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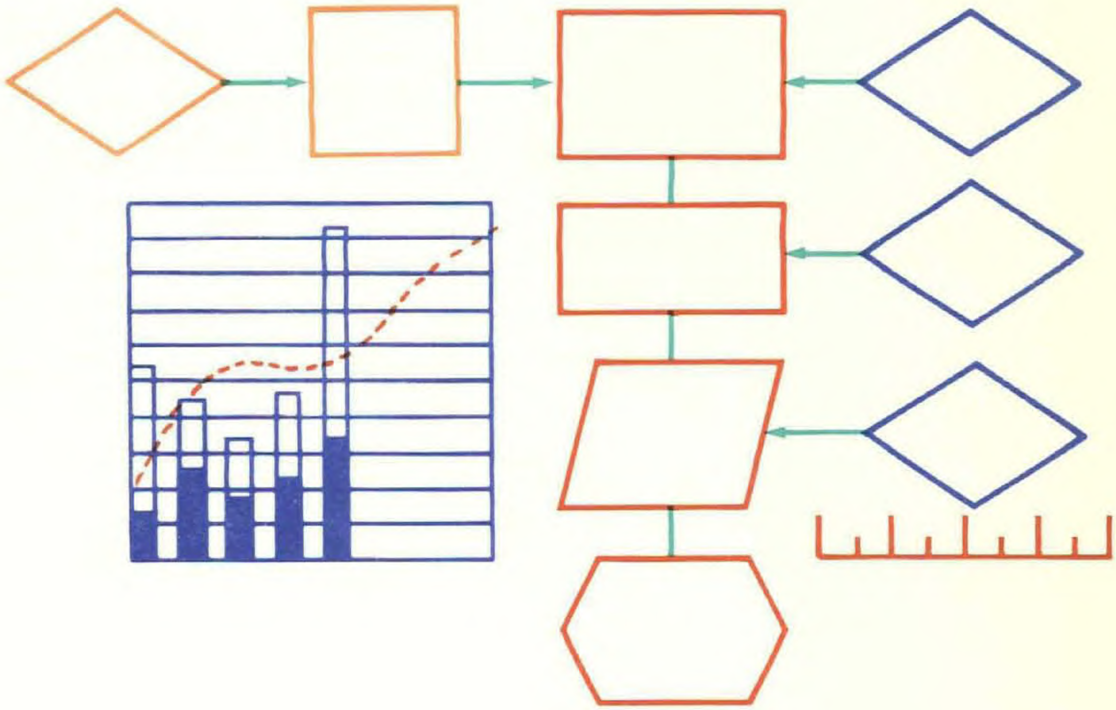
Working Paper No.7

HOUSEHOLD FORMATION AND RESIDENTIAL CONSTRUCTION IN CANDIDE-R

July 1975



ECONOMIC DEVELOPMENT ANALYSIS DIVISION
DIVISION DES ÉTUDES DE DÉVELOPPEMENT ÉCONOMIQUE

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This working document represents a partial regionalization of the CANDIDE 1.1 model. The acronym CANDIDE refers to the Canadian Disaggregated Interdepartmental Econometric model.

The CANDIDE-R version of the model outlined in this document is designed to help build an appreciation of the regional diversity of Canada. The authors draw attention to the tentative nature of the econometric work reported upon. So as to avoid attributing official status to the views expressed, prior consultation respecting quotation would be appreciated.

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HOUSEHOLD FORMATION AND RESIDENTIAL CONSTRUCTION IN CANDIDE-R

INTRODUCTION

The regionalization process in CANDIDE-R can be viewed as a series of modifications to the level of aggregation of certain sectors. Most of the components of housing demand are clearly regional, and differ greatly in value from one region to another. Population growth, one of the most important explanatory variables in a medium-term model of housing starts is a distinct example. Other such variables would include disposable income, and cost. Unfortunately, as is noted below, regional values do not always exist for the explanatory variables, in which case national values were used in estimating housing starts.

Regionalization of the residential construction block, in the context of CANDIDE-R allows us to examine at the regional level the implications of a particular policy, or event on a market which constitutes more than one-fifth of gross national capital formation.

The following charts give an indication of the role of the residential construction block within CANDIDE-R, and the degree of interaction there exists between this block and other sectors of the model.

1. Household Formation

Since household formation is one of the major determinants in residential construction, regionalization of household formation in the Demography Blocks was critical to the regionalization of residential construction. Households can be separated into two groups, family and non-family households.[1] In order to estimate family households, family formation must be initially determined. Net family formation is a function of marriages, immigration of family, deaths and divorces. This section deals first with the various aspects of family formation followed by a discussion of household formation.

1.1. Family Formation

For each of the five regions, there are equations explaining net family formation and the number of families. Net family formation is, as mentioned above, a function of marriages, net family immigration, deaths and divorces.

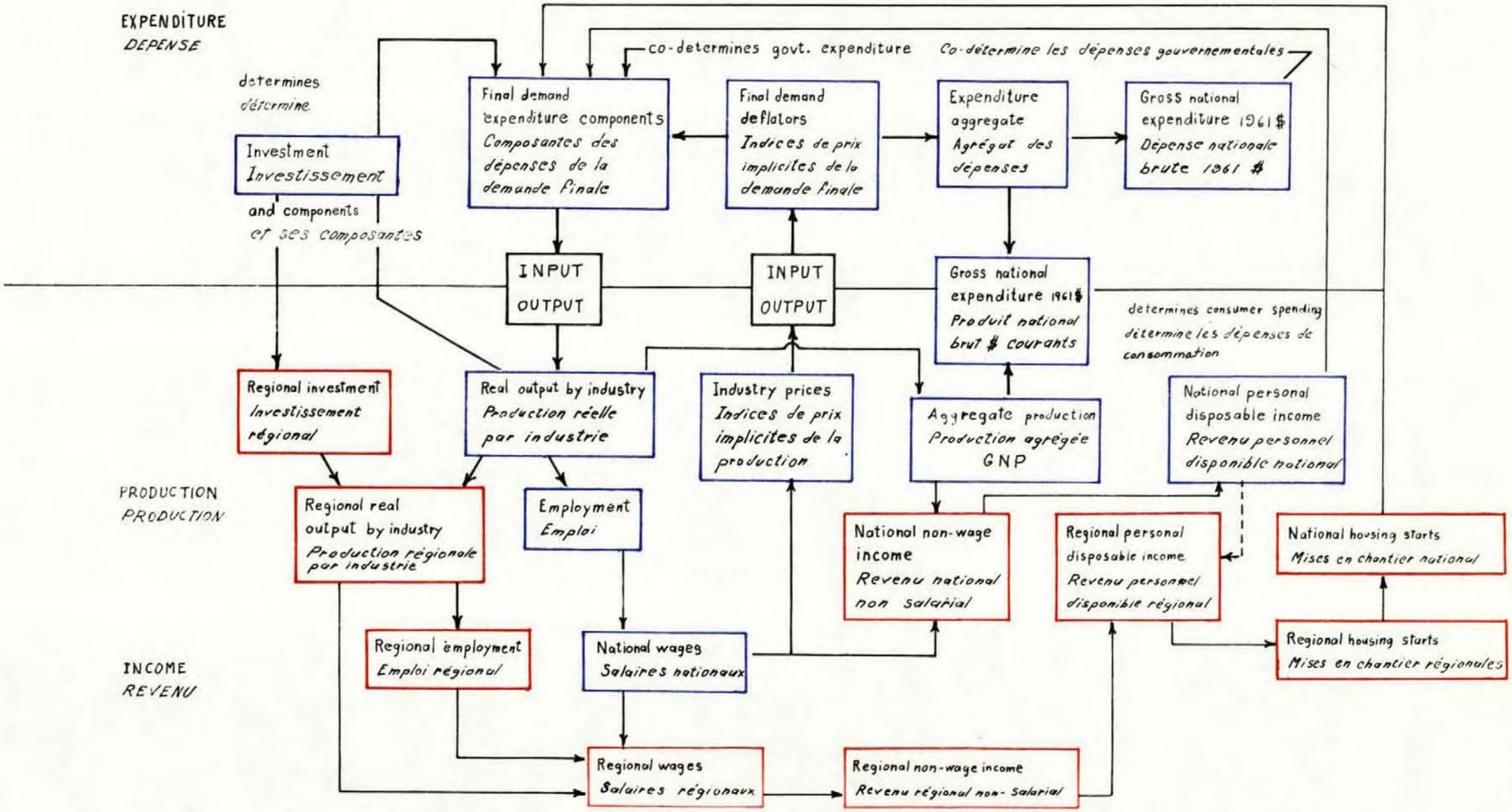
(1) NTFAMr = MARr + NIMFEr - DEATHr - DIVORr

(2) FAMr = $FAMr_{-1}$ + NTFAMr

1. According to the Statistics Canada definition, a person living alone or a group of two or more persons living together as a household, but not as a family, constitutes a non-family household.

Chart 1: Causal Relationships in Candide-R

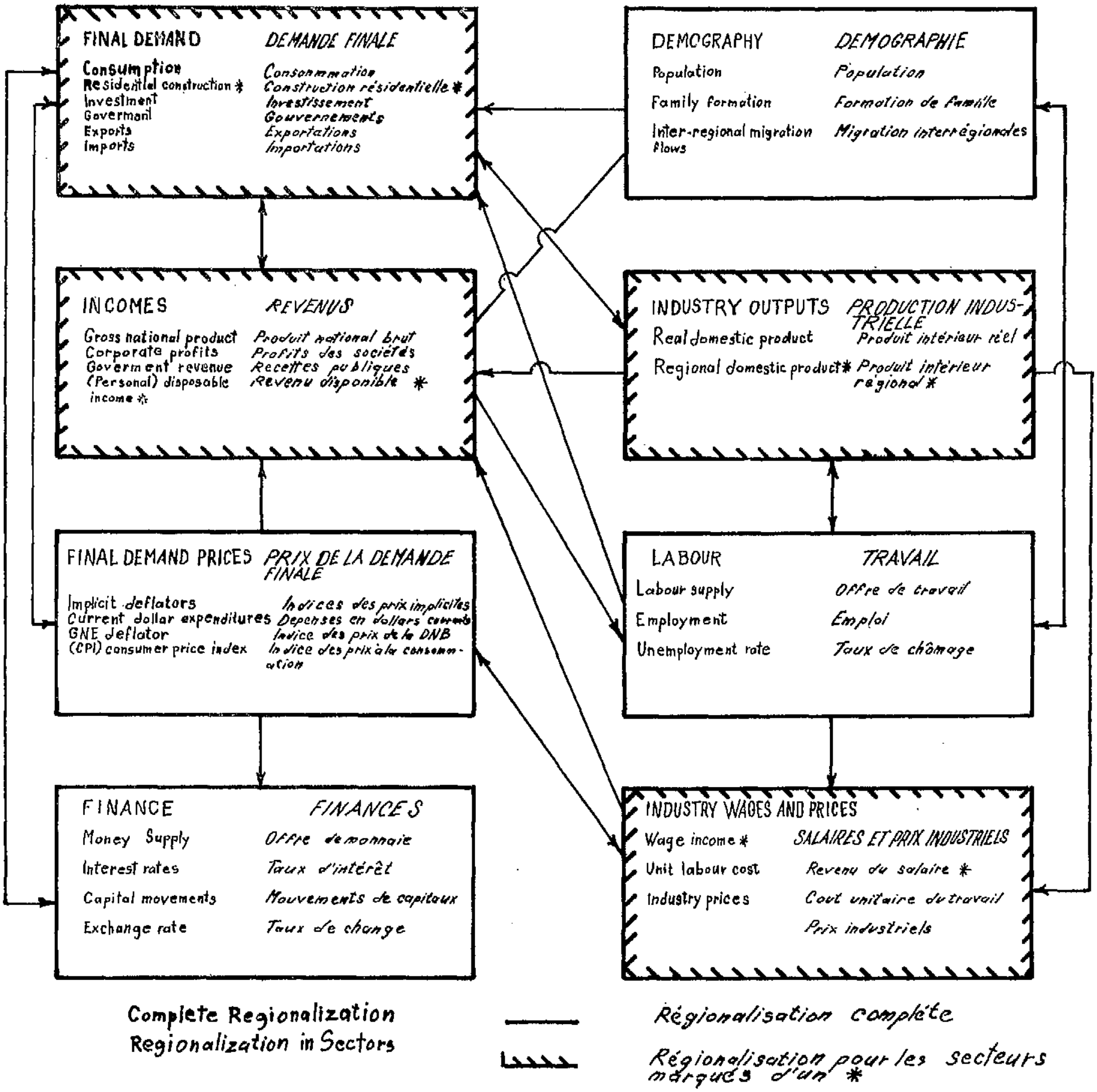
Diagrame 1: Relations Causales de Candide-R



Diagrame - 2 - Chart

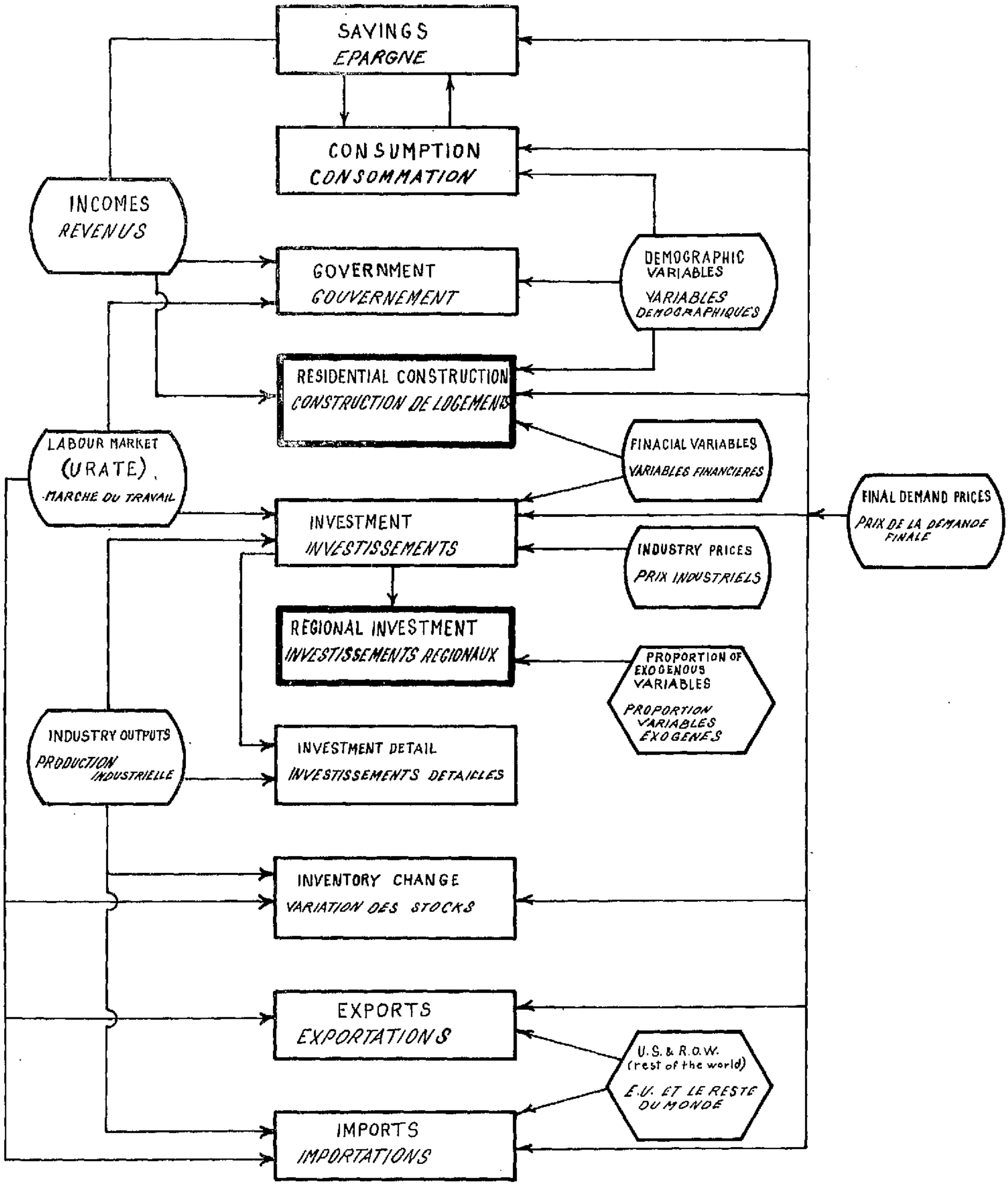
SECTORAL STRUCTURE OF THE CANDIDE-R MODEL

STRUCTURE SECTORIELLE DU MODELE CANDIDE-R



Diagrame 3 Chart

FINAL DEMAND SECTOR SECTEUR DE LA DEMANDE FINALE



where r represents either E, Q, O, W, or C, depending on the region under consideration. Net family formation and the number of families, at the national level, is simply a summation across all regions, of equations (1) and (2).

(22.44) NETFAM = NTFAME + NTFAMQ + NTFAMO + NTFAMW + NTFAMC

(22.50) FAM = FAME + FAMQ + FAMO + FAMW + FAMC

The components of net family formation are discussed below.

1.1.1 Marriages

In CANDIDE-R the number of marriages in each region is obtained by multiplying the national marriage rate for each age/sex cohort from 15 years and older, by the regional population of the cohort, and applying adjustment factors to the total. There is one equation for each region, and a national total, as follows:

(22.32) MARE = 1.025 * (RF1519 * PF19E + RF2024 * PF24E + ----- + RF6500 * PF65E + RM1519 * PM19E + ----- + RM6500 * PM65E) * 0.5 + ADMARE

(22.33) MARQ = 0.9 * (RF1519 * PF19Q + ----- + RM6500 * PM65Q) * 0.5 + ADMARQ

(22.34) MARO = 1.05 * (RF1519 * PF190 + ----- + RM6500 * PM650) * 0.5 + ADMARO

(22.35) MARW = 1.05*(RF1519*PF19W+----+RM6500*PM65W)*0.5+ ADMARW

(22.36) MARC = 1.05*(RF1519*PF19C+----+RM6500*PM65C)*0.5+ ADMARC

(22.31) MAR = MARE + MARQ + MARO + MARW + MARC

Equations (22.32)-(22.36) are multiplied by a constant factor to align the national marriage rates more closely to regional rates, and adjustment factors, ADMARr, are added to each equation to ensure equality, over the sample period, of the observed national number of marriages with the sum of regional marriages.

1.1.2 Net Family Migration

In order to obtain regional data on net family migration during the sample period, the following identity (developed from (1) and (2) above) was employed:

(3) $FAMr - FAMr_{-1} \equiv MARr + NIMFEr - DEATHr - DIVORr.$

Since values already existed for FAMr, MARr, DEATHr and DIVORr, NIMFEr was calculated residually. The series thus obtained were then used as the dependent variables in stochastic equations which explain net family migration in each region. The reliability of the NIMFEr series is dependent on the hypothesis underlying equation (1). The five equations for NIMFEr were estimated using pooled cross-section time-series data, due to the limited number of observations per region (10), and the dubious quality of the NIMFEr series. Such an approach is dependent on the hypothesis, or constraint, that the explanatory variables have the same influence on the dependent variable in each region. The five regional equations for net family migration are:

$$(22.83)\quad NIMFEE = \underset{[7.8]}{0.282} * (MINERT-MOERT) + \underset{[13.7]}{0.226} * (MINQXT-MOQXT)$$

$$(22.84)\quad NIMFEQ = \underset{[7.8]}{0.282} * (MINERT-MOERT) + \underset{[13.7]}{0.226} * (MINQXT-MOWXT) + \underset{[2.5]}{0.0317} * TIME$$

$$(22.85)\quad NIMFEO = \underset{[7.8]}{0.282} * (MINORT-MOORT) + \underset{[13.7]}{0.226} * (MINOXT-MOOXT) + \underset{[2.5]}{0.0524}\ TIME$$

$$(22.86)\quad NIMFEW = \underset{[7.8]}{0.282} * (MINWRT-MOWRT) + \underset{[13.7]}{0.226} * (MINWXT-MOWXT) + \underset{[3.9]}{0.0494}\ TIME$$

$$(22.87)\quad NIMFEC = \underset{[7.8]}{0.282} * (MINCRT-MOCRT) + \underset{[13.7]}{0.226} * (MINCXT-MOCXT)$$

$\bar{R}^2$ = 0.942
S.E.E. = 2.215
D.W. = 1.54
OLS (1962-1971)

A sixth equation calculates the national value:

(22.82) NIMFEM = NIMFEE+NIMFEQ+NIMFEO+NIMFEW+NIMFEC

The larger coefficient on the internal migration flow variable, than on the international variable is interpreted as a larger number of families originating from an internal migration flow of a given size than from international flows of the same magnitude.

1.1.3 Deaths of married persons

The national version of the Demography Block has the following identity for deaths of married people:

(4) DEATHS = RDEATH*POP

where: RDEATH = ratio of deaths of married persons to total population

POP = total Canadian population

The regional equations are derived in an analogous manner:

(22.38) DEATHE = RDEATE*POPE

(22.39) DEATHQ = RDEATQ*POPQ

(22.40) DEATHO = RDEATO*POPO

(22.41) DEATHW = RDEATW*POPW

(22.42) DEATHC = RDEATC*POPC

(22.37) DEATHS = DEATHE+DEATHQ+DEATHO+DEATHW+DEATHC

Regional data on deaths of married persons was calculated with the help of data from Statistics Canada.[2]

2. See Statistics Canada publications, nos. 91-203 and 84-206.

on the married status of the population per province and per age-sex group, and on mortality and marriage rates of the population per province and per age-sex group. Regional estimates were adjusted to make them consistent with the national series, DEATHS, and exogenous values for RDEATr (where r represents E,Q,D,W, or C) were calculated.

1.1.4 Divorces

Regional divorce variables are exogenous in CANDIDE-R, due to difficulty in predicting both the rate and number of divorces. The following identity appears, to preserve the use of the national divorce variable elsewhere in the model.

(22.43) DIVORC = DIVORE+DIVORQ+DIVORO+DIVORW+DIVORB

1.1.5 Family Formation Statistics

The evolution of family formation, and its regional characteristics are noted in the following table. The data is from the sample period, and covers the last three census years. Indications are that the large differences in the net family formation rate from one region to another, can be attributed to differences in migration flows.

TABLE I: FAMILY FORMATION IN '000

		MARr	NIMFEr	DEATHr	DIVORr	NTFAMr	POPr
ATL.	1961	13.7	-3.6	6.2	0.4	3.4	1897.4
	1966	15.5	-3.6	6.9	0.6	4.4	1974.7
	1971	18.7	-3.1	7.0	1.3	7.1	2057.3
QUE.	1961	35.9	11.8	18.4	0.3	29.0	5259.2
	1966	44.4	5.8	17.2	1.0	32.0	5780.8
	1971	49.8	-5.6	14.4	5.0	24.8	6027.8
ONT.	1961	44.4	-6.4	22.2	2.7	13.0	6236.1
	1966	54.6	23.0	25.4	4.1	48.1	6960.9
	1971	69.7	27.6	32.4	11.6	53.3	7703.1
PRAIR.	1961	23.1	4.3	12.2	1.6	13.5	3178.9
	1966	26.2	-4.1	12.0	2.4	7.6	3381.7
	1971	32.6	-0.3	10.6	5.6	16.1	3542.4
B.C.	1961	11.0	3.3	6.3	1.4	6.6	1629.1
	1966	14.7	16.1	10.3	2.1	18.4	1873.7
	1971	20.4	6.0	12.8	4.7	8.9	2184.6
CAN.	1961	128.5	9.3	65.4	6.5	65.6	18238.3
	1966	155.6	37.3	71.8	10.2	110.6	20014.9
	1971	191.3	26.8	77.2	28.2	110.4	21568.3

SOURCE: Statistics Canada

1.2 Household Estimation

It is the number of family and non-family, households which is used in determining housing starts. The values of both these variables are based on census data.

1.2.1 Family Households

Census data for 1956, 1961, 1966 and 1971 were used to determine the ratio of family households to families. Values were calculated for each of the four years, and for each region. These ratios were adjusted so as to correspond with year end values, and values for the intervening years calculated through interpolation. The following five regional and one national equation emerged:

(22.57)	FAMHOE	=	RFMHOE*FAME
(22.58)	FAMHOQ	=	RFMHOQ*FAMQ
(22.59)	FAMHOO	=	RFMHOO*FAMO
(22.60)	FAMHOW	=	RFMHOW*FAMW
(22.61)	FAMHOC	=	RFMHOC*FAMC
(22.56)	FAMHO	=	FAMHOE+FAMHOQ+FAMHOO+FAMHOW+FAMHOC

1.2.2 Non-Family Households

Non-family households are calculated in a manner analogous to family households. The ratio used in this case, however, is non-family households to total population. The same technique was employed with census data to obtain year end values for these ratios.

```
(22.63)  NFHOE = RNFHOE*POPE
(22.64)  NFHOQ = RNFHOQ*POPQ
(22.65)  NFHOO = RNFHOO*POPO
(22.66)  NFHOW = RNFHOW*POPW
(22.67)  NFHOC = RNFHOC*POPC
(22.62)  NFHO  = NFHOE+NFHOQ+NFHOO+NFHOW+NFHOC
```

2. Residential Construction

Residential construction is one area which is more adequately analysed at a regional than a national level. The factors which influence housing demand, with the exception of relative credit availability and interest rates are specifically regional. Such factors include regional population growth and composition, differences in housing distribution, and type of housing, whether single or multiple dwellings.

2.1 Regional Characteristics of Housing Demand

This section discusses the regional characteristics of housing demand, mentioned above.

2.1.1 Population Growth and Composition

Medium term trends in housing demand depend to a large extent on the demography of the area. Table 2, below, illustrates regional differences in population growth, and in the number of families per regional population. The first column shows population growth from 1961 to 1971. The strong disparity in regional population growth can be attributed mainly to inter-regional and international net migration flows rather than to differences in natural population growth.[3] Along with changes in the size of the population, one must consider the ratio of families to population, as the family unit is the principal market for houses. Changes in this ratio can be attributed to changes in population composition, marriage patterns, and changes in the family size.

3. For a more detailed discussion of regional migration flows, and population, see Migration Flows in CANDIDE-R and Population in CANDIDE-R (forthcoming).

TABLE 2: DEMOGRAPHIC FACTORS

REGION	% change of the population from '61 to '71	FAMr/POPr '61	'71	%
ATLANTIC	8.42	0.209	0.217	3.82
QUEBEC	14.61	0.211	0.228	8.05
ONTARIO	23.52	0.247	0.255	3.23
PRAIRIES	11.43	0.234	0.240	2.56
B.C.	34.09	0.248	0.246	-0.80
CAN.	18.41	0.230	0.240	4.34

SOURCE: Statistics Canada

Although at a national level the size and directional of the compositional effects (such as population of marriageable age) are relatively simple to predict, the regional level is much more complex due to considerable inter-regional and international migration flows.

2.1.2 Regional Distribution of Houses

Table 3 illustrates the regional distribution of the housing stock over the sample period, showing the percentage change in the regional stock, and the per capita housing distribution. There was in 1961, and to a lesser degree in 1971 a large disparity between the highest ratio, in British Columbia, 0.302 and 0.317 respectively, and the lowest, in the Atlantic region, 0.234 and 0.256 respectively. Comparison of Tables 2 and 3 seems to support an inverse relationship between population increase and change in per capita housing stock (except for the Atlantic Region).

TABLE 3: Comparison of per capita housing distribution

REGION	% change in Housing Stock from '61 to '71	Stock/population '61	'71	Change %
ATLANTIC	18.9	0.234	0.256	9.40
QUEBEC	29.6	0.243	0.275	13.16
ONTARIO	33.3	0.276	0.275	7.97
PRAIRIES	29.1	0.273	0.316	15.75
B.C.	41.1	0.302	0.317	4.96
CAN.	31.0	0.263	0.291	10.69

SOURCE: Statistics Canada and Central Mortgage and Housing Corporation

Table 3 also indicates that regional disparity in per capita housing distribution decreased between 1961 and 1971, as the regions with the largest population increases experienced the smallest increase in per capita housing stock (see also Table 2).

2.1.3. Distribution per Type of Housing

In order to better understand the behaviour of residential construction it is important to consider the type of housing, whether single or multiple units[4]. While the latter category is not a homogeneous one, this division of type of dwelling is presently the most suitable for use here.

TABLE 4: REGIONAL DISTRIBUTION PER TYPE OF HOUSING

	STHS/STH		Real Disposable Income per household			FAMHOr/NFHOr			% Change SCOUT/CPID[1]
	'61	'71	'61	'71	% chng	'61	'71	% chng	'61 to '71
ATL.	0.756	0.746	4662	6419	37.7	7.92	5.97	-24.6	6.5
QUE.	0.385	0.385	5860	7068	20.6	7.84	4.66	-40.5	4.2
ONT.	0.672	0.607	6474	8197	26.6	6.47	4.52	-30.1	24.4
PRAIR.	0.783	0.730	5049	6962	37.9	5.49	3.99	-27.3	6.1
B.C.	0.759	0.681	5967	7525	26.1	4.68	3.50	-25.2	20.1
CAN.	0.632	0.590	5836	7466	27.9	6.44	4.42	-31.3	15.3

[1]SCOUT/CPID represents the average real cost of a single dwelling

SOURCE: Central Mortgage and Housing Corporation and Statistics Canada

4. Single units are single family dwellings, all others, semi-detached, row houses, duplexes, apartments, etc. are termed multiples.

The first two columns in Table 4 indicate the ratio of single dwellings to total housing stock in each region. It is interesting to note that single dwellings account for approximately 75% of the total stock in three regions, while Quebec's distribution is the opposite with single dwellings representing only 38.5% of total stock. Two factors which may contribute to the proportion of single and multiple dwellings are the degree of urbanization in a region, and the real disposable income per household. While a high rate of urbanization would lead to a larger proportion of multiple dwellings, it is felt that higher real disposable income per household would have the reverse effect. Cost is a contributing factor is this analysis, as it is hypothesized that urbanization will cause an increase in the cost of a single dwelling relative to multiple dwellings, because urbanization will increase the cost of land. The discrepancy in the proportion of single and multiple dwellings in Quebec relative to other regions remains a puzzling phenomenon, since real disposable income in Quebec was about equal to the national average in 1961. However, its growth was slower than in other regions over the next ten years. Quebec has approximately the same degree of urbanization as both Ontario and British Columbia.

Besides the differences among the regions, the evolution of the distribution of multiple and single dwellings in each region merits consideration. During the sample period, while Ontario, the Prairies and British Columbia experienced a decrease in the ratio of single dwellings to total housing stock, the ratio remained unchanged for Quebec and the Atlantic region. Since family households represent the main buyers of single dwellings, the increase in the proportion of non-family households in the first three regions may be a contributing factor in the relative decline in single dwellings, along with increased urbanization. However, in Quebec and the Atlantic region, although the proportion of non-family households increased somewhat during the decade, the real cost of single dwellings increased less than real disposable income per household. This might have offset an otherwise downward trend in single dwellings.

2.2 Single Housing Starts

2.2.1 Theoretical Approach

The formulation of the residential construction sector is based on a stock adjustment model of the demand for new houses. This approach is similar to that used in CANDIDE 1.0 and CANDIDE 1.1.[5] The basic form of the equation is as follows:

$$(5)\quad HSSr = \lambda\ (STHSr^{*} - STHSr_{-1}) + \alpha\ STHSR_{-1} + \mu r$$

where HSSr is the number of single housing starts in region r, STHSr* is the desired housing stock, and STHSr the actual housing stock. In equation (5), α represents the rate of replacement demand and λ the adjustment coefficient. In order to isolate the influence of demographic from other factors, the equation is specified per family household. Thus, (5) becomes:

$$(6)\quad \frac{HSSr}{FAMHOr} = \lambda \left[\frac{STHSr^{*}}{FAMHOr} - \left(\frac{STHSr}{FAMHOr} \right)_{-1} \right] + \alpha \left[\frac{STHSr}{FAMHOr_{-1}} \right] + \mu r$$

Family households as opposed to total households were used in (6), so as to eliminate non-family households, which do not usually buy houses.

Since there are no observed values for $\frac{STHSr^{*}}{FAMHOr}$ desired single housing stock per family household, equation (7) was hypothesized to explain this variable.

5. See H.E.L. Waslander, CANDIDE Model 1.0 - Residential Construction, CANDIDE Project Paper No.3 published by the Economic Council of Canada, for the Interdepartmental Committee (Ottawa: Information Canada, 1973); and M. Jakubecki and P.C. Lee, CANDIDE Model 1.1 Residential Construction Block 3 Informetrica Ltd. Ottawa, May 29, 1973.

It is assumed that desired single housing stock per family household is positively related to: (a) real disposable income per household, [YDr/((FAMHOr + NFHOr)*CPID)] (b) the number of projects approved for last-appeal loans by the Central Mortgage and Housing Corporation, and (c) a mortgage credit availability variable MT-BLT, the spread between the average mortgage rate (MT) and the average corporate and government long term bond yield (BLT). It is also assumed that [STHSr*/FAMHOr] is negatively related to a proxy variable of real construction cost per single dwelling, [SCOUTr/CPID], and to an average of conventional and National Housing Act (NHA) mortgage interest rates (MT). A dummy variable DS70 is included to account for an abnormal slowdown of single housing starts in 1970.

$$(7) \quad STHSr^* = \beta_0 + \beta_1 [YDr/((NFHOr+FAMHOr)*CPID)] + \beta_2 [SCOUTr/CPID] + \beta_3 [CSAr/FAMHOr] + \beta_4 [1/(MT-BLT)] + \beta_5 MT + \beta_6 (DS70) + \mu r$$

By substituting (7) into (6) we arrive at the specification used for estimation in CANDIDE-R.

$$(8) \quad HSSr/FAMHOr = \lambda\beta_0 + \lambda\beta_1 \; [YDr/((FAMHOr+NFHOr)*CPID)] + \lambda\beta_2 \; [SCOUTr/CPID] + \lambda\beta_3 \; [CSAr/FAMHOr] + \lambda\beta_4 \; [1/(MT-BLT)] + \lambda\beta_5 \; (MT) + \beta_6 \; DS70 + (\alpha - \lambda) \; [STHSr/FAMHOr]_{-1} + \mu$$

The sign of the coefficient $(\alpha - \lambda)$ will depend on the relative importance of α, the rate of replacement, and of λ the rate of adjustment to demand.

One evident weakness in equation (8) is that it has no variable to take account of money illusion or price expectation. Further specification work will, we hope, rectify this situation. In some of the regional equations certain of the explanatory variables have been omitted, on the grounds that their coefficients were not statistically significant. It must be noted that this is not a conclusion that such a relationship does not exist.

□

2.2.2 Statistical Results

Single Housing Starts - Atlantic

(3.9)

$$HSSE = FAMHOE * \underset{[7.67]}{[0.3867} - \underset{[7.58]}{0.4420}(STHSE/FAMHOE)_{-1}$$

$$+ \sum_{i=0}^{1} \alpha_i \; (SCOUTE/CPID)_{t-i}$$

$$+ \sum_{i=0}^{1} \beta_i \; (0.001 * YDE/((NFHOE+FAMHOE)*CPID))t-i$$

$$+ \underset{[2.41]}{1.2246} \; (CSAE/FAMHOE) - \underset{[2.38]}{0.0035} \; DS70]$$

PDL, Degree 1, $\alpha_2 = 0$		*PDL*, Degree 1, $\beta_2 = 0$	
$\alpha_0 = -0.00104$	[1.42]	$\beta_0 = 5.6030$	[5.62]
$\alpha_1 = -0.00052$	[1.42]	$\beta_1 = 2.8010$	[5.62]

$\bar{R}^2$ = 0.86
S.E.E. = 0.0012
D.W. = 2.39
(*OLS*, 1958-1971)

where: $\bar{R}^2$ = coefficient of determination corrected for degrees of freedom
S.E.E. = standard error of estimate
D.W. = Durbin Watson statistic
[ ] = values in brackets are t-statistics
OLS = Ordinary Least Squares

Single Housing Starts - Québec

(3.10)

$$HSSQ = FAMHOQ * \underset{[5.13]}{[0.2486} - \underset{[4.09]}{0.5045} \; (STHSQ/FAMHOQ)_{-1}$$

$$+ \sum_{i=0}^{1} \alpha_i \; (SCOUTQ/CPID)_{t-i}$$

$$+ \sum_{i=0}^{1} \beta_i \; (0.001*YDQ/((NFHOQ+FAMHOQ)*CPID))_{t-i}$$

$$+ \underset{[7.10]}{1.3154} \; (CSAQ/FAMHOQ) - \underset{[1.54]}{0.0025} \; DS70]$$

PDL, Degree 1, $\alpha_2 = 0$

α_0 = -0.00258 [4.55]
α_1 = -0.00129 [4.55]

PDL, Degree 1, β_2 =0

β_0 = 4.4260 [4.14]
β_1 = 2.2130 [4.14]

$\bar{R}^2$ = 0.92
S.E.E. = 0.0011
D.W. = 1.12
(*OLS*, 1958-1971) Hildreth Lu

ρ = -0.4668

Single Housing Starts - Ontario

$$(3.11) \quad HSSO = FAMHOO*[\underset{[1.72]}{0.1307} - \underset{[1.25]}{0.0977} \quad (STHSO/FAMHOO)_{-1}$$

$$+ \sum_{i=o}^{1} \alpha_i \quad (SCOUTO/CPID)_{t-i}$$

$$+ \sum_{i=o}^{1} \beta_i (0.001*YDO/((NFHOO+FAMHOO)*CPID))_{t-i}$$

$$+ \underset{[3.72]}{1.1758} \; (CSAO/FAMHOO)$$

$$- \underset{[3.44]}{0.0229} \; (1/(MT-BLT)) - \underset{[0.83]}{0.0015} \; DS70]$$

PDL,Degree 1,α_2 = 0

α_0 = -0.00314 [2.57]
α_1 = -0.00157 [2.57]

PDL, Degree 1, β_2 = 0

β_0 = 3.6410 [2.64]
β_1 = 1.8070 [2.64]

$\bar{R}^2$ = 0.97
S.E.E. = 0.0013
D.W. = 2.51
(*OLS*, 1958-1971) Hildreth-Lu

ρ = - 0.9000

Single Housing Starts - Prairies

$$(3.12) \quad HSSW = FAMHOW * [\underset{[5.92]}{0.3252} - \underset{[4.58]}{0.3511} \quad (STHSW/FAMHOW)_{-1}$$

$$+ \sum_{i=0}^{1} \alpha_i \; (SCOUTW/CPID)_{t-i}$$

$$+ \sum_{i=0}^{1} \beta_i \; (0.001 * YDW/((NFHOW + FAMHOW) * CPID))_{t-i}$$

$$+ \underset{[2.85]}{0.3895} \; (CSAW/FAMHOW) - \underset{[0.95]}{0.0016} \; DS70]$$

PDL, Degree 1, α_2 =0			*PDL*, Degree 1, β_2 =0		
α_0	= 0.00125	[1.60]	β_0	=6.4400	[5.36]
α_1	= 0.00062	[1.60]	β_1	=3.2200	[5.36]

$\bar{R}^2$ =0.96
S.E.E. =0.0012 ρ = -0.4106
D.W. =2.19
(*OLS*, 1958-1971) Hildreth-Lu

Single Housing Starts - British Columbia

(3.13) $$HSSC \quad FAMHOC * \underset{[5.58]}{[0.1883} - \underset{[6.86]}{0.1611} \, (STHSC/FAMHOC)_{-1}$$

$$+ \sum_{i=o}^{1} \alpha_i \, (SCOUTC/CPID)_{t-i}$$

$$+ \sum_{i=o}^{1} \beta_i \, (0.001 * YDBC/((NFHOC+FAMHOC)*CPID))_{t-i}$$

PDL, Degree 1, α_2 = 0			*PDL*, Degree 1, β_2 = 0		
α_0	=-0.00523	[8.74]	β_0=	9.4850	[4.08]
α_1	=-0.00261	[8.74]	β_1=	4.7420	[4.08]

$\bar{R}^2$ = 0.93
S.E.E. = 0.0015
D.W. = 2.05 ρ = -0.1010
(*OLS*, 1958-1971) Hildreth-Lu

2.2.3 Analysis of Results

The coefficients of the five equations measure up to theorectical expectations. The income variable in each case has a positive coefficient, while the cost variable is negative. The stock variable in all regions has a negative coefficient, implying that the adjustment coefficient, λ, dominates the rate of replacement, α (see equation (8)). A coefficient in the neighbourhood of one for $\frac{CSAr}{FAMHOr}$ would imply that for region r, every direct loan approval from the CMHC resulted in a housing start which would not otherwise take place. If, however, the coefficient were zero, the implication would be that the CMHC was merely a substitute for other mortgage lenders. In the Atlantic, Quebec, and Ontario the coefficient on $\frac{CSAr}{FAMHOr}$ is nearly one, while it is closer to zero for British Columbia. The 0.4 coefficient in the Prairies suggests that there is some substitution and some real contribution on the part of the CMHC to single housing starts. The availability of funds variable, $\frac{1}{MT-BLT}$ was retained only for the equation for Ontario

(3.11), while the mortgage rate variable (MT) was dropped from all equations as the coefficient was not statistically different from zero.

The results of the five equations show the great diversity which exists between the relative impact of the explanatory variables in different regions. This is evidenced in Table 5.

TABLE 5: ANALYSIS OF THE ELASTICITY[1] OF HSSr

REGION	Elasticity in 1971 of HSSr compared to			%[3] change of HSSr during the period '66-'71 due to		
	STOCK(2)	COST	INCOME	STOCK	COST	INCOME
ATLANTIC	-14.88	-0.72	1.98	19.19	-4.60	30.84
QUEBEC	-15.45	-2.89	3.01	11.28	32.13	14.65
ONTARIO	-4.49	-4.32	2.65	21.19	-60.48	22.71
PRAIRIES	-17.19	-1.15	3.23	-15.12	5.91	19.21
B.C.	-4.26	-3.42	3.09	25.85	-25.41	25.83

1. This refers to point elasticity (1971) calculated as follows: $\frac{\delta Y}{\delta X} * \frac{X71}{Y71}$

   N.B. $\frac{\delta Y}{\delta X}$ corresponds to the coefficient of variable X in the equation.
2. Refers to the variables as used in the equations; for example, stock refers to $\frac{STHr <-1>}{FAMHOr<-1>}$ and HSSr to $\frac{HSSr}{FAMHOr}$
3. The percentage change of the variable during the sample period was calculated, and then multiplied by the corresponding elasticities of the dependant variable.

Certain tendencies can be observed from this table. Two distinct groups emerge when the elasticity of $\frac{HSSr}{FAMHOr}$ with respect to the stock variable, is examined. In Ontario and British Columbia, the stock of single dwellings seems to have relatively less impact. Without being able to identify the specific sequence of causes and events, it is possible to underline the fact that these two regions distinguish themselves from the others by a considerably higher cost of single dwellings, and by a more rapid population growth. On the other hand, the cost elasticity with respect to $\frac{HSSr}{FAMHOr}$ appears to be positively related to the regional degree of urbanization, as well as to the level of cost. It seems then, that urbanization, in increasing the level of cost, increases even more its impact on the construction of single dwellings.

A similar, yet inverse effect, seems to come into play for the income variable. Looking at the income column in Table 5, it is noted that the impact of the income variable tends to be stronger in those regions characterized by low income levels. This holds for all regions except the Atlantic. The last three columns in Table 5 show the percentage change which the dependent variable, $\frac{HSSr}{FAMHOr}$, would have shown following a variation in one of the explanatory variables over the last five years, if the other variables had remained constant. One fact which comes to light here is the importance of the cost variable in Ontario during 1966-1971, as compared to its marginal importance in the Atlantic and Prairie regions. As well the table indicates a positive effect of the stock variable in four of the five regions, implying a downward trend for $\frac{STHSr}{FAMHOr}$ in these regions over those years, 1966-1971.

The estimation properties of the regional equations, when they are re-aggregated at the national level, can now be examined.

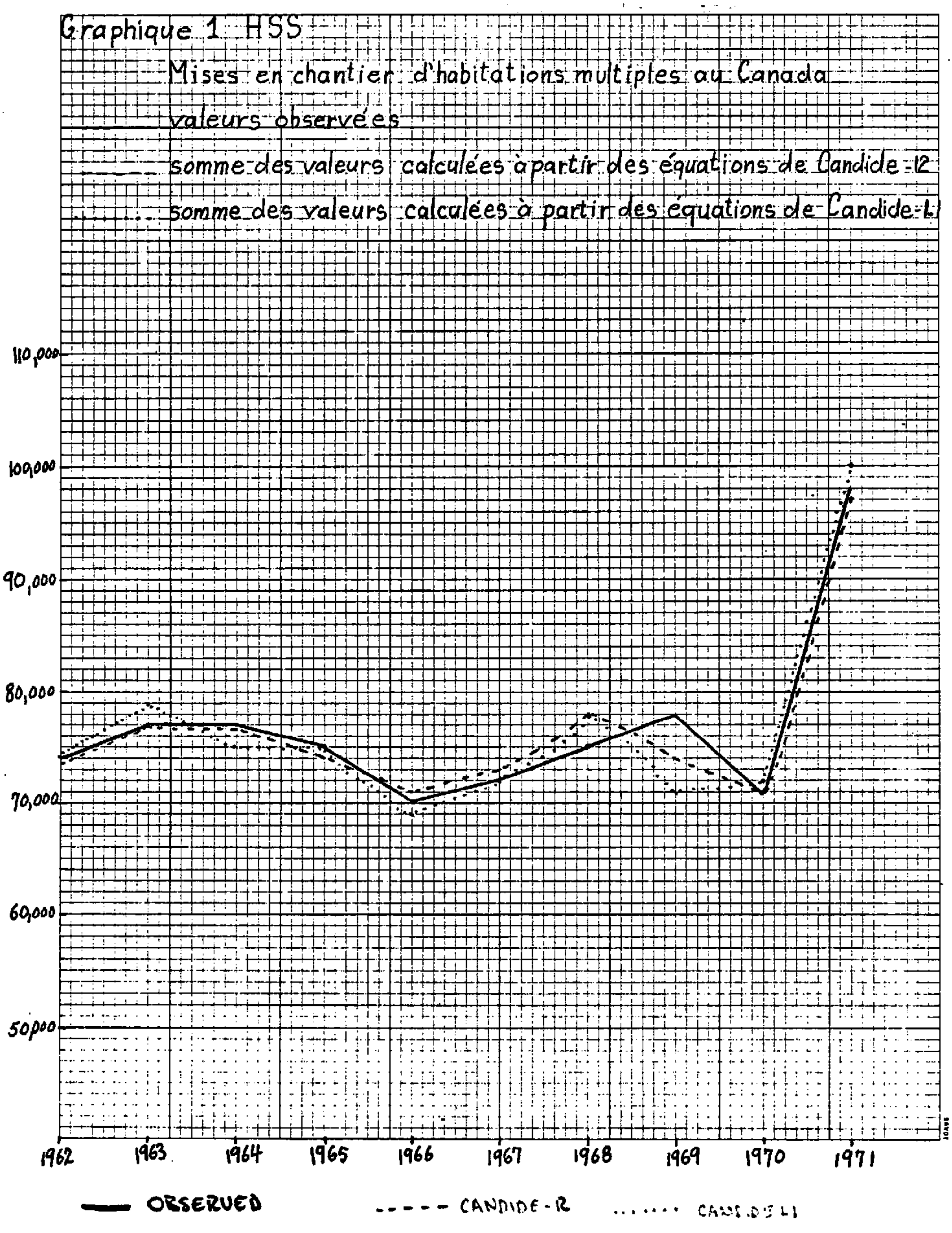
TABLE 6: ESTIMATION OF HSS ('58-'71)

Sum total of regions		National equation[1]	
R^2 from residuals	96.69	R^2 from residuals	93.21
Σ of squared errors	51.640	Σ of squared errors	113.170
D.W.	2.3	D.W.	2.92

1. These are the results of the CANDIDE 1.1 equation for HSS, as specified by Jakubecki and Lee (see footnote 5). The sum of squared errors has been corrected for the number of observations used in CANDIDE-R, and the R^2 is from the level form.

One of the objectives of the regionalization exercise was to localize the regional dimensions of housing starts, without deteriorating the predicted values at the national level. As the above table, and graph indicate the objectives appear to have been satisfied for the single housing starts equations.

Graph 1: Single Housing Starts Canada



2.3 Multiple Housing Starts

2.3.1 Theoretical Approach

The theory used for multiple starts is basically the same as that used for single starts. The only notable differences are the use of total number of households as the relevant demographic variable, and the use of the ratio of single to multiple starts, lagged one period, as a proxy for factors contributing to the increasing proportion of multiple dwellings in total housing starts. The general specification for multiple housing starts is:

$$
\begin{aligned}
(9)\quad HSMr/(FAMHOr\ NFHOr) = \; & \lambda\beta_0 + \lambda\beta_1\ [YDr/((NFHOr\ FAMHOr)*CPID)] \\
& + \lambda\beta_2\ [MCOUTr/CPID] \\
& + \lambda\beta_3\ [CMAr/(FAMHOr\ NFHOr)] \\
& + \lambda\beta_4\ (MT\text{-}BLT) + \lambda\beta_5\ MT \\
& + \lambda\beta_6\ [HSSr/HSMr]_{-1} + \lambda\beta_7\ D66 \\
& + (\alpha - \lambda)\ [STHMr/(NFHOr\ FAMHOr)]_{-1} + \mu r
\end{aligned}
$$

where CMAr = the number of CMHC direct mortgage approvals for multiple housing starts in region r.

The theory embodied in equation (9) implies positive coefficients for real disposable income per household, the number of CMHC mortgage loan approvals per household, and the availability of funds variable. Negative coefficients were expected for the cost variable and the mortgage interest rate. For the ratio of single to multiple starts, a negative coefficient would effectively take account of the tendency towards a larger proportion of multiple starts to total starts. Again, the coefficient on the stock variable will depend on the relative importance of the replacement demand coefficient, α, and the adjustment coefficient, λ.

2.3.2 Statistical Results

Multiple Housing Starts - Atlantic

(3.3) $HMSE = (NFHOE+FAMHOE)*[0.0574$
$[3.94]$

$$- \underset{[4.59]}{0.2174}\ (STHME/(NFHOE+FAMHOE))_{-1}$$

$$+ \sum_{i=o}^{1} \alpha_i (MCOUTE/CPID)_{t-i}$$

$$+ \sum_{i=o}^{1} \beta_i\ (0.001 * YDE/((NFHOE + FAMHOE) * CPID))_{t-i}$$

$$- \underset{[3.34]}{0.0068}\ (1/(MT-BLT))]$$

PDL, Degree 1, $\alpha_2 = 0$		*PDL*, Degree 1, $\beta_2 = 0$	
$\alpha_0 = -0.00185$	[4.79]	$\beta_0 = 3.9100$	[12.59]
$\alpha_1 = -0.00092$	[4.79]	$\beta_1 = 1.9550$	[12.59]

$\bar{R}^2$ =0.97
S.E.E. =0.0009 $\rho = -0.6162$
D.W. =2.28
(*OLS*, 1958-1971) Hildreth-Lu

Multiple Housing Starts - Québec

(3.4) $HMSQ = (NFHOQ + FAMHOQ)*[-0.1336$
$[5.43\ ]$

$$+ \sum_{i=o}^{1} \alpha_i (MCOUTQ/CPID)_{t-i}$$

$$+ \sum_{i=o}^{1} \beta_i (0.001 * YDQ/((NFHOQ+FAMHOQ)*CPID))_{t-i}$$

$$- \underset{[3.76]}{0.0138}\ (HSSQ/HMSQ)_{-1} + \underset{[6.72]}{0.5218}\ (1/MT)$$

$$- \underset{[6.03]}{0.0337}\ (1/(MT-BLT))]$$

PDL, Degree $1, \alpha_2 = 0$		*PDL*, Degree $1, \beta_2 = 0$	
$\alpha_0 = -0.00716$	[5.85]	$\beta_0 = 19.6640$	[6.72]
$\alpha_1 = -0.00358$	[5.85]	$\beta_1 = 9.8320$	[6.72]

$\bar{R}^2 = 0.85$

S.E.E. = 0.0014 $\qquad \rho = 0.1686$

D.W. = 1.82

(*OLS*, 1958-1971) Hildreth-Lu

Multiple Housing Starts - Ontario

(3.5)

$$HMSO = (NFHOO+FAMHOO)*\ [-\underset{[2.95]}{0.0638} + \sum_{i=o}^{1} \alpha_i\ (MCOUTO/CPID)_{t-i} + \sum_{i=o}^{1} \beta_i (0.001\ *YDO/((NFHOO+FAMHOO)/CPID))_{t-i} - \underset{[7.66]}{0.0113}\ D66 + \underset{[1.36]}{0.0736}\ (1/MT)]$$

PDL, Degree $1, \alpha_2 = 0$		*PDL*, Degree $1, \beta_2 = 0$	
$\alpha_0 = -0.00177$	[1.92]	$\beta_0 = 8.6850$	[12.34]
$\alpha_1 = -0.00088$	[1.92]	$\beta_1 = 4.3480$	[12.34]

$\bar{R}^2 = 0.98$

S.E.E. = 0.0013 $\qquad \rho = -0.6912$

D.W. = 2.11

(*OLS*, 1958-1971) Hildreth-Lu

Multiple Housing Starts - Prairies

(3.6) $$HMSW = (NFHOW + FAMHOW) * [\underset{[0.45]}{-0.0095} + \sum_{i=o}^{1} \alpha_i \, (MCOUTW/CPID)_{t-i} + \sum_{i=o}^{1} \beta_i \, (0.001 * YDW/((NFHOW + FAMHOW) * CPID))_{t-i} - \underset{[1.94]}{0.0069} \, D66 - \underset{[2.90]}{0.0268} \, (1/MT\text{-}BLT))]$$

PDL, Degree 1, $\alpha_2 = 0$	PDL, Degree 1, $\beta_2 = 0$
$\alpha_0 = -0.00413$ [1.60]	$\beta_0 = 9.3300$ [6.70]
$\alpha_1 = -0.00206$ [1.60]	$\beta_1 = 4.6600$ [6.70]

$\bar{R}^2$ = 0.94

S.E.E. = 0.0025 $\rho = -0.7275$

D.W. = 2.22

(*OLS*, 1958-1971) Hildreth-Lu

Multiple Housing Starts - British Columbia

(3.7) $$HMSC = (NFHOC + FAMHOC) * [\underset{[0.83]}{0.0251} + \sum_{i=o}^{1} \alpha_i \, (MCOUTC/CPID)_{t-i} + \sum_{i=o}^{2} \beta_i \, (0.001 * YDBC/((NFHOC + FAMHOC) * CPID))_{t-i} \underset{[2.81]}{-0.0035} \, (HSSC/HMSC)_{-1} \underset{[3.11]}{-0.0452} \, (1/(MT\text{-}BLT))]$$

PDL, Degree 1, $\alpha_2 = 0$	PDL, Degree 1, $\beta_3 = 0$
$\alpha_0 = -0.00106$ [2.85]	$\beta_0 = 10.7700$ [2.96]
$\alpha_1 = -0.00053$ [2.85]	$\beta_1 = 7.1790$ [2.96]
	$\beta_2 = 3.5880$ [2.96]

$\bar{R}^2$ = 0.83

S.E.E. = 0.0031

D.W. = 2.50

(*OLS*, 1958-1971)

2.3.3 Analysis of the Results

As can be seen in the estimation results, all the variables do not figure in each equation. For each region, only those variables with statistically significant coefficients were retained in the specification. However, where the coefficients were significant, the signs conformed with a priori expectations. The stock variable appears only in the equation for the Atlantic region (3.3), and again the coefficient is negative, indicating a domination of the adjustment coefficient λ over the replacement demand coefficient α. The negative coefficient on the dummy $D66$ is consistent with expectations, as this variable was introduced to take account of a slowdown in multiple starts in 1966. The coefficient on the variable for CMHC mortgage approvals for multiple starts was not significant in any of the equations, and the variable was dropped from the specification. This implies that, statistically, the CMHC was not, itself a important source for mortgage funds, and that it merely replaced private lenders. However, as H.E.L. Waslander points out "This unexpected result (statistical insignificance of CMHC financing variable) seems to indicate that government financing replaces rather than adds to private sources of mortgage credit but it provides too little evidence to draw solid conclusions, and a short-term financial model would probably underscore the effectiveness of CMHC's operations. This result stresses the difference between short and medium-term analysis, and it creates a dilemma. The model is both a medium-term prediction device and an instrument of policy analysis. How should policies that do not fit into a medium- to long-term context be treated?"[6]

It is more difficult for multiple dwellings to specify relations which would explain the regional disparity found in the elasticity analysis. However, it can be inferred from Table 7, below, that multiple housing construction is affected relatively more by disposable income than by cost. A comparison of Tables 5 and 7, shows that multiple housing construction is more sensitive to change in disposable income than is single dwelling construction, and multiple construction is relatively more sensitive to cost in four of the five regions.

6. H.E.L. Waslander <u>CANDIDE Model 1.0: Residential Construction</u>, CANDIDE Project Paper No. 3 published by the Economic Council of Canada, for the Interdepartmental Committee (Ottawa: Information Canada, 1973), p. 22.

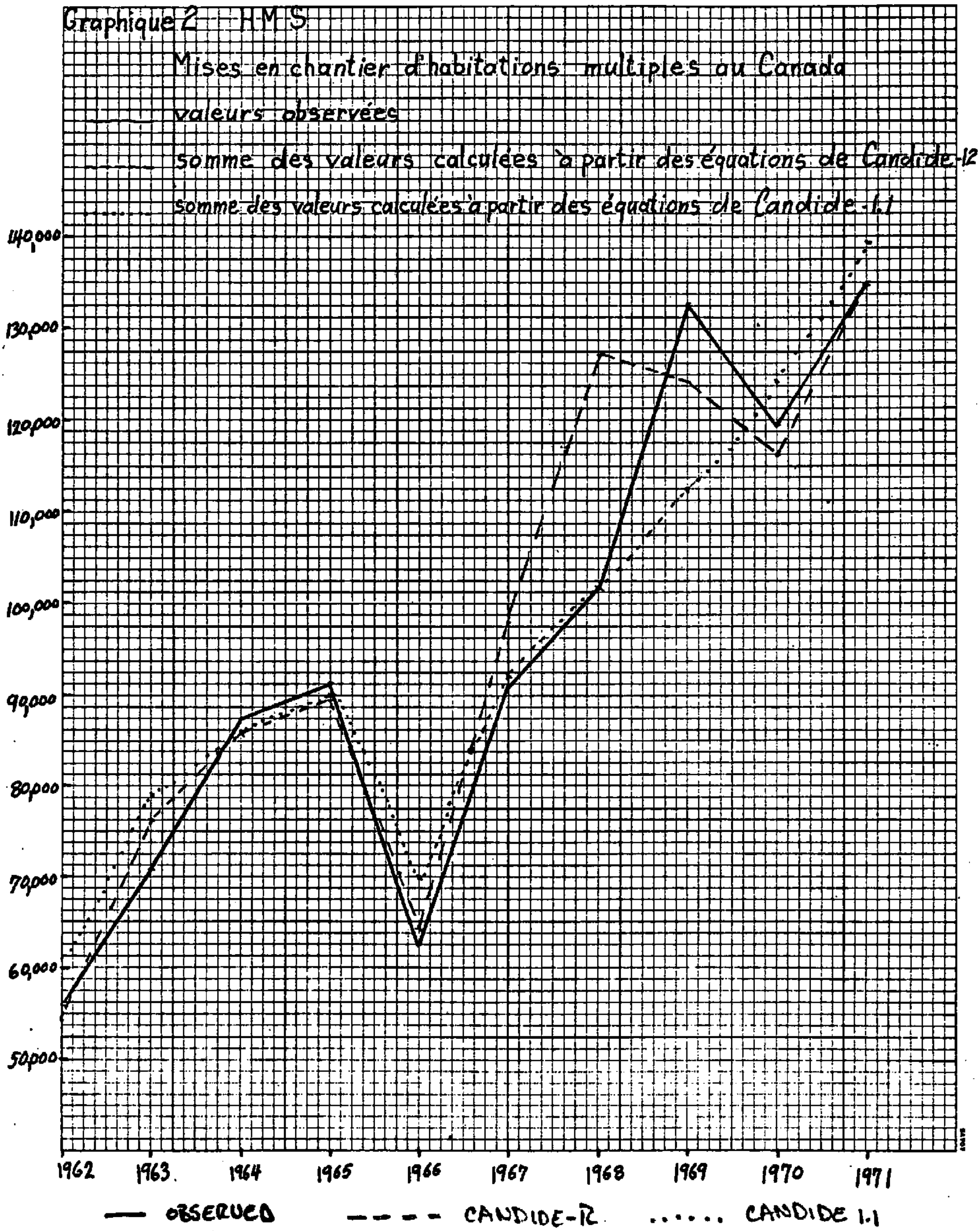
TABLE 7: ANALYSIS OF THE ELASTICITY OF HMSr[1]

	Elasticity in 1971 of HMSr with regard to			% change of HMSr during the period '66-'71 due to		
	STOCK	COST	INCOME	STOCK	COST	INCOME
ATLANTIC	-5.01	-2.06	3.28	-6.41	-3.42	51.10
QUEBEC		-4.62	11.46		-4.75	55.89
ONTARIO		-0.94	4.17		-16.98	35.73
PRAIRIES		-2.01	3.97		-17.46	23.58
B.C.		-4.77	6.03		-48.60	48.48

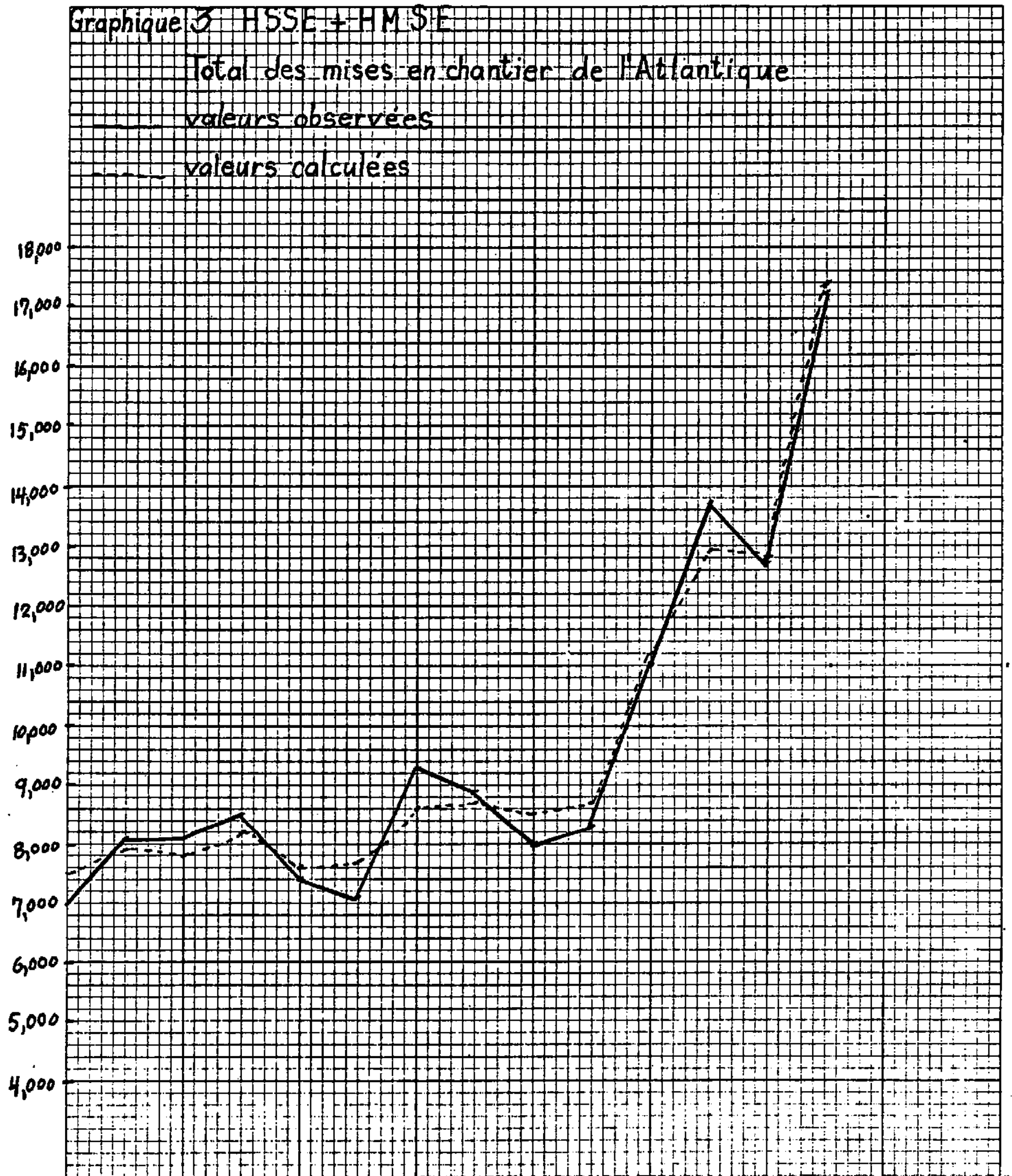
1. For an explanation of elasticity, see Table 7. The same procedure was followed here except that multiple housing starts and stock are used instead of single housing starts and stock.

Concerning the elasticity measures for multiple dwellings, some regional markets, notably Quebec, show more volatility than others, i.e. have relatively high elasticities.

Graph 2: Multiple Housing Starts – Canada

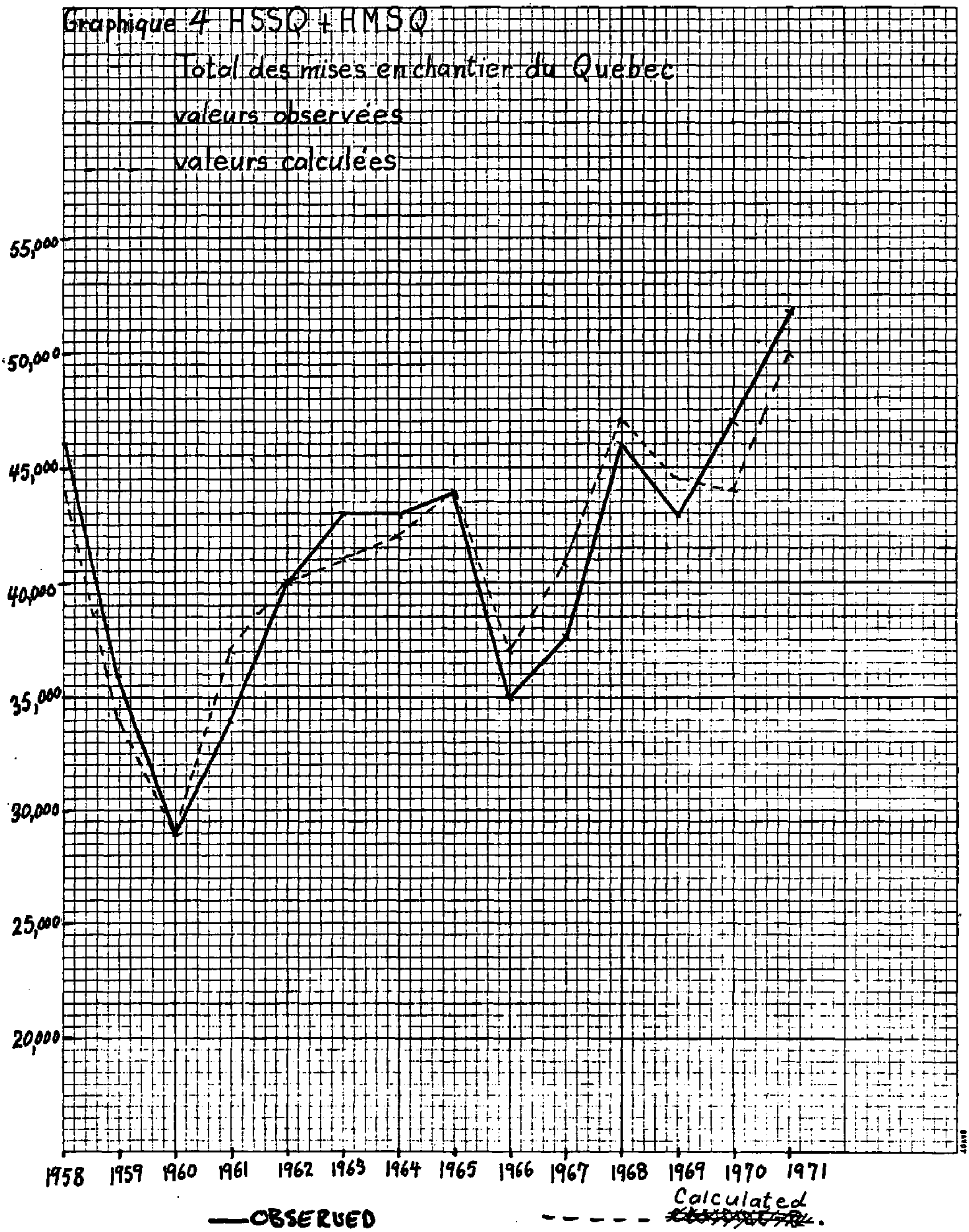


Graph 3: Total Housing Starts - Atlantic

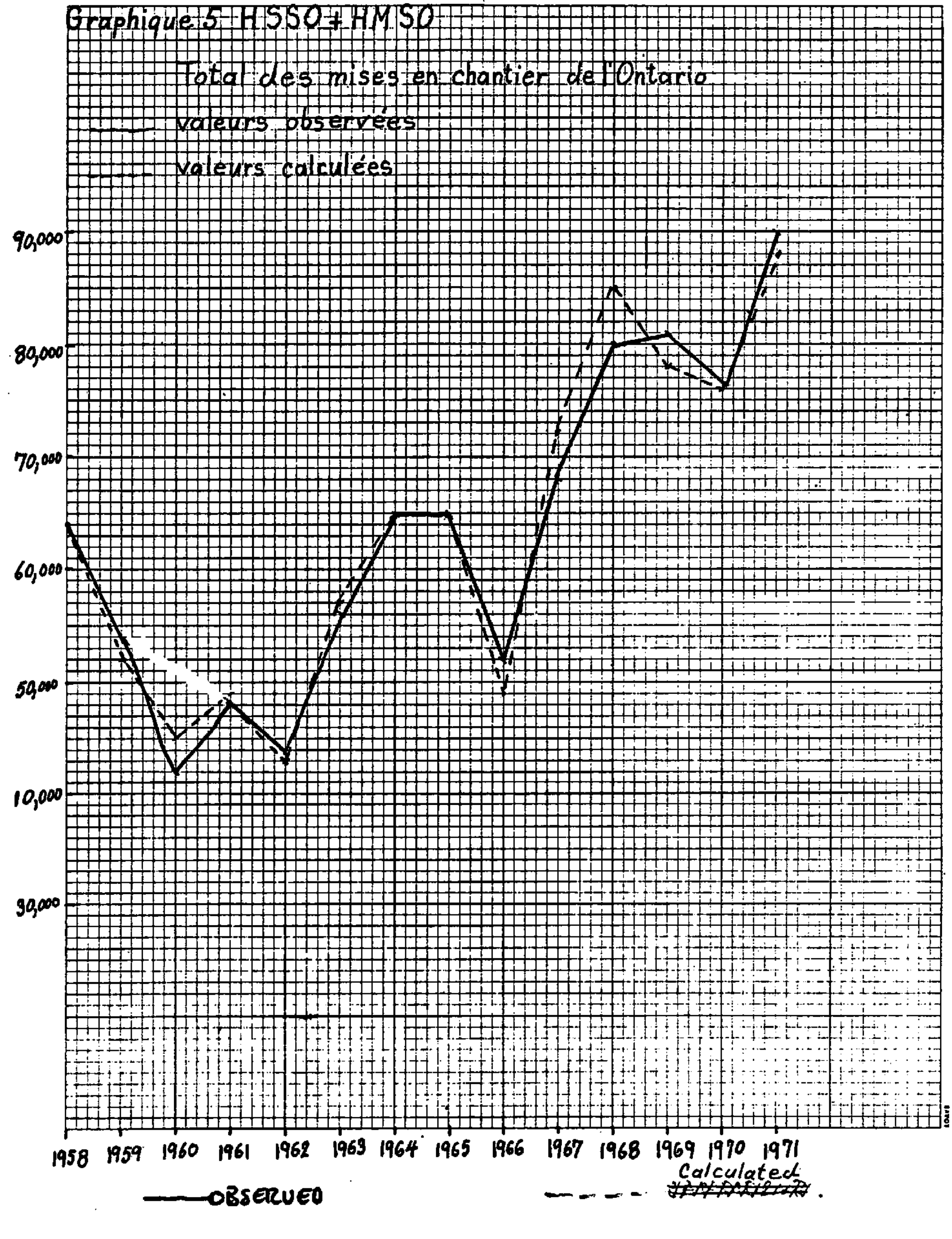


— OBSERVED ---- CALCULATED.

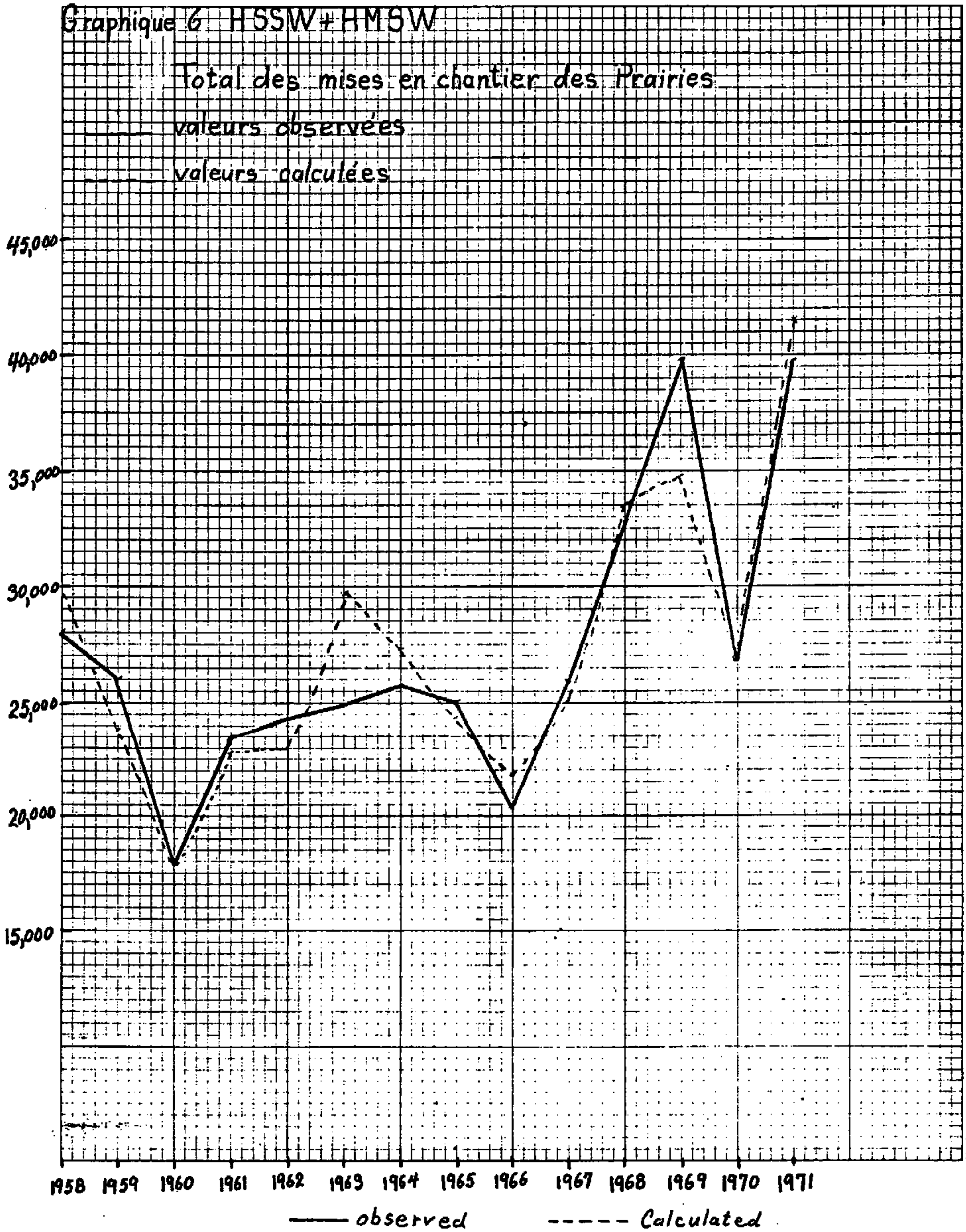
Graph 4: Total Housing Starts - Quebec.



Graph 5: Total Housing Starts - Ontario.



Graph 6: Total Housing Starts - Prairies



Graph 7 : Total Housing Starts — British Columbia.

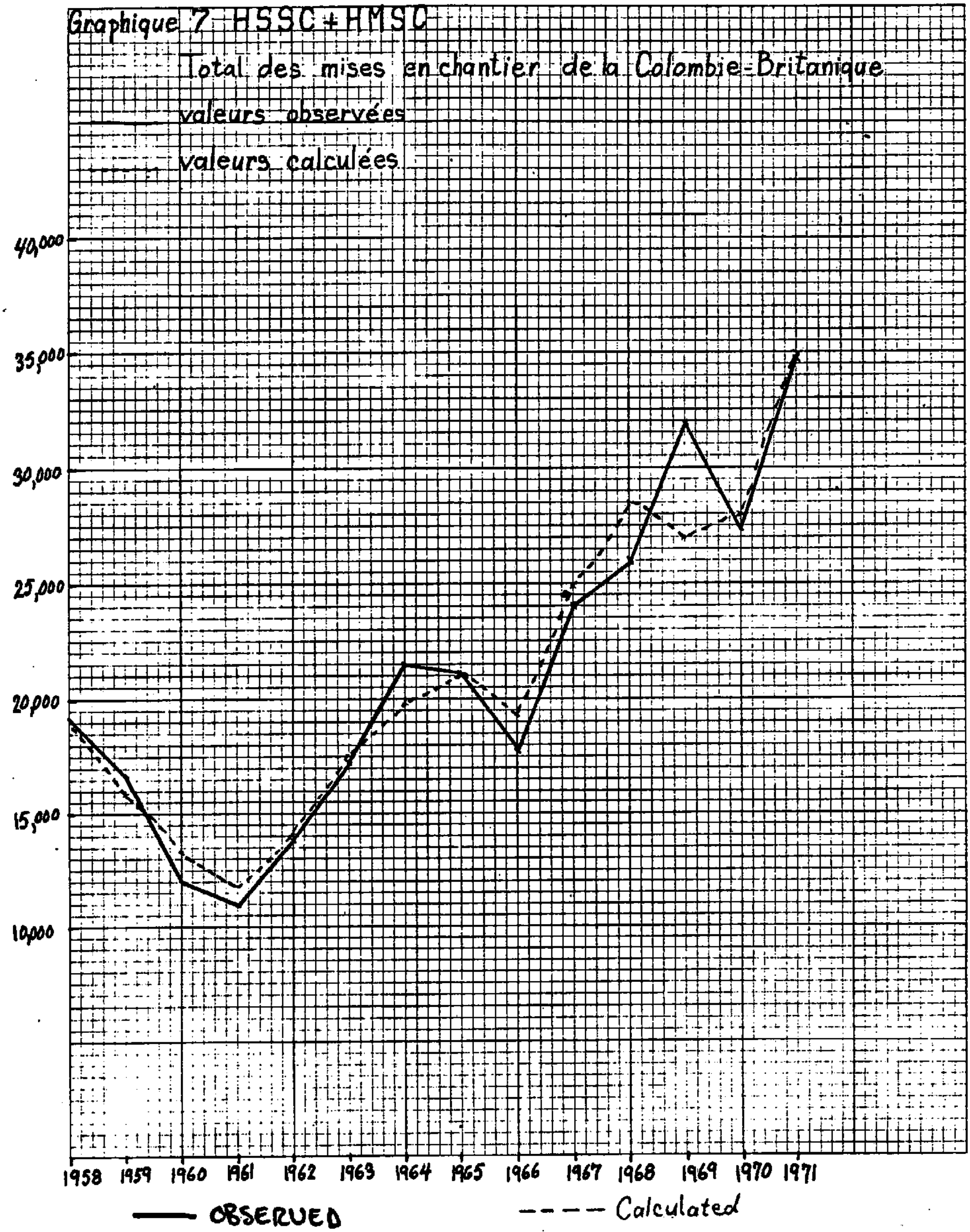


TABLE 8: ESTIMATION OF HMS ('58-'71)

Sum total of regions		National equation[1]	
R^2 from residuals =	0.982	R^2 from residuals =	0.960
Σ of squared errors =	249.6	Σ of squared errors =	644.2
Durbin-Watson =	2.11	Durbin-Watson =	2.29

1. The results for the national model are from the CANDIDE 1.1 Equation for HMS, as specified by Jakubecki and Lee (see footnote 5). The sum of squared errors has been corrected for the number of observations used in CANDIDE-R, and the R^2 is from the level form.

Table 8 and Graph 2 show that satisfactory results were obtained in the regionalization exercise for multiple housing starts, when compared to the national estimation results. Graphs 3-7 show the observed and calculated values of total housing starts in each region, over the sample period.

2.4 Completions

The same categories, single and multiple, are used for completions as were used for starts. The number of completions is calculated separately for each category (HSCr and HMCr respectively).

2.4.1 Theoretical Approach

The approach to housing completions is based on that used by Tjan[7] and Waslander.[8] Completions are explained by a distributed lag on housing starts. Since it seems unlikely that construction of a dwelling would last more than three years, the lags are extended back at most two periods from the current period.

7. H.S. Tjan " A Housing Model of Canada With Special Emphasis on the Demographic Factors and on the Dynamic Structure of Residential Construction", Economic Council of Canada, Econometrics Group, Discussion Paper No. 4, June 1970.

8. H.E.L. Waslander <u>CANDIDE Model 1.0: Residential Construction</u>

2.4.2 Statistical Results

Single Housing Completions - Atlantic

(3.23)

$$HSCE = \underset{[4.07]}{0.5003}\ HSSE + \underset{[3.67]}{0.4768}\ HSSE_{-1}$$

$\bar{R}^2$ = 0.74

$S.E.E.$ = 543.0438

$D.W.$ = 1.45

(OLS, 1957-1971)

sum of coefficients 0.9771

Single Housing Completions - Quebec

(3.24)

$$HSCQ = \underset{[5.31]}{0.5543}\ HSSQ + \underset{[3.94]}{0.4195}\ HSSQ_{-1}$$

$\bar{R}^2$ = 0.75

$S.E.E.$ = 1088.103

$D.W.$ = 2.58

(OLS, 1957-1971)

sum of coefficients 0.9738

Single Housing Completions - Ontario

$$(3.25)\quad HSCO = \underset{[8.55]}{0.6259}\ HSSO + \underset{[5.21]}{0.3751}\ HSSO_{-1}$$

$\bar{R}^2$ = 0.89

$S.E.E.$ = 1544.197

$D.W.$ = 1.78

(OLS, 1957-1971)

sum of coefficients = 1.0010

Single Housing Completions - Prairies

$$(3.26)\quad HSCW = \underset{[8.09]}{0.5981}\ HSSW + \underset{[5.41]}{0.3988}\ HSSW_{-1}$$

$\bar{R}^2$ = 0.88

$S.E.E.$ = 941.4308

$D.W.$ = 1.53

(OLS, 1957-1971)

sum of coefficients = 0.9969

Single Housing Completions - British Columbia

$$(3.27)\quad HSCC = \underset{[6.32]}{0.4914}\ HSSC + \underset{[5.95]}{0.4853}\ HSSC_{-1}$$

$\bar{R}^2$ = 0.92

$S.E.E.$ = 592.3718

$D.W.$ = 0.99

(OLS, 1957-1971)

sum of coefficients = 0.9767

Multiple Housing Completions - Atlantic

(3.17) $$HMCE = \underset{[6.14]}{0.4586}\ HMSE + \underset{[5.53]}{0.4727}\ HMSE_{-1}$$

$\bar{R}^2$ = 0.97

S.E.E. = 231.4204

D.W. = 2.35

(*OLS*, 1957-1971)

sum of coefficients = 0.9313

Multiple Housing Completions - Quebec

(3.18) $$HMCQ = \underset{[4.94]}{0.4537}\ HMSQ + \underset{[5.28]}{0.5004}\ HMSQ_{-1}$$

$\bar{R}^2$ = 0.86

S.E.E. = 1726.109

D.W. = 2.21

(*OLS*, 1957-1971)

sum of coefficients = 0.9641

Multiple Housing Completions - Ontario

(3.19) $$HMCO = \underset{[0.87]}{0.1223}\ HMSO + \underset{[3.55]}{0.6473}\ HMSO_{-1} + \underset{[1.16]}{0.1803}\ HMSO_{-2}$$

$\bar{R}^2$ = 0.92

S.E.E. = 3611.521

D.W. = 2.24

(*OLS*, 1957-1971)

sum of coefficients = 0.9499

Multiple Housing Completions - Prairies

(3.20) $$HMCW = \underset{[8.44]}{0.3452}\ HMSW + \underset{[8.86]}{0.4642}\ HMSW_{-1} + \underset{[3.44]}{0.1638}\ HMSW_{-2}$$

$\bar{R}^2$ = 0.99

S.E.E. = 669.3851

D.W. = 3.15

(*OLS*, 1957-1971)

sum of coefficients = 0.9732

Multiple Housing Completions - British Columbia

(3.21) $$HMCC = \underset{[4.37]}{0.3296}\ HMSC + \underset{[4.11]}{0.4022}\ HMSC_{-1} + \underset{[2.98]}{0.2490}\ HMSC_{-2}$$

$\bar{R}^2$ = 0.97

S.E.E. = 827.6149

D.W. = 2.20

(*OLS*, 1957-1971)

sum of coefficients = 0.9808

2.4.3 Analysis of Results

The estimation results show longer significant lags for multiple than for single completions, in most regions, while for all regions the coefficient on the starts variable for the current period is higher in the single housing completions equations than in the multiples. This may be interpreted as a longer construction period required for multiples than for single dwellings. However, the difference in coefficient values between regions cannot be considered a true reflection of regional variations in construction time. The coefficients can indicate the duration of construction, but their values depend as well on regional variations in the timing of the starts during the year.

The sum of the coefficients on each completions equation do not sum to one as desired. However, the difference between observed completions in Canada over the sample period, and completions as calculated in the regional equations is only 1.2% for single dwellings and 0.2% for multiples. In a medium-term exercise, such accuracy is satisfactory.

The value of the Durbin Watson statistic in certain of the equations suggests the presence of serial correlation in the error term. However, use of the Hildreth-Lu technique to correct for this did not greatly improve the results, neither did the use of Zellner's Generalized Least Squares[9], and the above specifications were retained.

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9. Zellner, A., "An Efficient Method of Estimating Seemingly Unrelated Regressions and Tests for Aggregation Bias", Journal of the American Statistical Association, June, 1962.

CONCLUDING COMMENTS

The major problem area in a regional model-building exercise is finding acceptable data. In order to improve the model, the data base must be improved. The least satisfactory variable in the CANDIDE-R residential construction block is that of cost, which is computed from the average value of building permits per construction unit. Regional equations would likely improve if regional values could be found for such national variables as: index of paid space rent, total single dwelling ownership cost index, and property cost, for example.

One additional weakness of the housing starts equations of CANDIDE-R is that they do not take account of the relatively recent phenomenon of consumer expectations in the face of rising costs. Cost increases generally lead to a slowdown in demand, however, continual cost escalations may result in current construction in anticipation of even higher costs in the future, or for speculative reasons.

Despite the lack of regional data for some variables, the results of the regional equations for housing starts concur with the hypothesis that the region is a more appropriate level of aggregation than the national level, for a study of housing starts. For single as well as multiple housing starts, the estimation of national aggregates using regional equations is slightly superior to the CANDIDE 1.1 equations.

APPENDIX: MNEMONIC TABLE

MNEMONIC LIST -- BLOCK 3 -- LISTE DES MNEMONIQUES

ADDALT	FB	3029	1	EXP,ON ADDITIONS AND ALTERATIONS TO HOUSING
BLT	EI	3035	3	AVERAGE OF CORP,&GOVT,LT,BOND YIELD
CC	FB	34044	3	CONSTRUCTION COST PER SQUARE FOOT,1961=1
CONVK	XX	460	1	CONVERSIONS-$MILLIONS CONST,
COSTHS	FI	3051	2	INDEX OF COST OF SINGLE HOUSING STARTS,1961=1,0
CPID	EI	24025	3	IMPLICIT DEFLATOR OF CONSUMER EXPENDITURE
CSAE	XX	504	1	CMHC APPROVALS FOR SINGLE HOUSES ATLANTIC
CSAO	XX	506	2	CMHC APPROVALS FOR SINGLE HOUSES ONTARIO
CSAQ	XX	505	2	CMHC APPROVALS FOR SINGLE HOUSES QUEBEC
CSAW	XX	516	2	CMHC APPROVALS FOR SINGLE HOUSES PRAIRIES
DS70	XD	43	1	DUMMY 1 IN 70 ZERO OTHERWISE
D66	XD	35	2	DUMMY(1 IN 1966,ZERO OTHERWISE)
ESTCOM	XX	465	1	REAL ESTATE COMMISSIONS,CONST,$-1961
FAMHO	EI	22056	3	TOTAL NUMBER OF FAMILY HOUSEHOLDS- CANADA
FAMHOC	FI	22061	3	TOTAL NUMBER OF FAMILY HOUSEHOLDS- BRITISH COLUMBIA
FAMHOE	FI	22057	3	TOTAL NUMBER OF FAMILY HOUSEHOLDS- ATLANTIC
FAMHOO	EI	22059	3	TOTAL NUMBER OF FAMILY HOUSEHOLDS- ONTARIO
FAMHOQ	EI	22058	3	TOTAL NUMBER OF FAMILY HOUSEHOLDS- QUEBEC
FAMHOW	EI	22060	3	TOTAL NUMBER OF FAMILY HOUSEHOLDS- PRAIRIES
GRESCK	XG	115	1	GOVT,RES,CONSTR,-CONST,$
HMC	EI	3016	2	MULTIPLE HOUSING COMPLETIONS - CANADA
HMCC	EB	3021	1	MULTIPLE HOUSING COMPLETIONS - BRITISH COLUMBIA
HMCE	EB	3017	1	MULTIPLE HOUSING COMPLETIONS - ATLANTIC
HMCO	EB	3019	1	MULTIPLE HOUSING COMPLETIONS - ONTARIO
HMCQ	EB	3018	1	MULTIPLE HOUSING COMPLETIONS - QUEBEC
HMCW	EB	3020	1	MULTIPLE HOUSING COMPLETIONS - PRAIRIES
HMS	EI	3002	3	MUTIPLE HOUSING STARTS -CANADA
HMSC	FB	3007	3	MUTIPLE HOUSING STARTS - BRITISH COLUMBIA
HMSE	EB	3003	2	MUTIPLE HOUSING STARTS - ATLANTIC
HMSO	FB	3005	3	MUTIPLE HOUSING STARTS - ONTARIO
HMSQ	EB	3004	3	MUTIPLE HOUSING STARTS - QUEBEC
HMSW	EB	3006	3	MUTIPLE HOUSING STARTS - PRAIRIES
HOHD	EI	22068	5	TOTAL HOUSEHOLDS
HOWIX	EB	3049	3	TOTAL HOME-OWNERSHIP INDEX,1961=1,0
HS	FI	3001	1	TOTAL HOUSING STARTS
HSC	EI	3022	2	SINGLE HOUSING COMPETIONS -CANADA
HSCC	EB	3027	1	SINGLE HOUSING COMPLETIONS - BRITISH COLUMBIA
HSCE	FB	3023	1	SINGLE HOUSING COMPETIONS - ATLANTIC
HSCO	EB	3025	1	SINGLE HOUSING COMPLETIONS - ONTARIO
HSCQ	FB	3024	1	SINGLE HOUSING COMPETIONS - QUEBEC
HSCW	FB	3026	1	SINGLE HOUSING COMPLETIONS - PRAIRIES
HSS	EI	3008	3	SINGLE HOUSING STARTS -CANADA
HSSC	EB	3013	2	SINGLE HOUSING STARTS - BRITISH COLUMBIA
HSSE	EB	3009	2	SINGLE HOUSING STARTS - ATLANTIC
HSSO	EB	3011	2	SINGLE HOUSING STARTS - ONTARIO
HSSQ	FB	3010	3	SINGLE HOUSING STARTS - QUEBEC
HSSW	FB	3012	2	SINGLE HOUSING STARTS - PRAIRIES
IR	FI	3030	1	BUS,EXPENDITURE ON RESIDENTIAL CONSTRUCTION-$CONST,
IRLREK	FI	3048	1	RESIDENTIAL CONSTRUCT,EXCL,REAL EST,COMM,CTS,$61
IRFG	EI	3032	1	RESIDENTIAL CONSTRUCTION BY BUS,&GOVT,-CONST,$
LANDIX	EB	3050	1	INDEX OF LAND COST FOR SING,DET,DWELL,FIN,UND,NHA
MCUUTC	XX	507	2	EST, COST 'MULTIP,HOUSES' USING BUILDING PERMITS B,C,
MCUUTE	XX	511	2	EST, COST 'MULTIP,HOUSES' USING BUILDING PERMITS ATLANTIC
MCUUTO	XX	509	2	EST, COST 'MULTIP,HOUSES' USING BUILDING PERMITS ONTARIO
MCUUTQ	XX	510	2	EST, COST 'MULTIP,HOUSES' USING BUILDING PERMITS QUEBEC

MNEMONIC LIST -- BLOCK 3 -- LISTE DES MNEMONIQUES

MCOUTW	XX	508	2	EST. COST 'MULTIP.HOUSES' USING BUILDING PERMITS PRAIRIES
MT	EI	3033	3	AVERAGE MORTGAGE RATE
MTX	EI	3034	2	AV.OF NHA AND CONV.MORT.RATES,INDEX-1961=1.0
NFHOC	EI	22067	3	NON-FAMILY HOUSEHOLDS BRITISH COLUMBIA
NFHOE	EI	22063	3	NON-FAMILY HOUSEHOLDS ATLANTIC
NFHOO	EI	22065	3	NON-FAMILY HOUSEHOLDS ONTARIO
NFHOQ	EI	22064	3	NON-FAMILY HOUSEHOLDS QUEBEC
NFHOW	EI	22066	3	NON-FAMILY HOUSEHOLDS PRAIRIES
PF0004	EI	22002	6	FEMALE POPULATION, AGE 0-4
PF0509	EI	22003	6	FEMALE POPULATION, AGE 5-9
PF1014	EI	22004	6	FEMALE POPULATION, AGE 10-14
PGNE	EI	24024	3	IMPLICIT PRICE INDEX GNE
PHMQ	EI	3031	3	AV.FLOOR SIZE MULTIPLES,INDEX-1961=1
PM0004	EI	22016	6	MALE POPULATION, AGE 0-4
PM0509	EI	22017	6	MALE POPULATION, AGE 5-9
PM1014	EI	22018	6	MALE POPULATION, AGE 10-14
RCMK	EB	3054	1	RESIDENTIAL CONSTRUCTION OF MULT.DWELLINGS-$M,CONST
RCN	EI	3028	1	EXPENDITURE ON NEW RES.CONSTR.,CONST.$-1961
RCUNVM	EB	20009	4	CONVENTIONAL MORTGAGE RATE
RCSK	EB	3053	2	RESIDENTIAL CONSTRUCTION OF SINGLE DWELLINGS-$M,CONST
RGOVLB	EB	20007	3	AVERAGE YIELD FOR 10 YEARS OR OVER GOVERNMENT BONDS
RINDB	EB	20008	3	AVERAGE YIELD FOR 10 INDUSTRIAL BONDS
RNHA	XM	269	1	NHA MORTGAGE RATE
SCOUTC	XX	512	2	EST. COST 'SINGLE HOUSES' USING BUILDING PERMITS B.C.
SCOUTE	XX	597	2	EST.COST 'SINGLE HOUSES' USING BUILDING PERMITS ATLANTIC
SCOUTO	XX	513	2	EST. COST 'SINGLE HOUSES' USING BUILDING PERMITS ONTARIO
SCOUTQ	XX	514	2	EST. COST 'SINGLE HOUSES' USING BUILDING PERMITS QUEBEC
SCOUTW	XX	598	2	EST.COST 'SINGLE HOUSES' USING BUILDING PERMITS AWEST
SIZE	EB	3014	1	AV.FLOOR SIZE OF NHA SINGLE-DETACH.DWELLINGS,1961=1
STH	EI	3015	3	STOCK OF HOUSES
STHM	EI	3042	3	MULTIPLE& DWELLINGS STOCK - CANADA
STHMC	EI	3047	2	MULTIPLE& DWELLINGS STOCK - BRITISH COLUMBIA
STHME	EI	3043	3	MULTIPLE& DWELLINGS STOCK - ATLANTIC
STHMO	EI	3045	3	MULTIPLE& DWELLINGS STOCK - ONTARIO
STHMQ	EI	3044	3	MULTIPLE& DWELLINGS STOCK - QUEBEC
STHMW	EI	3046	3	MULTIPLE& DWELLINGS STOCK - PRAIRIES
STHS	EI	3036	3	SINGLE DWELLINGS STOCK - CANADA
STHSC	EI	3041	3	SINGLE DWELLINGS STOCK - BRITISH COLUMBIA
STHSE	EI	3037	2	SINGLE DWELLINGS STOCK - ATLANTIC
STHSO	EI	3039	3	SINGLE DWELLINGS STOCK - ONTARIO
STHSQ	EI	3038	3	SINGLE DWELLINGS STOCK - QUEBEC
STHSW	EI	3040	3	SINGLE DWELLINGS STOCK - PRAIRIES
SUPCK	EB	3055	2	SUPPLEMENTARY COSTS OF NEW HOUSING -$MILL CONST.
TIME	XD	1	2	TIME(LAST TWO DIGITS OF YEAR,1970=70)
TPROP	XR	380	1	PROV.& LOCAL REAL PROP.TAXES
YD	EI	19017	5	DISPOSABLE PERSONAL INCOME IN CONST.$1961-MILL.
YDBC	EI	51037	3	PERSONAL DISPOSABLE INCOME BRIT. COLUMBIA
YDE	EI	51033	3	PERSONAL DISPOSABLE INCOME ATLANTIC
YDO	EI	51035	3	PERSONAL DISPOSABLE INCOME ONTARIO
YDQ	EI	51034	3	PERSONAL DISPOSABLE INCOME QUEBEC
YDW	EI	51036	3	PERSONAL DISPOSABLE INCOME PRAIRIES