 = 0.992$, SEE = 32.30, COV = 1.64, D/W = .91

9. Demand Deposits, 1Q55 - 4Q65

$$\frac{DD - DD_{t-1}}{TBA} = \underset{(3.24)}{0.0840} - \underset{(5.37)}{0.0158}\ Q1 - \underset{(2.92)}{0.00561}\ Q2 - \underset{(1.52)}{0.00473}\ Q3 - \underset{(6.11)}{0.2526}\ \frac{DD_{t-1}}{TBA}$$

$$\underset{(2.73)}{0.0742} - \underset{(4.91)}{0.0152} \qquad - \underset{(2.84)}{0.00549} \qquad - \underset{(1.71)}{0.00560} \qquad - \underset{(5.60)}{0.2426}$$

$$+ \underset{(1.12)}{0.03655}\ \frac{YGNE}{TBA} - \underset{(7.82)}{0.00825}\ R03 + \underset{(2.51)}{0.000247}\ S^2_{t-1}$$

$$\underset{(1.38)}{0.0484} \qquad - \underset{(7.42)}{0.00869} \qquad \underset{(2.61)}{0.000262}$$

O.L.S. $\bar{R}^2 = 0.840$, SEE = 0.0043, D/W = 1.75

T.S.F. $\bar{R}^2 = 0.838$, SEE = 0.0044, D/W = 1.77

10. Dividends Paid to Residents, 1Q53 - 4Q65

$$DIVC = \underset{(2.91)}{-22.00} - \underset{(2.87)}{13.23}\ Q2 - \underset{(4.26)}{19.70}\ Q3 + \underset{(20.13)}{0.0781}\ (PC + CCAC - TCA)$$

$$\underset{(2.79)}{-21.39} - \underset{(2.87)}{13.23} \qquad - \underset{(4.26)}{19.68} \qquad \underset{(19.77)}{0.0778}$$

$$+ \underset{(20.13)}{0.0440}\ (PC + CCAC - TCA)_{t-1} + \underset{(20.13)}{0.0195}\ (PC + CCAC - TCA)_{t-2}$$

$$\underset{(19.77)}{0.0438} \qquad \underset{(19.77)}{0.0195}$$

$$+ \underset{(20.13)}{0.0049}\ (PC + CCAC - TCA)_{t-3}$$

$$\underset{(19.77)}{0.0049}$$

O.L.S. $\bar{R}^2 = 0.891$
SEE = 13.59
COV = 11.96
D/W = 0.57

T.S.F. $\bar{R}^2 = 0.891$
SEE = 13.59
COV = 11.97
D/W = 0.57

11. Dividends Paid to Non-Residents, 1Q53 - 4Q65

$$DIVF = \underset{(3.98)}{53.19} - \underset{(5.65)}{37.93}\ Q1 - \underset{(8.78)}{57.23}\ Q2 - \underset{(8.97)}{57.97}\ Q3 + \underset{(2.16)}{15.89}\ D8$$

$$\underset{(3.53)}{48.69} - \underset{(5.53)}{37.26} - \underset{(8.71)}{56.88} - \underset{(8.93)}{57.80} \underset{(1.84)}{13.84}$$

$$+ \underset{(7.81)}{0.0586}\ (PC + CCAC - TCA) + \underset{(7.81)}{0.0329}\ (PC + CCAC - TCA)_{t-1}$$

$$\underset{(7.88)}{0.0613} \qquad \underset{(7.88)}{0.0345}$$

$$+ \underset{(7.81)}{0.0146}\ (PC + CCAC - TCA)_{t-2} + \underset{(7.81)}{0.0037}\ (PC + CCAC - TCA)_{t-3}$$

$$\underset{(7.88)}{0.0153} \qquad \underset{(7.88)}{0.0038}$$

O.L.S. $\bar{R}^2 = 0.874$
SEE = 16.43
COV = 12.76
D/W = 2.08

T.S.F. $\bar{R}^2 = 0.874$
SEE = 16.46
COV = 12.78
D/W = 2.09

12. Chartered Banks More Liquid Assets

ELA = TBA - TL - OCS - VC - BCD

13. Employed Contributors to Unemployment Insurance Fund

EMPS = INS - CL

14. Government Balance

$$GBAL = TP + TOP + TCA + TI + TW + GIM + SSPS + UIR + GX - GW - GNW - MP - GTR - UIB - GINT - SUBS - ASST$$

15. Government Wage Expenditure

$$GW = WG(NEPG) + (GWI)$$

16. Stock of Non-farm Inventories

$$H = H_{t-1} + INV$$

17. Average Weekly Hours Worked, Paid Non-agricultural Workers, 1Q54 - 4Q65

$$\begin{aligned} HAW - HAW_{t-1} = {} & \underset{(8.68)}{53.36}\ Q1 + \underset{(8.98)}{54.88}\ Q2 + \underset{(8.47)}{53.97}\ Q3 + \underset{(8.39)}{52.70}\ Q4 - \underset{(0.84)}{0.01323}\ TQ1 \\ & \underset{(4.68)}{53.86} \quad \underset{(4.84)}{55.41} \quad \underset{(4.57)}{54.55} \quad \underset{(4.54)}{53.24} \quad - \underset{(1.01)}{0.01710} \\ & - \underset{(1.49)}{0.02495}\ TQ2 - \underset{(2.01)}{0.03608}\ TQ3 - \underset{(1.00)}{0.01908}\ TQ4 + \underset{(3.13)}{0.0006242}\ \left(YGPK + \frac{GNW}{PGNE}\right) \\ & - \underset{(1.61)}{0.02972} \quad - \underset{(2.04)}{0.04125} \quad - \underset{(1.09)}{0.02462} \quad \underset{(2.34)}{0.0007059} \\ & + \underset{(2.41)}{0.01895}\ \frac{NL}{NU} - \underset{(4.03)}{5.087}\ WPH - \underset{(8.51)}{1.230}\ HAW_{t-1} \\ & \underset{(1.69)}{0.01577} \quad - \underset{(2.84)}{5.272} \quad - \underset{(4.69)}{1.243} \end{aligned}$$

O.L.S. $\bar{R}^2 = 0.973$, SEE = 0.209, D/W = 1.90

T.S.F. $\bar{R}^2 = 0.973$, SEE = 0.209, D/W = 1.84

18. Trended Average Weekly Hours Worked, 3Q53 - 4Q65

$$\begin{aligned} HAWT = {} & \underset{(126.5)}{41.13}\ Q1 + \underset{(130.5)}{43.21}\ Q2 + \underset{(146.5)}{42.48}\ Q3 + \underset{(138.1)}{40.75}\ Q4 - \underset{(5.53)}{0.0340}\ T(Q1) - \underset{(6.88)}{0.0423}\ T(Q2) \\ & - \underset{(11.13)}{0.0607}\ T(Q3) - \underset{(5.06)}{0.0276}\ T(Q4) \end{aligned}$$

O.L.S. $\bar{R}^2 = 0.912$, SEE = 0.294, COV = 0.74, D/W = 1.41

19. Inventories Sales Ratio

$$HSL = \frac{H_{t-1}}{YGPK + (GNW/PGNE) - INV}$$

20. Trended Inventories Sales Ratio, 1Q50 - 4Q65

$$HSLT = \underset{(49.2)}{1.302} - \underset{(3.7)}{0.002057}\ T$$

O.L.S. $\bar{R}^2 = 0.172$
SEE = 0.08
COV = 6.70
D/W = 2.0

21. Housing Starts, 1Q57 - 4Q65

$$HST = \underset{(.96)}{28.58} - \underset{(8.67)}{20.21}\ Q1 + \underset{(3.76)}{7.984}\ Q2 + \underset{(3.89)}{7.766}\ Q3 + \underset{(2.55)}{9.350}\ WW + \underset{(3.16)}{9.258}\ \left(\frac{PH}{CLC}\right)$$

$$\underset{(.55)}{17.19} - \underset{(8.62)}{20.20} \qquad \underset{(3.65)}{7.810} \qquad \underset{(3.72)}{7.500} \qquad \underset{(2.34)}{8.708} \qquad \underset{(3.37)}{10.94}$$

$$- \underset{(3.85)}{12.03}\ RM_{t-1} + \underset{(1.27)}{2.662}\ (RM - RLC)_{t-1} + \underset{(1.31)}{2.868}\ \left(\frac{CMHC}{PH}\right) + \underset{(3.69)}{5.810}\ \left(\frac{CMHC}{PH}\right)_{t-1}$$

$$\underset{(3.96)}{-12.55} \qquad \underset{(1.50)}{3.244} \qquad \underset{(1.40)}{3.083} \qquad \underset{(3.65)}{5.771}$$

O.L.S. $\bar{R}^2 = 0.922$
SEE = 3.52
COV = 9.96
D/W = 1.84

T.S.F. $\bar{R}^2 = 0.921$
SEE = 3.55
COV = 10.03
D/W = 1.83

22. Investment, Machinery and Equipment, 1Q53 - 4Q65

$$IME - 0.05\ KME_{t-1} = \underset{(3.84)}{-212.8}\ Q1 - \underset{(1.87)}{132.7}\ Q2 - \underset{(3.97)}{271.0}\ Q3 - \underset{(3.72)}{233.6}\ Q4 + \underset{(5.58)}{0.1654}\ Q1(KMEG)$$

$$\underset{(3.40)}{-269.3} - \underset{(2.02)}{205.9} - \underset{(3.47)}{341.5} - \underset{(3.30)}{298.1} \qquad \underset{(5.27)}{0.1604}$$

$$+ \underset{(5.61)}{0.1665}\ Q2(KMEG) + \underset{(5.22)}{0.1442}\ Q3(KMEG) + \underset{(7.40)}{0.1977}\ Q4(KMEG) + \underset{(5.09)}{317.9}\ CFR$$

$$\underset{(5.18)}{0.1585} \qquad \underset{(5.01)}{0.1409} \qquad \underset{(7.05)}{0.1929} \qquad \underset{(4.23)}{383.2}$$

O.L.S. $\bar{R}^2 = 0.878$
SEE = 38.46
COV = 45.26
D/W = .87

T.S.F. $\bar{R}^2 = 0.875$
SEE = 38.94
COV = 45.83
D/W = .88

23. Investment, Non-residential Construction 1Q53 - 4Q65

$$INRC - 0.01\ KNR_{t-1} = \underset{(2.47)}{-1.052}\ T(Q1) + \underset{(4.52)}{1.878}\ T(Q2) + \underset{(11.50)}{4.714}\ T(Q3) + \underset{(7.33)}{2.942}\ T(Q4)$$

$$+ \underset{(13.25)}{0.0299}\ KNRG + \underset{(15.13)}{299.1}\ RLCI$$

O.L.S. $\bar{R}^2 = 0.931$
SEE = 37.36
COV = 10.46
D/W = 1.25

24. Level of Enrolment in Unemployment Insurance Fund, 1Q52 - 4Q65

$$INS = \underset{(.48)}{-0.4422}\ Q1 - \underset{(.80)}{0.7563}\ Q2 - \underset{(.96)}{0.9460}\ Q3 - \underset{(.79)}{0.7588}\ Q4 + \underset{(3.70)}{0.9695}\ NEP(D5)$$

$$\underset{(2.14)}{-2.375} - \underset{(2.34)}{2.770} - \underset{(2.53)}{3.033} - \underset{(2.39)}{2.796} \quad \underset{(4.78)}{1.524}$$

$$+ \underset{(4.90)}{1.002}\ NEP(D6) + \underset{(1.21)}{0.00218}\ T1(NEP)(D5) - \underset{(2.08)}{0.00346}\ T2(NEP)(D6)$$

$$\underset{(5.77)}{1.435} \qquad \underset{(.69)}{0.00151} \qquad - \underset{(3.41)}{0.00680}$$

O.L.S. $\bar{R}^2 = 0.956$
SEE = 0.098
COV = 2.52
D/W = 1.12

T.S.F. $\bar{R}^2 = 0.952$
SEE = 0.102
COV = 2.63
D/W = 1.20

25. Change in Non-farm Business Inventories, 1Q56 - 4Q65

$$INV = \underset{(3.80)}{626.7} + \underset{(2.83)}{326.4}\ Q1 + \underset{(1.91)}{160.3}\ Q2 - \underset{(0.85)}{39.45}\ Q3 - \underset{(3.02)}{0.1351}\ H_{t-1}$$

$$\underset{(3.68)}{610.6} \quad \underset{(3.05)}{366.8} \quad \underset{(0.55)}{58.80} \quad - \underset{(1.54)}{83.63} \quad - \underset{(1.63)}{0.0830}$$

$$+ \underset{(2.65)}{0.1601}\ (YGPK - CS - INV + \frac{GNW}{PGNE}) - \underset{(2.26)}{0.1896}\ [(YGPK - CS - INV + \frac{GNW}{PGNE})$$

$$\underset{(1.21)}{0.0855} \qquad - \underset{(0.95)}{0.1020}$$

$$- (YGPK - CS - INV + \frac{GNW}{PGNE})_{t-1}] \underset{(5.74)}{-271.9} \frac{NU}{\sum_{i=1}^{12} NU_{t-1}/12}$$

$$\underset{(5.64)}{-287.9}$$

O.L.S. $\bar{R}^2 = 0.809$
SEE = 72.43
D/W = 1.70

T.S.F. $\bar{R}^2 = 0.797$
SEE = 74.62
D/W = 1.80

26. Investment, Residential Construction, 1Q54 - 4Q65

$$IRC = \underset{(6.62)}{117.2} + \underset{(16.96)}{4.616}\ HST + \underset{(7.69)}{1.958}\ HST_{t-1} + \underset{(3.32)}{0.9238}\ HST_{t-2}$$

$$\underset{(6.56)}{117.9} \quad \underset{(16.42)}{4.600} \quad \underset{(7.70)}{1.958} \quad \underset{(3.29)}{0.9179}$$

O.L.S. $\bar{R}^2 = 0.886$
SEE = 22.06
COV = 5.91
D/W = 1.05

T.S.F. $\bar{R}^2 = 0.886$
SEE = 22.06
COV = 5.91
D/W = 1.05

27. Stock of Machinery and Equipment

$$KME = KME_{t-1} + IME - 0.05\ KME_{t-1}$$

28. Desired Stock of Machinery and Equipment

$$KMED = Y(KMEY)$$

29. Gap between Desired and Actual Stock of Machinery and Equipment

$$KMEG = 0.1000\ (KMED_{t-1} - KME_{t-2}) + 0.1500\ (KMED_{t-2} - KME_{t-3})$$

$$+ 0.3000\ (KMED_{t-3} - KME_{t-4}) + 0.2500\ (KMED_{t-4} - KME_{t-5})$$

$$+ 0.1500\ (KMED_{t-5} - KME_{t-6}) + 0.0500\ (KMED_{t-6} - KME_{t-7})$$

30. Trended Stock of Machinery and Equipment

$$KMEY = 1.903 - 0.0068\ T + 0.0061\ T(D7) - 0.4157\ D7$$

31. Stock of Non-residential Construction

$$KNR = (KNR_{t-1} + INRC) - 0.0100\ KNR_{t-1}$$

32. Desired Stock of Non-residential Construction

$$KNRD = Y(KNRY)\ CFR$$

33. Gap between Desired and Actual Stock of Non-residential Construction

$$KNRG = 0.0600\ (KNRD_{t-2} - KNR_{t-3}) + 0.1100\ (KNRD_{t-3} - KNR_{t-4})$$

$$+ 0.1600\ (KNRD_{t-4} - KNR_{t-5}) + 0.1700\ (KNRD_{t-5} - KNR_{t-6})$$

$$+ 0.1600\ (KNRD_{t-6} - KNR_{t-7}) + 0.1300\ (KNRD_{t-7} - KNR_{t-8})$$

$$+ 0.1100\ (KNRD_{t-8} - KNR_{t-9}) + 0.0700\ (KNRD_{t-9} - KNR_{t-10})$$

$$+ 0.0400\ (KNRD_{t-10} - KNR_{t-11})$$

34. Trended Stock of Non-residential Construction

$$KNRY = 3.103 + 0.0093\ T$$

35. Chartered Banks' Loans to Business, 1Q57 - 4Q65

$$LB - LB_{t-1} = \underset{(4.23)}{-308.0} - \underset{(2.99)}{0.0224}\ Q1(LB_{t-1}) + \underset{(4.09)}{0.0373}\ Q2(LB_{t-1}) + \underset{(6.08)}{0.0437}\ Q3(LB_{t-1})$$

$$- \underset{(3.90)}{0.3111}\ LB_{t-1} + \underset{(4.16)}{0.1514}\ TA + \underset{(2.14)}{0.1286}\ [PGNE\ (IME + INRC + INV)$$

$$- CCAC - PCRT] + \underset{(3.26)}{48.62}\ R03$$

O.L.S. $\bar{R}^2 = 0.820$
SEE = 44.28
D/W = 0.92
$\rho$ = 0.419

36. Estimated Logarithm of Investment in Non-residential Construction, 1Q53 - 4Q65

$$LINE = \underset{(80.6)}{6.152} - \underset{(7.14)}{0.3851}\ Q1 - \underset{(1.70)}{0.9170}\ Q2 + \underset{(2.36)}{0.1276}\ Q3 + \underset{(5.37)}{0.0068}\ T$$

O.L.S. $\bar{R}^2 = 0.718$
SEE = 0.137
COV = 2.14
D/W = .23

37. Estimated Logarithm of Investment in Residential Construction, 1Q53 - 4Q65

$$\underset{}{LIRE} = \underset{(93.34)}{5.879} - \underset{(8.22)}{0.3660\ Q1} - \underset{(2.31)}{0.1029\ Q2} - \underset{(.17)}{0.0076\ Q3} + \underset{(2.55)}{0.0027\ T}$$

O.L.S. $\bar{R}^2 = 0.65$
SEE = 0.113
COV = 1.92
D/W = .63

38. Chartered Banks' Loans to Persons, 3Q56 - 4Q65

$$LP - LP_{t-1} = \underset{(7.99)}{-533.8} + \underset{(4.62)}{0.0342\ TBA} - \underset{(2.92)}{0.0124\ Q1(LP_{t-1})} + \underset{(6.37)}{0.0313\ Q2(LP_{t-1})}$$

$$+ \underset{(9.63)}{0.0377\ Q3(LP_{t-1})} - \underset{(1.96)}{0.0626\ LP_{t-1}} + \underset{(3.80)}{752.7\ \left(\frac{ELA}{TBA}\right)_{t-1}}$$

$$- \underset{(1.77)}{11.88\ (RLC - R03)_{t-1}}$$

O.L.S. $\bar{R}^2 = 0.890$
SEE = 16.11
D/W = .99
$\rho$ = 0.480

39. Net Long Term Capital Inflow, 1Q53 - 4Q65

$$\underset{}{LTK} = \underset{(5.40)}{-632.8} + \underset{(2.88)}{108.2\ Q1} - \underset{(2.17)}{77.32\ Q2} - \underset{(2.35)}{92.02\ Q3} - \underset{(3.76)}{0.00556\ (T-24)(IME + INRC)\ PGNE}$$

$$\underset{(5.21)}{-653.2} \quad \underset{(2.98)}{113.3} \quad \underset{(2.22)}{-79.80} \quad \underset{(2.43)}{-96.25} \quad \underset{(3.48)}{-0.00548}$$

$$+ \underset{(6.64)}{0.7430\ (IME + INRC)\ PGNE} - \underset{(3.77)}{193.0\ DLK1} - \underset{(1.40)}{140.3\ DLK4} + \underset{(2.36)}{0.3000\ PMB}$$

$$\underset{(6.32)}{0.7624} \qquad \underset{(3.92)}{-201.4} \qquad \underset{(1.53)}{-153.4} \qquad \underset{(2.24)}{0.2857}$$

$$+ \underset{(2.74)}{177.0\ (RLC - RLUS)}$$

$$\underset{(2.37)}{167.0}$$

O.L.S. $\bar{R}^2 = 0.534$ T.S.F. $\bar{R}^2 = 0.533$
SEE = 84.25 SEE = 84.39
D/W = 1.53 D/W = 1.54

40. Imports of Goods, 1Q53 - 4Q65

$$MG = \underset{(6.42)}{1506} + \underset{(4.83)}{78.70}\,Q1 + \underset{(11.43)}{175.4}\,Q2 + \underset{(1.54)}{23.37}\,Q3 + \underset{(42.85)}{1.080}\,[0.20\,(CD + CND)$$

$$\underset{(6.08)}{1461} \quad \underset{(4.71)}{76.95} \quad \underset{(11.34)}{174.3} \quad \underset{(1.49)}{22.65} \quad \underset{(42.11)}{1.074}$$

$$+ 0.21\,(IME + INRC + IRC) + 0.11\,XG + 0.09\,\frac{GNW}{PGNE} + 0.17\,INV]\,(\tfrac{1}{4})\sum_{i=0}^{3}\left(\frac{Y}{YC}\right)_{t-i}$$

$$\underset{(6.43)}{-607.6}\,\frac{PMG}{PGNE} \underset{(6.43)}{-422.0}\left(\frac{PMG}{PGNE}\right)_{t-1} \underset{(6.43)}{-270.1}\left(\frac{PMG}{PGNE}\right)_{t-2} \underset{(6.43)}{-151.9}\left(\frac{PMG}{PGNE}\right)_{t-3}$$

$$\underset{(6.05)}{-586.6} \qquad \underset{(6.05)}{-407.4} \qquad \underset{(6.05)}{-260.7} \qquad \underset{(6.05)}{-146.7}$$

$$\underset{(6.43)}{-67.52}\left(\frac{PMG}{PGNE}\right)_{t-4} \underset{(6.43)}{-16.88}\left(\frac{PMG}{PGNE}\right)_{t-5}$$

$$\underset{(6.05)}{-65.18} \qquad \underset{(6.05)}{-16.30}$$

O.L.S. $\bar{R}^2 = 0.977$ T.S.F. $\bar{R}^2 = 0.976$
SEE = 38.06 SEE = 38.10
COV = 2.72 COV = 2.72
D/W = 1.38 D/W = 1.38

41. Imports of Services, 1Q53 - 4Q65

$$MS - DIVF = \underset{(2.45)}{-40.96} + \underset{(2.24)}{21.95}\,Q1 + \underset{(6.85)}{65.69}\,Q2 + \underset{(3.12)}{30.14}\,Q3 + \underset{(34.94)}{0.0582}\,YGNE$$

$$\underset{(2.50)}{-41.80} \quad \underset{(2.25)}{22.07} \quad \underset{(6.86)}{65.73} \quad \underset{(3.12)}{30.07} \quad \underset{(34.94)}{0.0582}$$

O.L.S. $\bar{R}^2 = 0.965$ T.S.F. $\bar{R}^2 = 0.965$
SEE = 24.36 SEE = 24.36
COV = 4.79 COV = 4.79
D/W = .88 D/W = .88

42. Paid Workers, Total, All Industries

$$NEP = (NEPG + NEPP)$$

43. Paid Workers, Private Industry, 1Q54 - 4Q65

$$NEPP - NEPP_{t-1} = \underset{(6.56)}{6.078} - \underset{(3.35)}{0.07660}\,Q1 + \underset{(15.42)}{0.4346}\,Q2 + \underset{(17.19)}{0.2375}\,Q3$$

$$\underset{(6.32)}{5.996} - \underset{(3.29)}{0.09183} \quad \underset{(15.12)}{0.4380} \quad \underset{(16.44)}{0.2410}$$

$$+ \underset{(3.70)}{0.00009238}\left(YGPK + \frac{GNW}{PGNE}\right) - \underset{(2.20)}{0.03897}\,(HAWT - HAW)$$

$$\underset{(2.28)}{0.00007314} \quad - \underset{(2.47)}{0.06718}$$

$$- \underset{(6.48)}{0.1322}\,HAWT - \underset{(5.41)}{0.3780}\,NEPP_{t-1}$$

$$- \underset{(6.32)}{0.1316} \quad - \underset{(3.83)}{0.3303}$$

O.L.S. $\bar{R}^2 = 0.977$, SEE = 0.029, D/W = 2.24

T.S.F. $\bar{R}^2 = 0.975$, SEE = 0.030, D/W = 2.40

44. Employed, Unpaid Workers, Private Industry, 1Q53 - 4Q65

$$NEUP = \underset{(1.84)}{0.2948} + \underset{(2.01)}{0.0483}\,Q1 + \underset{(7.68)}{0.1569}\,Q2 + \underset{(11.24)}{0.1656}\,Q3 - \underset{(2.80)}{0.0017}\,T + \underset{(1.47)}{0.000175}\,\frac{YNFC}{PGNE}$$

$$\underset{(.14)}{-0.0439} \quad \underset{(2.28)}{0.0735} \quad \underset{(5.32)}{0.1944} \quad \underset{(9.12)}{0.1814} \quad \underset{(.99)}{-0.0009} \quad \underset{(1.36)}{0.000173}$$

$$+ \underset{(6.13)}{0.6643}\,NEUP_{t-1}$$

$$\underset{(4.12)}{0.9009}$$

O.L.S. $\bar{R}^2 = 0.928$, SEE = 0.022, COV = 1.87, D/W = 1.71

T.S.F. $\bar{R}^2 = 0.920$, SEE = 0.023, COV = 1.97, D/W = 2.01

45. Labor Force, 1Q53 - 4Q65

$$\left(\frac{NL}{POP}\right) - \left(\frac{NL}{POP}\right)_{t-1} = \underset{(8.81)}{-0.00960} + \underset{(2.36)}{0.00495}\,Q1 + \underset{(8.52)}{0.0153}\,Q2 + \underset{(15.39)}{0.0210}\,Q3$$

$$\underset{(5.80)}{-0.00961} \quad \underset{(.88)}{0.00503} \quad \underset{(7.37)}{0.0153} \quad \underset{(15.40)}{0.0210}$$

$$+ \underset{(1.32)}{0.0000247}\left[\frac{YGPK}{POP} - \left(\frac{YGPK}{POP}\right)_{t-1}\right] - \underset{(6.35)}{0.6389}\left[\frac{SP}{POP} - \left(\frac{SP}{POP}\right)_{t-1}\right]$$

$$\underset{(.47)}{0.0000255} \qquad \underset{(6.24)}{- 0.6401}$$

O.L.S. $\bar{R}^2 = 0.982$
SEE = 0.0017
D/W = 1.88

T.S.F. $\bar{R}^2 = 0.982$
SEE = 0.0017
D/W = 1.88

46. Total Number of Taxable Persons

$$NT = \underset{}{-0.3053} + \underset{(66.86)}{0.7930}\ (NEP + NEUP) + \underset{(14.35)}{0.02544}\ T$$

O.L.S. $\bar{R}^2 = 0.987$
SEE = 0.108
COV = 1.98
D/W = .55

47. Number of Taxable Persons, Assessed Incomes between 0 and $3,000

NT03 = N03 (NT)

48. Number of Taxable Persons, Assessed Incomes between $3,000 and $5,000

NT35 = N35 (NT)

49. Number of Taxable Persons, Assessed Incomes between $5,000 and $10,000

NT51 = N51 (NT)

50. Number of Taxable Persons, Incomes over $10,000

NT10 = NT - NT03 - NT35 - NT51

51. Total Unemployed

NU = NL - NEPP - NEUP - NEPG

52. Corporate Profits, 1Q53 - 4Q65

$$PC = \underset{(1.86)}{-1133.}\ Q1 - \underset{(2.00)}{1169.}\ Q2 - \underset{(2.40)}{1348.}\ Q3 - \underset{(2.04)}{1190.}\ Q4 + \underset{(5.68)}{0.1745}\ [YGNE - INV(PGNE)]$$

$$\underset{(1.36)}{-904.6}\ Q1 - \underset{(1.52)}{970.1}\ Q2 - \underset{(1.90)}{1164.}\ Q3 - \underset{(1.54)}{985.2}\ Q4 + \underset{(5.72)}{0.1941}\ [YGNE - INV(PGNE)]$$

$$- 1341.\ WPH + 1.768\ (\tfrac{1}{4}) \sum_{i=0}^{i=3} \left(\frac{Y}{NEPP}\right)_{t-i}$$
$$(5.62) \qquad (3.94)$$

$$- 1496. \qquad 1.702$$
$$(5.71) \qquad (3.50)$$

O.L.S. $\overline{R}^2 = 0.949$
SEE = 51.49
COV = 5.87
D/W = 1.38

T.S.F. $\overline{R}^2 = 0.948$
SEE = 51.76
COV = 5.90
D/W = 1.45

53. Undistributed Corporation Profits

PCRT = PC - DIVF - DIVC - TCA - CCB

54. Taxable Corporate Profits, 1Q50 - 4Q65

PCT = 125.1362 + 7.8163 T3 + 0.7591 PC
(6.85) (8.00) (24.32)

O.L.S. $\overline{R}^2 = 0.997$
SEE = 6.91
COV = 0.89
D/W = 1.98

55. Implicit Price Deflator, Consumer Durable Expenditure, 2Q52 - 4Q65

$$PD - PD_{t-1} = 0.0008\ Q1 - 0.0090\ Q2 - 0.0162\ Q3 + 0.0093\ Q4$$
$$(.27) \qquad (3.03) \qquad (4.92) \qquad (3.34)$$

$$0.00038 \quad - 0.0100 \quad - 0.0181 \quad 0.0091$$
$$(.13) \qquad (2.45) \qquad (3.39) \qquad (3.50)$$

$$+ 0.7603\ (PGNE - PGNE_{t-1})$$
$$(3.57)$$

$$0.9966$$
$$(1.59)$$

O.L.S. $\overline{R}^2 = 0.416$
SEE = 0.0104
D/W = 1.73

T.S.F. $\overline{R}^2 = 0.401$
SEE = 0.011
D/W = 1.77

56. Implicit Price Deflator, Gross National Private Expenditure, 1Q55 - 4Q65

PGNE = 0.1537 - 0.01096 Q1 - 0.008114 Q2 - 0.005894 Q3 + 0.00009716 WP
(3.48) (3.26) (1.97) (1.30) (1.46)

0.1638 - 0.01027 - 0.006954 - 0.004147 0.0001164
(3.23) (2.20) (1.10) (0.59) (1.49)

$$+ \underset{(4.24)}{0.3745}\ ULC_t + \underset{(8.50)}{0.3556}\ ULC_{t-1} + \underset{(6.46)}{0.3088}\ ULC_{t-2} + \underset{(4.28)}{0.2339}\ ULC_{t-3}$$

$$\underset{(2.18)}{0.3302} \qquad \underset{(6.48)}{0.3376} \qquad \underset{(4.50)}{0.3083} \qquad \underset{(2.72)}{0.2423}$$

$$+ \underset{(3.29)}{0.1310}\ ULC_{t-4} + \underset{(1.52)}{0.03089}\ PMG_{t-2} + \underset{(1.52)}{0.02270}\ PMG_{t-3} + \underset{(1.52)}{0.01576}\ PMG_{t-4}$$

$$\underset{(2.07)}{0.1395} \qquad \underset{(1.32)}{0.02917} \qquad \underset{(1.32)}{0.02143} \qquad \underset{(1.32)}{0.01488}$$

$$+ \underset{(1.52)}{0.01009}\ PMG_{t-5} + \underset{(1.52)}{0.00567}\ PMG_{t-6} + \underset{(1.52)}{0.00252}\ PMG_{t-7} + \underset{(1.52)}{0.00063}\ PMG_{t-8}$$

$$\underset{(1.32)}{0.00952} \qquad \underset{(1.32)}{0.00536} \qquad \underset{(1.32)}{0.00238} \qquad \underset{(1.32)}{0.00060}$$

$$- \underset{(4.11)}{0.1472}\left[\tfrac{1}{4}\sum_{i=0}^{3}(HSL - HSLT)_{t-i}\right]_t - \underset{(4.11)}{0.0828}\left[\tfrac{1}{4}\sum_{i=0}^{3}(HSL - HSLT)_{t-i}\right]_{t-1}$$

$$\underset{(2.68)}{-0.1200} \qquad \underset{(2.68)}{-0.0675}$$

$$- \underset{(4.11)}{0.0368}\left[\tfrac{1}{4}\sum_{i=0}^{3}(HSL - HSLT)_{t-i}\right]_{t-2} - \underset{(4.11)}{0.0092}\left[\tfrac{1}{4}\sum_{i=0}^{3}(HSL - HSLT)_{t-i}\right]_{t-3}$$

$$\underset{(2.68)}{-0.0300} \qquad \underset{(2.68)}{-0.0075}$$

O.L.S. $\bar{R}^2 = 0.988$, SEE = 0.0061, COV = 0.58, D/W = 1.19

T.S.F. $\bar{R}^2 = 0.988$, SEE = 0.0063, COV = 0.60, D/W = 1.19

57. Price of Houses, 1Q57 - 4Q65

$$PH = \underset{(1.80)}{72.20} + \underset{(1.44)}{1.406}\ Q1 + \underset{(3.92)}{4.003}\ Q2 + \underset{(2.18)}{2.036}\ Q3 - \underset{(2.85)}{199.3}\frac{STH}{HH} + \underset{(4.74)}{170.2}\ PGNE_{t-1}$$

$$\underset{(1.95)}{79.14} \quad \underset{(1.49)}{1.467} \quad \underset{(3.98)}{4.083} \quad \underset{(2.22)}{2.075} \quad \underset{(2.99)}{-212.3} \quad \underset{(4.82)}{174.0}$$

$$+ \underset{(2.94)}{53.20}\left(\frac{YDP}{HH}\right)_{t-1}$$

$$\underset{(3.05)}{55.62}$$

O.L.S. $\bar{R}^2$ = 0.914
SEE = 1.92
COV = 1.77
D/W = 1.11

T.S.F. $\bar{R}^2$ = .914
SEE = 1.92
COV = 1.77
D/W = 1.14

58. Implicit Price Deflator, Consumer Non-durable Expenditure, 1Q55 - 4Q65

$$PND = \underset{(12.11)}{0.3573} - \underset{(4.89)}{0.01077}\,Q1 - \underset{(3.77)}{0.008508}\,Q2 - \underset{(1.74)}{0.004421}\,Q3 + \underset{(2.24)}{0.00009876}\,WP$$

$$\underset{(11.07)}{0.3502} - \underset{(4.96)}{0.01102} - \underset{(3.88)}{0.008837} - \underset{(1.91)}{0.005033} \quad \underset{(1.82)}{0.00008730}$$

$$+ \underset{(7.80)}{0.2744}\,ULC_t + \underset{(7.80)}{0.1756}\,ULC_{t-1} + \underset{(7.80)}{0.0988}\,ULC_{t-2} + \underset{(7.80)}{0.0439}\,ULC_{t-3}$$

$$\underset{(7.42)}{0.2907} \quad \underset{(7.42)}{0.1861} \quad \underset{(7.42)}{0.1047} \quad \underset{(7.42)}{0.04652}$$

$$+ \underset{(7.80)}{0.01098}\,ULC_{t-4} + \underset{(5.94)}{0.09629}\,PMG_{t-2} + \underset{(5.94)}{0.07074}\,PMG_{t-3} + \underset{(5.94)}{0.04913}\,PMG_{t-4}$$

$$\underset{(7.42)}{0.01163} \quad \underset{(5.75)}{0.09614} \quad \underset{(5.75)}{0.07063} \quad \underset{(5.75)}{0.04905}$$

$$+ \underset{(5.94)}{0.03144}\,PMG_{t-5} + \underset{(5.94)}{0.01769}\,PMG_{t-6} + \underset{(5.94)}{0.00786}\,PMG_{t-7} + \underset{(5.94)}{0.00197}\,PMG_{t-8}$$

$$\underset{(5.75)}{0.03139} \quad \underset{(5.75)}{0.01766} \quad \underset{(5.75)}{0.00785} \quad \underset{(5.75)}{0.00196}$$

O.L.S. $\bar{R}^2$ = 0.987
SEE = 0.0050
COV = 0.48
D/W = 1.48

T.S.F. $\bar{R}^2$ = 0.987
SEE = 0.0050
COV = 0.48
D/W = 1.46

59. Chartered Banks' Personal Savings and Non-Personal Term Deposits

$$PNPS = TD - DD - DG$$

60. Implicit Price Deflator, Goods Exports, 1Q53 - 4Q65

$$PXG = \underset{(9.53)}{0.3154} + \underset{(8.28)}{0.2846}\,PGNE + \underset{(9.31)}{0.4018}\,PWXG$$

$$\underset{(9.55)}{0.3158} \quad \underset{(8.15)}{0.2822} \quad \underset{(9.33)}{0.4038}$$

| O.L.S. | T.S.F. |
|---|---|
| $\bar{R}^2$ = 0.902 | $\bar{R}^2$ = 0.902 |
| SEE = 0.012 | SEE = 0.012 |
| COV = 1.20 | COV = 1.20 |
| D/W = 0.63 | D/W = 0.63 |

61. Implicit Price Deflator, Service Exports, 1Q53 - 4Q65

$$PXS = \underset{(10.73)}{-1.085} - \underset{(2.52)}{0.0198}\, Q3 + \underset{(2.97)}{0.5105}\, PXG + \underset{(15.93)}{1.593}\, PGNE$$

$$\underset{(10.67)}{-1.179} - \underset{(2.48)}{0.0197} \quad \underset{(3.42)}{0.6614} \quad \underset{(13.97)}{1.535}$$

| O.L.S. | T.S.F. |
|---|---|
| $\bar{R}^2$ = 0.963 | $\bar{R}^2$ = 0.962 |
| SEE = 0.024 | SEE = 0.025 |
| COV = 2.29 | COV = 2.31 |
| D/W = 1.55 | D/W = 1.56 |

62. Short-Term Interest Rate, 3Q53 - 4Q65

$$R03 = \underset{(4.71)}{3.180} + \underset{(6.74)}{0.5756}\, RTUS + \underset{(4.08)}{0.00060}\, [(1ME + 1NV + INRC)PGNE - CCA - PCRT - GBAL]$$

$$\underset{(4.54)}{3.214} \quad \underset{(6.30)}{0.5655} \quad \underset{(3.74)}{0.00059}$$

$$+ \underset{(4.08)}{0.00050}\, [(1ME + 1NRC + 1NV)PGNE - CCA - PCRT - GBAL]_{t-1}$$

$$\underset{(3.74)}{0.00049}$$

$$+ \underset{(4.08)}{0.00040}\, [(1ME + 1NRC + 1NV)PGNE - CCA - PCRT - GBAL]_{t-2}$$

$$\underset{(3.74)}{0.00040}$$

$$+ \underset{(4.08)}{0.00030}\, [(1ME + 1NRC + 1NV)PGNE - CCA - PCRT - GBAL]_{t-3}$$

$$\underset{(3.74)}{0.00030}$$

$$+ \underset{(4.08)}{0.00020}\, [(1ME + 1NRC + 1NV)PGNE - CCA - PCRT - GBAL]_{t-4}$$

$$\underset{(3.74)}{0.00020}$$

$$+ \underset{(4.08)}{0.00010}\ [(IME + INRC + INV)PGNE - CCA - PCRT - GBAL]_{t-5}$$

$$\underset{(3.74)}{0.00010}$$

$$- \underset{(5.74)}{9.580}\ \frac{ELA}{TBAT} - \underset{(3.43)}{1.558}\ \left(\frac{ELA}{TBAT}\right)_{t-1} + \underset{(4.18)}{2.713}\ \left(\frac{ELA}{TBAT}\right)_{t-2} + \underset{(4.98)}{3.232}\ \left(\frac{ELA}{TBAT}\right)_{t-3}$$

$$\underset{(4.98)}{-10.27} \qquad \underset{(3.31)}{- 1.569} \qquad \underset{(3.79)}{3.041} \qquad \underset{(4.35)}{3.564}$$

O.L.S. $\bar{R}^2 = 0.876$, SEE = 0.338, COV = 9.31, D/W = 1.40

T.S.F. $\bar{R}^2 = 0.875$, SEE = 0.339, COV = 9.33, D/W = 1.38

63. Conventional Mortgage Rate, 2Q54 - 4Q65

$$RC = \underset{(3.16)}{10.67} + \underset{(3.32)}{0.2508}\ RLC_{t-1} + \underset{(5.43)}{0.4871}\ RNHA - \underset{(7.84)}{0.003741}\ ALTM + \underset{(7.09)}{0.005457}\ MLTM_{t-1}$$

$$\underset{(3.30)}{11.28} \quad \underset{(3.46)}{0.2667} \quad \underset{(5.30)}{0.4784} \quad \underset{(7.84)}{- 0.003753} \quad \underset{(7.19)}{0.005665}$$

$$+ \underset{(3.84)}{3.9927}\ \frac{YDP}{HH} - \underset{(3.25)}{10.6980}\ \left(\frac{STH}{HH}\right)_{t-1}$$

$$\underset{(2.85)}{3.3279} \qquad \underset{(3.20)}{- 10.5470}$$

O.L.S. $\bar{R}^2 = 0.949$, SEE = 0.097, COV = 1.44, D/W = 1.25

T.S.F. $\bar{R}^2 = 0.948$, SEE = 0.098, COV = 1.45, D/W = 1.26

64. Long-Term Interest Rate, 1Q53 - 4Q65

$$RLC = \underset{(4.71)}{0.1321}\ R03 + \underset{(3.18)}{0.2163}\ RLUS + \underset{(11.28)}{0.6969}\ (RLC)_{t-1}$$

$$\underset{(3.80)}{0.1195} \qquad \underset{(3.05)}{0.2164} \qquad \underset{(10.90)}{0.7071}$$

O.L.S. $\bar{R}^2 = 0.975$, SEE = 0.125, COV = 2.81, D/W = 1.42

T.S.F. $\bar{R}^2 = 0.975$, SEE = 0.125, COV = 2.81, D/W = 1.47

65. Long-Term Interest Rate, Index

$$RLCI = 0.06 \left(\frac{\sum_{i=1}^{i=12} RLC_{t-i}/12}{RLC}\right)_{t-2} + 0.11 \left(\frac{\sum_{i=1}^{i=12} RLC_{t-i}/12}{RLC}\right)_{t-3}$$

$$+ 0.16 \left(\frac{\sum_{i=1}^{i=12} RLC_{t-i}/12}{RLC}\right)_{t-4} + 0.17 \left(\frac{\sum_{i=1}^{i=12} RLC_{t-i}/12}{RLC}\right)_{t-5}$$

$$+ 0.16 \left(\frac{\sum_{i=1}^{i=12} RLC_{t-i}/12}{RLC}\right)_{t-6} + 0.13 \left(\frac{\sum_{i=1}^{i=12} RLC_{t-i}/12}{RLC}\right)_{t-7}$$

$$+ 0.11 \left(\frac{\sum_{i=1}^{i=12} RLC_{t-i}/12}{RLC}\right)_{t-8} + 0.07 \left(\frac{\sum_{i=1}^{i=12} RLC_{t-i}/12}{RLC}\right)_{t-9}$$

$$+ 0.04 \left(\frac{\sum_{i=1}^{i=12} RLC_{t-i}/12}{RLC}\right)_{t-10}$$

66. Mortgage Rate

$$RM = (RC + RNHA)/2$$

67. Change in Official Reserves of Gold and U.S. Dollars

$$RSR = XG(PXG) + XS - MS - MG(PMG) + LTK + STK$$

68. Stock of Houses, 2Q54 - 4Q65

$$STH = 0.9997\ STH_{t-1} + 0.2240\ HST + 0.3723\ HST_{t-1} + 0.2750\ HST_{t-2} + 0.0961\ HST_{t-3}$$

| | | | | | |
|---|---|---|---|---|---|
| | (680.79) | (2.85) | (5.07) | (4.69) | (4.44) |
| 0.9993 | | 0.2015 | 0.4056 | 0.3101 | 0.1100 |
| (651.6) | | (2.49) | (5.25) | (4.99) | (4.78) |

O.L.S. $\bar{R}^2 = 0.9998$
SEE = 6.62
COV = 0.15
D/W = 2.02

T.S.F. $\bar{R}^2 = 0.9998$
SEE = 6.66
COV = 0.15
D/W = 2.02

69. Net Private Short-Term Capital Inflow, 1Q53 - 4Q65

$$\begin{array}{lllllll} \text{STK} = 10.54 & - 96.26\ Q3 & + 3144\ DRS & - 9944\ DRSU & + 21705\ DRSF & + 152.2\ DSK2 & \\ \quad (.23) & \quad (2.48) & \quad (1.35) & \quad (2.97) & \quad (1.75) & \quad (2.44) & \\ \quad 34.88 & - 86.14 & \quad 3251 & - 9729 & \quad 28074 & \quad 118.1 & \\ \quad (.61) & \quad (2.10) & \quad (1.33) & \quad (2.78) & \quad (2.10) & \quad (1.77) & \end{array}$$

$$\begin{array}{lll} + 102.2\ (R03 - RTUS) & - 0.2826\ LTK & \\ \quad (2.88) & \quad (1.90) & \\ \quad 42.93 & - 0.1210 & \\ \quad (.90) & \quad (.55) & \end{array}$$

O.L.S. $\bar{R}^2 = 0.382$
SEE = 112.9
D/W = 1.72

T.S.F. $\bar{R}^2 = 0.336$
SEE = 116.96
D/W = 1.78

70. Chartered Banks' Total Loan Authorizations over $100,000, 3Q56 - 4Q65

$$\begin{array}{lllll} \dfrac{TA - TA_{t-1}}{TBA} = & -0.00507 & + 0.1330\ \dfrac{ELA}{TBA} & + 0.0193\ (RPR - RLC) & - 0.00790\ (RLC - R03) \\ & \quad (0.29) & \quad (4.26) & \quad (6.88) & \quad (4.76) \\ & -0.0143 & \quad 0.1312 & \quad 0.0172 & - 0.00659 \\ & \quad (.73) & \quad (4.01) & \quad (5.45) & \quad (3.19) \end{array}$$

$$\begin{array}{ll} - 0.3567\ \dfrac{TA_{t-1}}{TBA} & + 0.00186T \\ \quad (5.58) & \quad (8.49) \\ - 0.3008 & \quad 0.00166 \\ \quad (3.81) & \quad (6.11) \end{array}$$

O.L.S. $\bar{R}^2 = 0.729$
SEE = 0.0033
D/W = 1.73

T.S.F. $\bar{R}^2 = 0.721$
SEE = 0.0034
D/W = 1.73

71. Chartered Banks' Total Major Assets

$$TBA = DD + PNPS + DG + CA + OTHL - OTHA$$

72. Chartered Banks' Trended Total Major Assets, 1Q52 - 4Q65

$$\begin{array}{lllllll} TBAT = 3611 & + 170.2\ T(Q1) & + 171.2\ T(Q2) & + 172.4\ T(Q3) & + 173.3\ T(Q4) & & \\ \quad (16.68) & \quad (34.31) & \quad (35.12) & \quad (35.97) & \quad (36.78) & & \end{array}$$

O.L.S. $\bar{R}^2 = 0.968$
SEE = 512.0
COV = 4.29
D/W = .18

73. Corporate Income Tax Accruals, 1Q52 - 4Q65

$$TCA = \underset{(166.8)}{0.9794}\ RPC(PCT) + PLMT$$

$$\underset{(166.6)}{0.9794}$$

O.L.S. $\bar{R}^2 = 0.962$
SEE = 17.46
COV = 4.6
D/W = 1.38

T.S.F. $\bar{R}^2 = 0.962$
SEE = 17.46
COV = 4.60
D/W = 1.38

74. Customs Duties, 1Q52 - 4Q65

$$TCUS = \underset{(61.17)}{0.1201}\ PMG(MG) - \underset{(16.20)}{0.0000189}\ [PMG(MG)]^2 + \underset{(10.78)}{0.9876}\ MG(SUR)PMG$$

$$\underset{(60.28)}{0.1209} \qquad - \underset{(16.25)}{0.0000195} \qquad \underset{(10.74)}{0.9857}$$

$$- \underset{(4.10)}{0.00461}\ Q1\ (MG)PMG$$

$$- \underset{(4.20)}{0.00473}$$

O.L.S. $\bar{R}^2 = 0.963$
SEE = 4.69
COV = 3.64
D/W = 1.04

T.S.F. $\bar{R}^2 = 0.963$
SEE = 4.70
COV = 3.64
D/W = 1.05

75. Chartered Banks' Total Deposits

$$TD = \frac{BCD + BCN - ERL}{DCR} - FLO$$

76. Excise Duties, 1Q52 - 4Q65

$$TEX = \underset{(109.2)}{0.02299}\ [CD(PD) + CND(PND)]$$

$$\underset{(109.2)}{0.02299}$$

O.L.S. $\bar{R}^2$ = 0.920
SEE = 5.60
COV = 7.04
D/W = 1.78

T.S.F. $\bar{R}^2$ = 0.920
SEE = 5.60
COV = 7.04
D/W = 1.78

77. Total Indirect Taxes

TI = TS + TCUS + TEX + TMIS

78. Chartered Banks' Total Loans

TL = LB + LBS + LF + LP + LMUN + LPRV + LH + LM

79. Total Personal Taxes, 1Q52 - 4Q65

$$TP = 1.105\ (1/3\ AY_{t-1} + 2/3\ AY) - 0.006558\ Q1 \sum_{i=1}^{i=4} AY_{t-i} + 0.04106\ Q2 \sum_{i=2}^{i=5} AY_{t-i}$$
(97.31) (1.20) (7.41)

1.106 - 0.006793 0.04081
(97.35) (1.24) (7.37)

O.L.S. $\bar{R}^2$ = 0.972
SEE = 27.91
COV = 5.84
D/W = 1.77

T.S.F. $\bar{R}^2$ = 0.972
SEE = 27.92
COV = 5.84
D/W = 1.77

80. Federal Sales Tax, 1Q55 - 4Q65

TS = 0.6326 PGNE[CND + CD] RSC + .5504 PGNE[(RS1M)(1ME) + .42 (RS1R)(1NRC + 1RC)]
(74.01) (9.90)

0.6329 0.5478
(73.93) (9.81)

O.L.S. $\bar{R}^2$ = 0.943
SEE = 19.30
COV = 7.03
D/W = 1.66

T.S.F. $\bar{R}^2$ = 0.943
SEE = 19.30
COV = 7.04
D/W = 1.66

81. Unemployment Insurance Benefits, 1Q52 - 4Q65

UIB = -1.657 - .5816 Q1(S)(WR)CL + .8562 Q2(S)(WR)CL
(.49) (1.78) (2.32)

-4.104 - .7778 .7758
(1.12) (2.26) (2.06)

- 1.6359 Q3(S)(WR)CL - 3.5823 Q4(S)(WR)CL + 8.7352 (WR)CL
(2.68) (9.72) (22.04)

- 1.5587 - 3.7021 9.0461
(2.45) (9.84) (21.05)

O.L.S. $\bar{R}^2 = 0.966$
SEE = 9.80
COV = 11.94
D/W = 1.62

T.S.F. $\bar{R}^2 = 0.965$
SEE = 9.86
COV = 12.02
D/W = 1.64

82. Unemployment Insurance Receipts, 1Q52 - 4Q65

$$UIR = \underset{(2.82)}{7.990} + \underset{(12.31)}{10.77}\ EMPS + \underset{(20.80)}{6.400}\ EMPS(D6) + \underset{(3.83)}{1.321}\ Q1(EMPS)S - \underset{(4.90)}{1.703}\ Q2(EMPS)S$$

$$\underset{(2.53)}{7.223}\ \underset{(12.45)}{11.01}\ \underset{(20.78)}{6.393}\ \underset{(3.78)}{1.304}\ \underset{(4.97)}{-1.729}$$

$$- \underset{(0.40)}{0.1407}\ Q3(EMPS)S + \underset{(0.15)}{0.0585}\ Q4(EMPS)S$$

$$\underset{(.50)}{-0.1770}\ \underset{(0.09)}{0.0352}$$

O.L.S. $\bar{R}^2 = 0.987$
SEE = 1.79
COV = 3.17
D/W = 2.04

T.S.F. $\bar{R}^2 = 0.987$
SEE = 1.79
COV = 3.17
D/W = 2.04

83. Private Unit Labor Cost

$$ULC = \frac{(WP)(NEPP)(1/12 \sum_{i=0}^{11} (\frac{YGPK}{YGPK + GNW/PGNE})_{t-i})}{YGPK}$$

84. Quarterly Compensation per Employee, Private Sector

$$WP = (WPH)(HAW)(13)$$

85. Compensation per Man-Hour, Private Sector, 1Q55 - 4Q65

$$\frac{WPH - WPH_{t-4}}{WPH_{t-4}} \times 100 = \underset{(2.02)}{-4.830} + \underset{(3.92)}{0.9383}\ [\tfrac{1}{4} \sum_{i=0}^{3} (\frac{PND - PND_{t-4}}{PND_{t-4}} \times 100)_{t-i}]$$

$$\underset{(1.98)}{-4.953}\ \underset{(3.68)}{0.9308}$$

$$+ \underset{(4.55)}{0.005172}\ [\tfrac{1}{4} \sum_{i=0}^{3} (\frac{NU}{NL})_{t-i}]^{-2} + \underset{(2.41)}{88.64}\ [\tfrac{1}{4} \sum_{i=0}^{3} (\frac{PC - TCA}{YGPK})_{t-i}]$$

$$\underset{(4.42)}{0.005173}\ \underset{(2.35)}{90.36}$$

$$- 0.2238 \underset{(1.63)}{} \left(\frac{WPH_{t-4} - WPH_{t-8}}{WPH_{t-8}} \times 100\right)$$

$$- 0.2208 \underset{(1.57)}{}$$

O.L.S. $\bar{R}^2 = 0.655$, SEE = 1.13, D/W = 1.76

T.S.F. $\bar{R}^2 = 0.655$, SEE = 1.13, D/W = 1.77

86. Wages, Salaries and Supplementary Labor Income

$$WSSL = WP(NEPP) + WG(NEPG)$$

87. Exports of Goods, 1Q53 - 4Q65

$$XG = \underset{(3.60)}{1921} - \underset{(10.27)}{294.8}\, Q1 - \underset{(3.53)}{83.08}\, Q2 - \underset{(3.15)}{74.73}\, Q3 + \underset{(35.47)}{1455}\, AWI - \underset{(1.89)}{736.2}\left(Y - XG - \frac{XS}{PXS}\right)/YC$$

$$\underset{(3.23)}{2033} - \underset{(9.39)}{294.5} - \underset{(3.52)}{83.22} - \underset{(3.13)}{74.68} \quad \underset{(35.12)}{1453} - \underset{(1.47)}{721.2}$$

$$- \underset{(4.11)}{331.3}\frac{PXG}{PWXG} - \underset{(4.11)}{289.9}\left(\frac{PXG}{PWXG}\right)_{t-1} - \underset{(4.11)}{248.5}\left(\frac{PXG}{PWXG}\right)_{t-2} - \underset{(4.11)}{207.1}\left(\frac{PXG}{PWXG}\right)_{t-3}$$

$$\underset{(4.14)}{- 358.1} \quad \underset{(4.14)}{- 313.3} \quad \underset{(4.14)}{- 268.5} \quad \underset{(4.14)}{- 223.8}$$

$$- \underset{(4.11)}{165.6}\left(\frac{PXG}{PWXG}\right)_{t-4} - \underset{(4.11)}{124.2}\left(\frac{PXG}{PWXG}\right)_{t-5} - \underset{(4.11)}{82.82}\left(\frac{PXG}{PWXG}\right)_{t-6} - \underset{(4.11)}{41.41}\left(\frac{PXG}{PWXG}\right)_{t-7}$$

$$\underset{(4.14)}{- 179.0} \quad \underset{(4.14)}{- 134.3} \quad \underset{(4.14)}{- 89.51} \quad \underset{(4.14)}{- 44.76}$$

O.L.S. $\bar{R}^2 = 0.967$, SEE = 59.97, COV = 4.31, D/W = 1.33

T.S.F. $\bar{R}^2 = 0.967$, SEE = 60.05, COV = 4.33, D/W = 1.33

88. Exports of Services, 1Q52 - 4Q65

$$XS = \underset{(4.41)}{-107.8} - \underset{(8.22)}{97.33}\, Q1 - \underset{(1.58)}{18.66}\, Q2 + \underset{(10.41)}{123.2}\, Q3 + \underset{(22.95)}{487.9}\, AWS$$

O.L.S. $\bar{R}^2 = 0.942$, SEE = 31.31, COV = 7.47, D/W = 1.88

89. Real Domestic Product Less Agriculture

$$Y = \frac{YGNE + SUBS + INTF + DIVF - RES - TI - NRR - YFA + YX}{PGNE}$$

90. Assessed Taxable Income

$$YAS = \underset{(6.81)}{-493.8} + \underset{(71.99)}{0.8153}\ YP$$

O.L.S. $\bar{R}^2 = 0.997$
SEE = 0.324
COV = 1.80
D/W = 1.52

91. Assessed Taxable Income between 0 and $3,000

YAS1 = Y1(YAS)

92. Assessed Taxable Income between $3,000 and $5,000

YAS2 = Y2(YAS)

93. Assessed Taxable Income between $5,000 and $10,000

YAS3 = Y3(YAS)

94. Assessed Taxable Income over $10,000

YAS4 = YAS - YAS1 - YAS2 - YAS3

95. Capacity Real Domestic Product

$$YC = 0.5\ \left(\frac{KME}{KMEY} + \frac{KNR}{KNRY}\right)$$

96. Real Disposable Personal Income

YD = YP - TP - TOP

97. Permanent Real Disposable Income

$$YDP = 0.176 \sum_{i=0}^{i=7} \cdot 9^{i}\ \left(\frac{YD}{PGNE}\right)_{t-i}$$

98. Gross National Expenditure

YGNE = YGPK(PGNE) + GW + GNW + MP + INVF - RES - GX

99. Private Non-farm Real Gross National Expenditure

$$YGPK = CND + CD + CS + IME + INRC + IRC + INV + XG + \frac{XS}{PXS} - MG - \frac{MS}{PMS}$$

100. Personal Income

$$YP = WSSL + MP - SSPS - UIR + YF + YNFC + YI + DIVC + GINT + CCB - TW - GIM + GTR + UIB + YRES$$

101. Simulated Income - Expenditure Residual

$$YRES = YGNE + DIVF - WSSL - MP - YI - YNFC - IVA - YFA - TI - CCA + SUBS - PC - RES$$

# A P P E N D I X  C

## LIST OF VARIABLES

APPENDIX C

LIST OF VARIABLES
(The 101 endogenous variables of the model are denoted by *)

| | | |
|---|---|---|
| | ALTM | Total assets of trust and mortgage companies plus total assets less policy loans of 12 insurance companies. Millions. (11240) |
| | ASST | Government capital assistance to industry. Millions. (11283) |
| | AWI | World activity index, 1957=1. (9863) |
| | AWS | World activity index for services, 1957=1. (8202) |
| * | AY | Personal income tax accruals. Millions (11600) |
| | BCD | Chartered Banks' Canadian dollar deposits at the Bank of Canada. Millions. (2795) |
| | BCN | Chartered banks' Canadian cash reserves, Bank of Canada notes. Millions. (399) |
| | CA | Chartered banks' capital account, shareholders equity. Millions. (11208) |
| | CCA | Capital consumption allowances and miscellaneous valuation adjustments. Millions. (234) |
| | CCAC | Capital consumption allowances, corporations. Millions. (3711) |
| | CCB | Charitable contributions by corporations. Millions. (239) |
| * | CD | Personal expenditure on durable goods. Millions of 1957 dollars. (141) |
| * | CFR | Cash flow ratio. The cash flow is the sum of corporate retained earnings (PCRT) and capital consumption allowances (CCA) deflated by the implicit GNE deflator (PGNE). CFR is the ratio of the cash flow to the trend value of the cash flow (CFRT). (11096) |
| * | CFRT | Trend value of the cash flow. (11310) |
| * | CL | Claimants on the Unemployment Insurance Fund. Millions of persons. (11247) |
| * | CLC | Average cost of construction per square foot (including land) on new single detached NHA homes. (11369) |
| | CMHC | CMHC direct mortgage approvals. Millions (11440) |
| * | CND | Consumer non-durable expenditure. Millions of 1957 dollars. (140) |
| * | CS | Personal expenditure on services. Millions of 1957 dollars. (139) |
| | D5 | Dummy; equals 1 from first quarter 1952 to third quarter 1959, zero elsewhere. (11323) |

| | | |
|---|---|---|
| | D6 | Dummy; equals 1 from fourth quarter 1959, zero elsewhere. (11324) |
| | D7 | Dummy; equals 1 from first quarter 1964, zero elsewhere. (11531) |
| | D8 | Dummy; equals 1 from first quarter 1961, zero elsewhere. (11459) |
| | DCR | Required cash reserve ratio. (11527) |
| * | DD | Chartered banks' demand deposits less float. Millions. (699) |
| | DG | Chartered banks' Government of Canada deposits. Millions. (386) |
| * | DIVC | Dividends paid to Canadians by Canadian companies. Millions. (2406) |
| * | DIVF | Dividends paid to non-residents by Canadian companies. Millions. (227) |
| | DLK1 | Dummy; equals 1 from third quarter 1963, zero elsewhere. (11108) |
| | DLK4 | Dummy; equals 1 in fourth quarter 1965, zero elsewhere. (11109) |
| | DRS | First difference of the Canadian price of U.S. dollars. Canadian dollars per U.S. dollar. (5691) |
| | DRSF | Defined as DRS from third quarter 1962, zero elsewhere. (11243) |
| | DRSU | Defined as DRS from third quarter 1961 to second quarter 1962, zero elsewhere. (11243) |
| | DSK2 | Dummy; equals 1 in each quarter of 1965, zero elsewhere. (11244) |
| | DVST | Dummy variable for sales tax on building materials; equals 1 from third quarter 1963 to second quarter 1966, zero elsewhere. (11027) |
| * | ELA | Chartered banks' more liquid assets (including foreign assets). Millions. (11296) |
| * | EMPS | Employed contributors to Unemployment Insurance Fund. Millions of persons. (11246) |
| | ERL | Chartered banks' excess legal reserves. Millions. (11297) |
| | FLO | Chartered banks' float, estimated net Canadian dollar items in transit. Millions. (11282) |
| * | GBAL | Total government national accounts surplus (if positive) or deficit (if negative). Millions. (1385) |
| | GIM | Total investment income, all levels of government. Millions. (1361) |

| | | |
|---|---|---|
| | GINT | Interest on the public debt. Millions. (1375) |
| | GNW | Government non-wage expenditures. Millions. (11068) |
| | GTR | Government transfer payments to persons, excluding interest on the public debt and unemployment insurance benefits. Millions. (11287) |
| * | GW | Government wage payments, public administration. Millions. (11067) |
| | GW1 | Government wage payments, institutional sector. Millions. (11379) |
| | GX | Correction for seasonality in quarterly series for government wage and non-wage expenditure. Millions. (11601) |
| * | H | Stock of non-farm inventories. Millions of 1957 dollars. (11636) |
| * | HAW | Average weekly hours worked by paid non-agricultural workers. (1205) |
| * | HAWT | Trend value of HAW. (11414) |
| | HH | Number of families in Canada. Thousands. (3054) |
| * | HSL | Inventory stock/sales ratio. (11637) |
| * | HSLT | Trend value of inventory stock/sales ratio. (11638) |
| * | HST | Total number of dwelling starts. Thousands. (3064) |
| * | IME | Investment in machinery and equipment. Millions of 1957 dollars. (11306) |
| * | INRC | Investment in non-residential construction. Millions of 1957 dollars. (11307) |
| * | INS | Level of enrolment in Unemployment Insurance Fund. Millions of persons. (11257) |
| | INTF | Interest payments to non-residents. Millions. (11651) |
| * | INV | Change in non-farm business inventories. Millions of 1957 dollars. (150) |
| | INVF | Farm inventories and grain in commercial channels. Millions. (219) |
| * | IRC | Investment in residential construction. Millions of 1957 dollars. (145) |
| | IVA | Inventory valuation adjustment. Millions. (231) |
| * | KME | Stock of machinery and equipment. Millions of 1957 dollars. (11309) |
| * | KMED | Desired stock of machinery and equipment. Millions of 1957 dollars. (11316) |
| * | KMEG | Gap between desired and actual stock of machinery and equipment. Millions of 1957 dollars. (11317) |

| | | |
|---|---|---|
| * | KMEY | Trend value of machinery and equipment capital-output ratio. (11315) |
| * | KNR | Stock of non-residential construction. Millions of 1957 dollars. (11314) |
| * | KNRD | Desired stock of non-residential construction. Millions of 1957 dollars. (11313) |
| * | KNRG | Gap between desired and actual stock of non-residential structures. Millions of 1957 dollars. (11090) |
| * | KNRY | Trend value of non-residential construction capital-output ratio. (11311) |
| | L | Index of land costs on new single detached NHA homes. 1957 = 100. (11372) |
| * | LB | Chartered banks' business loans over $100,000. Millions. (11271) |
| | LBS | Chartered banks' business loans under $100,000. Millions. (11272) |
| | LF | Chartered banks' loans to instalment finance companies. Millions. (693) |
| | LH | Chartered banks' insured mortgages. Millions. (3993) |
| * | LINE | Estimated trend value of ln INRC. (11449) |
| * | LIRE | Estimated trend value of ln IRC. (11450) |
| | LM | Chartered banks' farm, CSB, grain dealer and institution loans. Millions. (11290) |
| | LMUN | Chartered banks' loans to municipalities. Millions. (692) |
| * | LP | Chartered banks' loans to persons. Millions. (11042) |
| | LPRV | Chartered banks' loans to provinces. Millions. (691) |
| * | LTK | Net long term capital inflow. Millions of 1957 dollars. (9143) |
| * | MG | Imports of goods. Millions of 1957 dollars. (9147) |
| | MLTM | Weighted sum of total mortgage holdings of 12 life insurance, trust and mortgage companies. Millions. (11645) |
| | MP | Military pay and allowances. Millions. (225) |
| * | MS | Imports of services. Millions. (9149) |
| | N03 | Proportion of total persons taxable with taxable income between 0 and $3,000. (11302) |
| | N35 | Proportion of total persons taxable with taxable incomes between $3,000 and $5,000. (11303) |

| | | |
|---|---|---|
| | N51 | Proportion of total persons taxable with taxable income between $5,000 and $10,000. (11304) |
| * | NEP | Total number of paid workers. Millions of persons. (11604) |
| | NEPG | Paid workers, public administration and defense. Millions of persons. (11060) |
| * | NEPP | Paid workers, private sector. Millions of persons. (11059) |
| * | NEUP | Employed, unpaid workers. Millions of persons. (11062) |
| * | NL | Total civilian labor force. Millions of persons. (11141) |
| | NRR | Income received from non-residents. Millions. (11322) |
| * | NT | Total number of persons taxable, calculated. Millions of persons. (11544) |
| * | NT03 | Number of persons taxable with taxable incomes between 0 and $3,000, calculated. Millions of persons. (11545) |
| * | NT35 | Number of persons taxable with taxable incomes between $3,000 and $5,000, calculated. Millions of persons. (11546) |
| * | NT51 | Number of persons taxable with taxable incomes between $5,000 and $10,000, calculated. Millions of persons. (11547) |
| * | NT10 | Number of persons taxable with taxable incomes over $10,000. Millions of persons. (11548) |
| * | NU | Total unemployed. Millions of persons. (11063) |
| | OCS | Chartered banks' other Canadian securities. Millions. (3950) |
| | OTHA | Chartered banks' all other assets. Millions. (11209) |
| | OTHL | Chartered banks' all other liabilities. Millions. (11038) |
| * | PC | Corporation profits before taxes and before dividends paid to non-residents. Millions. (226) |
| * | PCRT | Undistributed corporation profits. Millions. (1393) |
| * | PCT | Taxable corporate profits. Millions. (11624) |
| * | PD | Implicit price index of consumer durable expenditure. 1957 = 1. (11384) |
| * | PGNE | Deflator of Gross National Expenditure less government less farm inventories. 1957 = 1. (9153) |
| * | PH | Index of housing prices. 1957 = 100. (11070) |
| | PLMT | Provincial logging and mining taxes. Millions. (11626) |

PMB Net new issues of provincial and municipal securities. Millions. (11465)

PMG Implicit price index of goods imports. 1957 = 1. (9145)

PMS Implicit price index of service imports. 1957 = 1. (9151)

* PND Implicit price index of consumer non-durable expenditure. 1957 = 1. (11423)

* PNPS Chartered banks' personal savings and non-personal term and notice deposits. Millions. (11664)

POP Civilian, non-institutional population. Millions of persons. (11308)

POPT Total Canadian population. Millions of persons. (3032)

PWXG Price index of world exports in Canadian dollars. 1957 = 1. (9154)

* PXG Implicit price index of goods exports. 1957 = 1. (9144)

* PXS Implicit price index of service exports. 1957 = 1. (9150)

Q1 First quarter seasonal dummy. 1 in Q1, 0 otherwise. (11073)

Q2 Second quarter seasonal dummy. 1 in Q2, 0 otherwise. (11074)

Q3 Third quarter seasonal dummy. 1 in Q3, 0 otherwise. (11075)

Q4 Fourth quarter seasonal dummy. 1 in Q4, 0 otherwise. (11076)

* R03 Average yield on short term Government of Canada bonds, zero to three years. (1365)

* RC Conventional mortgage rate. (1096)

RDC Rate of dividend tax credit. (11006)

RES Residual error of estimate. Millions. (235)

* RLC Average yield on long term Government of Canada bonds, ten to fifteen years. (2764)

* RLCI 12 quarter moving index of RLC. (11091)

RLUS United States corporate bond yield. (11466)

* RM Mortgage rate. (11318)

RNHA Maximum NHA mortgage rate. (245)

| | | |
|---|---|---|
| | RPC | Weighted marginal rate of corporate income tax. (11007) |
| | RPR | Chartered banks' prime loan rate. (397) |
| | RSC | Sales tax rate on consumption goods. (11025) |
| | RSIM | Sales tax rate on machinery, equipment. (11620) |
| | RSIR | Sales tax rate on non-residential construction. (11621) |
| * | RSR | Change in official foreign exchange, reserves, in millions of Canadian $. (11289) |
| | RTUS | Market yield on United States Government three month bills. (4255) |
| | RW1 | Weighted tax rate for 0 to $3,000 class. (11019) |
| | RW2 | Weighted tax rate for $3,000 to $5,000 class. (11020) |
| | RW3 | Weighted tax rate for $5,000 to $10,000 class. (11021) |
| | RW4 | Weighted tax rate for over $10,000 class. (11022) |
| | S | Dummy; equals 1 from first quarter 1959 to fourth quarter 1967, zero elsewhere. (11327) |
| | S2 | Four quarter moving variance of holding period yield on 5 year rate. (2702) |
| | SP | Number of persons going to school. Millions of persons. (11396) |
| | SSPS | Social security and pension contributions net of employer and employee payments into unemployment insurance fund. (11285) |
| * | STH | Stock of houses. Thousands of units. (3057) |
| * | STK | Net private short term capital inflow. Millions. (9139) |
| | SUBS | Total subsidies from all levels of government. Millions. (1378) |
| | SUR | Amount of surcharge that would have been collected had the 1961 volume of imports been maintained through the surcharge period, 2Q 1962 - 4Q 1963. (11010) |
| | T | Time trend; equals 1 in first quarter 1947. (11142) |
| | T1 | Time trend; equals 6 in first quarter 1952 increasing to third quarter 1959, zero elsewhere. (11325) |
| | T2 | Time trend; equals 1 in first quarter 1959 increasing to fourth quarter 1967, zero elsewhere. (11326) |

| | | |
|---|---|---|
| | T3 | Time trend; a step function, equals 1 in each quarter of 1950, two in 1951, etc. (11625) |
| * | TA | Chartered banks' total business loan authorizations outstanding over $100,000. Millions. (11273) |
| * | TBA | Chartered banks' total major assets. Millions. (383) |
| * | TBAT | Time trend of chartered banks' total major assets. Millions. (11572) |
| * | TCA | Corporate income tax accruals. Millions. (1352) |
| * | TCUS | Customs import duties. Millions. (2157) |
| * | TD | Chartered banks' total Canadian deposits including government deposits. Millions. (384) |
| * | TEX | Excise duties. Millions. (2158) |
| * | TI | Total indirect taxes. Millions. (1358) |
| * | TL | Chartered banks' total loans. Millions. (11291) |
| | TMIS | Indirect taxes other than federal sales, customs and excise duties. Millions. (11288) |
| | TOP | Total personal direct taxes other than personal income taxes. Millions. (11321) |
| * | TP | Personal income tax collections. Millions. (11560) |
| * | TS | Federal sales tax collections. Millions. (11270) |
| | TW | Federal with-holding taxes. Millions. (1357) |
| * | UIB | Federal transfers to persons, unemployment insurance benefits. Millions. (2167) |
| * | UIR | Employer and employee contributions to federal unemployment insurance. Millions. (2178) |
| * | ULC | Private unit labour costs. (11649) |
| | VC | Bank of Canada notes at Chartered banks. Millions. (389) |
| | WC | Average hourly earnings of hourly rated construction workers. (2486) |
| | WG | Average quarterly wage in the government sector. (11057) |
| * | WP | Average quarterly wage in the private sector. (11056) |

* WPH Average hourly wage in the private sector. (11425)

WR Weighted maximum rate of unemployment insurance payments. (11248)

* WSSL Wages, salaries and supplementary labor income. Millions (224)

WW Dummy winter works variable; equals one in fourth quarter 1963 and each fourth quarter thereafter, zero elsewhere. (11320)

* XG Exports of goods. Millions of 1957 dollars. (9146)

* XS Exports of services. Millions. (9148)

* Y Real domestic product less agriculture. Millions of 1957 dollars. (11312)

Y1 Proportion of total assessed income in 0 to $3,000 class. (11393)

Y2 Proportion of total assessed income in $3,000 to $5,000 class. (11394)

Y3 Proportion of total assessed income in $5,000 to $10,000 class. (11395)

* YAS Total assessed income, calculated. Millions. (11550)

* YAS1 Total assessed income in 0 to $3,000 class. Millions. (11551)

* YAS2 Total assessed income in $3,000 to $5,000 class. Millions. (11552)

* YAS3 Total assessed income in $5,000 to $10,000 class. Millions. (11553)

* YAS4 Total assessed income in over $10,000 class. Millions. (11554)

* YC Capacity real domestic product less agriculture. Millions of 1957 dollars. (11446)

* YD Personal disposable income. Millions. (1398)

* YDP Permanent real disposable income. Millions. (3052)

YEX1 Average exemptions claimed by those taxpayers with assessed incomes between 0 and $3,000. Dollars. (11556)

YEX2 Average exemptions claimed by those taxpayers with assessed incomes between $3,000 and $5,000. Dollars. (11557)

YEX3 Average exemptions claimed by those taxpayers with assessed incomes between $5,000 and $10,000. Dollars. (11558)

YEX4 Average exemptions claimed by those taxpayers with assessed incomes over $10,000. Dollars. (11559)

YF Income of farm operators excluding accruals. Millions. (11005)

YFA Accrued net income of farm operators from farm production. Millions. (229)

* YGNE Gross national expenditure at market prices. Millions. (223)

* YGPK Gross National Expenditure less government and less farm inventories. Millions of 1957 dollar. (11069)

YI Rent, interest and miscellaneous investment income. Millions. (228)

YNFC Net income of non-farm unincorporated business. Millions. (230)

* YP Personal income. Millions. (240)

* YRES Simulation residual; defined to be zero over estimation period but equilibrating income and expenditure sides of national accounts under simulation. (11528)

YX Real domestic product less agriculture residual; defined to reconcile the National Accounts definition with the figures published by the DBS in index form. Millions. (11650)

## RÉSUMÉ

RDX1 est un modèle trimestriel de l'économie canadienne; il s'agit d'un modèle agrégé de dimension intermédiaire. Il comprend 101 équations, dont 50 relations stochastiques de comportement et 51 relations techniques et identités. Comme ce modèle a été conçu dans le but d'en arriver finalement à une meilleure connaissance des effets des mesures prises en matière de politique monétaire et fiscale, nous avons tenté d'y incorporer, d'une manière explicite, les instruments de la politique économique tels que les taux des impôts et les réserves bancaires. Nous avons accordé une attention particulière aux secteurs financier et gouvernemental; dans ces secteurs, en effet, les instruments de politique économique ont un impact direct et immédiat sur les variables qui influencent à leur tour, directement ou indirectement, les diverses composantes de la demande ou de l'offre globale, ou des deux.

La structure fondamentale de ce modèle est semblable à celle des modèles macroéconomiques existants dans lesquels l'économie d'un pays est présentée comme un processus dynamique comportant la formation successive du revenu, de la demande globale, de la production, des salaires et des prix. Ce modèle tente, cependant, de saisir certains traits spécifiques de l'économie canadienne. La plus remarquable et la plus importante de ces caractéristiques est l'extrême sensibilité de l'économie canadienne à des influences économiques ayant leur origine à l'étranger, notamment aux États-Unis. Ce caractère ouvert de l'économie canadienne affecte aussi bien le secteur réel que financier. Aussi, la production, les prix et les taux d'intérêt à l'étranger apparaissent-ils comme variables importantes dans plusieurs secteurs du modèle. Comme on doit s'y attendre, cette ouverture exerce une influence marquée (en raison de nombreuses fuites) sur la nature des objectifs économiques qui sont à la portée de la politique économique canadienne. La structure du modèle est centrée sur la détermination (compte tenu des contraintes résultant d'influences économiques externes) des dépenses brutes et de la production du secteur privé, en termes réels, ainsi que de l'emploi et des prix pertinents. Etant donné que l'ensemble du secteur public (aussi

bien que l'investissement en stocks du secteur agricole) est traité en dollars courants, notre principale variable-prix est l'indice implicite des prix de la dépense réelle du secteur privé.

Notre approche et notre façon de procéder lorsqu'il s'est agi de construire ce modèle ont été quelque peu différentes de celles qu'ont adoptées ceux qui ont construit jusqu'ici des modèles agrégés de quelque importance. Au lieu de rechercher la "perfection" dans la spécification de chacune des relations utilisées, en vérifiant, par toute une série de tests isolés, la validité de différentes théories de la consommation, de l'investissement, de la détermination des salaires, etc., nous avons préféré concentrer nos efforts sur l'analyse des propriétés dynamiques d'un système complet, même si sa formulation n'était pas des plus satisfaisantes dans certains cas. Nous avons jugé que, si nous pouvions examiner le plus tôt possible les interactions et les rétroactions des divers secteurs du modèle, cette étude nous fournirait des indications très utiles à l'amélioration ultérieure de sa spécification; elle nous permettrait en outre d'identifier clairement, avant que nous n'épuisions notre énergie et nos ressources, les secteurs (ou les paramètres) qui exigeraient une attention particulière. Nous présentons dans la présente étude l'ensemble des équations structurelles qui constituent le modèle RDX1. Certaines de ces équations furent choisies avant que nous n'ayons procédé à des expériences dynamiques avec un modèle complet, alors que d'autres ont été modifiées à la lumière de notre première série d'expériences de simulation. Dans une deuxième étude portant sur le modèle RDX1, nous en exposerons les propriétés dynamiques, telles que révélées par une série d'expériences de simulation.

Nous devons préciser, enfin, que nous désirions présenter la documentation relative au modèle sous une forme qui puisse susciter des commentaires, des études critiques, des tests ou d'autres emplois du modèle. Ce souci nous a conduits à concevoir notre système de façon à pouvoir publier non seulement le modèle, mais aussi les programmes et les données de base (y compris la procédure d'estimation et de simulation), le tout sous une forme accessible aux ordinateurs et d'un maniement facile. La description de l'ensemble du système fera l'objet d'un manuel que publiera prochainement la Banque du Canada.

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