1

CANADIAN THESES ON MICROFICHE

THÈSES CANADIENNES SUR MICROFICHE

National Library of Canada
Collections Development Branch

Canadian Theses on
Microfiche Service

Ottawa, Canada
K1A 0N4

Bibliothèque nationale du Canada
Direction du développement des collections

Service des thèses canadiennes
sur microfiche

NOTICE

The quality of this microfiche is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us an inferior photocopy.

Previously copyrighted materials (journal articles, published tests, etc.) are not filmed.

Reproduction in full or in part of this film is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30. Please read the authorization forms which accompany this thesis.

**THIS DISSERTATION
HAS BEEN MICROFILMED
EXACTLY AS RECEIVED**

AVIS

La qualité de cette microfiche dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de qualité inférieure.

Les documents qui font déjà l'objet d'un droit d'auteur (articles de revue, examens publiés, etc.) ne sont pas microfilmés.

La reproduction, même partielle, de ce microfilm est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30. Veuillez prendre connaissance des formules d'autorisation qui accompagnent cette thèse.

**LA THÈSE A ÉTÉ
MICROFILMÉE TELLE QUE
NOUS L'AVONS REÇUE**

0-315-19938-5

National Library
of CanadaBibliothèque nationale
du Canada

37

Canadian Theses Division

Division des thèses canadiennes

Ottawa, Canada
K1A 0N4

67845

PERMISSION TO MICROFILM — AUTORISATION DE MICROFILMER

• Please print or type — Écrire en lettres moulées ou dactylographier

Full Name of Author — Nom complet de l'auteur

AMIR KIA

Date of Birth — Date de naissance

March 6, 1945

Country of Birth — Lieu de naissance

IRAN

Permanent Address — Résidence fixe

1078 Cadboro Rd. Gloucester ont K1S-7R1

Title of Thesis — Titre de la thèse

Evaluating Regional Policies in Canada - Case of Newfoundland

University — Université

Carleton

Degree for which thesis was presented — Grade pour lequel cette thèse fut présentée

Ph.D

Year this degree conferred — Année d'obtention de ce grade

1985

Name of Supervisor — Nom du directeur de thèse

Professor Lithwick

Permission is hereby granted to the NATIONAL LIBRARY OF CANADA to microfilm this thesis and to lend or sell copies of the film.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

L'autorisation est, par la présente, accordée à la BIBLIOTHÈQUE NATIONALE DU CANADA de microfilmer cette thèse et de prêter ou de vendre des exemplaires du film.

L'auteur se réserve les autres droits de publication, ni la thèse ni de longs extraits de celle-ci ne doivent être imprimés ou autrement reproduits sans l'autorisation écrite de l'auteur.

Date

April 10, 1985

Signature

Amir Kia

EVALUATING REGIONAL POLICIES IN CANADA:
THE CASE OF NEWFOUNDLAND

by

Amir Kia, B.A., M.A.

A thesis submitted to
the Faculty of Graduate Studies and Research
in partial fulfillment of
the requirements for the degree of
Doctor of Philosophy

Department of Economics
Carleton University
OTTAWA, Ontario
March 1985

© 1985 Amir Kia

The undersigned hereby recommend to
The Faculty of Graduate Studies and Research
acceptance of the thesis, submitted by
Amir Kila, B.A., M.A.
in partial fulfilment of the requirements
for the degree of Doctor of Philosophy.

Debra A. Smith
.....
Chairman, Department of Economics

Harry Livshitz
.....
Thesis Supervisor

Ian McArthur
.....
External Examiner

Carleton University

April 10, 1985

ABSTRACT

Since Confederation, numerous regional policies have been designed and implemented to reduce economic disparities among the various regions of Canada. They are of two types: compensating and transforming policies. Three models which incorporate them as policy instruments were introduced. Two of the models are subjected to econometric testing on Newfoundland data to evaluate the effectiveness of such policies in altering the region's rate of employment and per-worker real income growth rate. The following results were obtained:

- i) Policies of the Regional Development Incentives Act (RDIA) of DREE (now DRIE) were not successful in increasing the employment rate in Newfoundland. The program's subsidies on labor, it was found, reduce the region's per-worker income growth rate and this rate did not respond to subsidies on capital.
- ii) Direct job creation programs - Winter Works Projects, Youth Canada Work Plan, Local Employment Assistance, Local Initiatives Program, and Canada Works Programs, etc. were found to reduce the region's rate of employment. It was also found that the per-worker income growth rate did not respond to job creation programs. All compensating policies, such

as equalization payments and statutory subsidies, were found to reduce the region's employment rate, but left the rate of growth of income per worker unaffected.

iii) Federal expenditures on infrastructural and other items - such as relocating small farmers, relocation of families from isolated fishing areas, Agricultural Rehabilitation and Development, Land Protection and Reclamation - were found to have no impact on the employment rate but had a negative impact on the region's per-worker real income growth rate.

iv) Generosity of unemployment insurance benefits was found to have no impact on the employment rate. It did, however, increase per-worker real income growth.

v) An important problem of the region under study is its high rate of labor force unionization. This factor was found to reduce both the employment rate and the rate of growth of income per worker in the region.

vi) The empirical results also show that in the absence of all regional policies, when the ratio of the average wage rates in Newfoundland to the rest of Canada, as well as the rate of labor force unionization remain constant, real per-worker income growth rate rises through time.

ACKNOWLEDGEMENTS

For helpful comments, assistance, and encouragement, I owe many thanks to the members of my committee, Professors Harvey Lithwick, Richard Carson, Keith Hay, and Don McFetridge. I am immensely grateful for the inexorable support of Professors Harvey Lithwick and Richard Carson during periods of disappointment and joyful success so familiar to those entangled with writing a Ph.D. dissertation. Special thanks are also due to Mr. Mehrzad Salem for editorial assistance. Finally, I am indebted to Miss Diane Tardif for typing this as well as several earlier drafts of this thesis.

TABLE OF CONTENTS

	Page
<u>ABSTRACT</u>	iii
<u>ACKNOWLEDGEMENTS</u>	v
<u>LIST OF TABLES</u>	ix
<u>LIST OF FIGURES</u>	xiii
<u>INTRODUCTION</u>	1
<u>CHAPTER I:</u> A Brief Survey of Regional Growth Models.....	3
I - Demand-Determined Models.....	4
II - Supply-Determined Models.....	9
III - Conclusions.....	26
<u>CHAPTER II:</u> A Classification of Federal Regional Policies in Canada.....	28
I - Unconditional Grants.....	31
II - Conditional Grants.....	37
III - Department of Regional Economic Expansion (DREE)....	71
Summary.....	87

	Page
Appendix A.....	89
<u>CHAPTER III:</u> The Region, Newfoundland.....	101
Introduction.....	101
I - Natural Environment.....	102
II - Population, Employment, Income and Migration.....	106
III - Production Sector.....	128
IV - Newfoundland's Market Environment.....	134
Conclusions.....	138
<u>CHAPTER IV:</u> Regional Long-run Supply Growth Models.....	139
Model I.....	141
Model II.....	165
Model III.....	185
Summary and Conclusions.....	201

	Page
<u>CHAPTER V: Empirical Results: Testing the Models on Newfoundland Data.....</u>	204
Summary.....	244
Appendix A.....	246
Appendix B.....	251
Appendix C.....	252
Appendix D.....	256
<u>CHAPTER VI: Summary and Concluding Remarks.....</u>	262
<u>BIBLIOGRAPHY.....</u>	268

LIST OF TABLES

Table	Description	Page
1-1	Structure of Selected Existing Demand-Determined models	8
2-1	Share of Income Tax on Power Utilities.	36
2-2	Capital Assistance Grants on Vocational Training.....	42
2-3	Canada Manpower Training.....	43
2-4	Youth Canada Works Program.....	45
2-5	Local Employment Assistance Program....	46
2-6	Local Initiatives Program.....	47
2-7	Canada Works Program.....	48
2-8	Manpower Mobility Program.....	49
2-9	Federal Grants For Relocating Families.	50
2-10	Area Development Agency.....	51
2-11	Transportation and Communication.....	54
2-12	Agricultural Rehabilitation and Development and ARDA.....	57
2-13	Fisheries Development.....	61
2-14	Construction of Vessels.....	62
2-15	Atlantic Development Board.....	66
2-16	Minerals and Mines.....	68
2-17	Federal-Provincial Special Development Loan Program (1970).....	74
2-18	Land Surveying and Mapping Agreements..	77
2-19	Subsidiary Agreements.....	79

Table	Description	Page
A-1	Tax Rental Agreements.....	89
A-2	Federal-Provincial Tax-Sharing (or Fiscal) Arrangements.....	90
A-3	Equalization.....	91
A-4	(Statutory) Subsidies.....	92
A-5	Health.....	93
A-6	Social Welfare to Provincial and Local Governments.....	94
A-7	Civil Defence.....	95
A-8	Recreation and Culture Services...	96
A-9	Winter Works Projects in Municipalities.....	97
A-10	Housing.....	98
A-11	RDIA.....	99
A-12	GDA.....	100
3-1	Canada, Newfoundland Live Birth, Death, and Natural Increase Rates per 1000 population.....	108
3-2	Rural and Urban Population of Newfoundland and Rural and Urban Percentage for Census Years 1901 to 1981 and Rate of Population Growth Between Each Census Year...	109
3-3	Number of Communities in Newfoundland By Population of Community, Census Years 1961, 1966 1971 and 1981.....	112
3-4	Population 15 Years and Over, by Sex and Level of Schooling.....	114

Table	Description	Page
3-5	Selected Values, Labor Force & Employment Newfoundland and Canada 1971, 1978, 1981 Unadjusted Series.....	116
3-6	Selected Ratio of Per Capita Investment of Newfoundland to Canada by Sector 1971-1981.....	118
3-7	Employed Labor Force, By Industry Newfoundland and Labrador, 1961, 1971 and 1981.....	120
3-8	Personal Income Per Capita Newfoundland and Canada.....	121
3-9	Average Weekly Wages and Salaries 1976, 1980 and 1981.....	122
3-10	Migration Data.....	124
3-11	Share of The Selected Federal Government Grants to Newfoundland (1971-81).....	125
3-12	Selected Values, Real Per Capita Gross Domestic Products Newfoundland and Canada 1961, 1971, 1981.....	128
3-13	Real Selected Product By Industry, Newfoundland - 1961, 1971, 1981.....	130
4-1	Summary of Policy Conclusions....	203
5-1	Real Per-Worker Income Growth ($\bar{y}$)	205
5-2	Employment Rate (EM).....	206
5-3	Dependent Variable EM (without FIS).....	223

Table	Description	Page
5-4	Dependent Variable EM (without RI_{t-1} , RI_{t-2} and T).....	224
5-5	Estimated Elasticities for the Employment Rate.....	225
5-6	Dependent Variable EM.....	229
5-7	Dependent Variable GY (without FIS).....	231
5-8	Dependent Variable GY (without RI_{t-1} , RI_{t-2} and T).....	232
5-9	Estimated Elasticities for GY.....	233
5-10	Results of Historical Simulation of EM....	239
5-11	Results of Historical Simulation of GY....	242
B-1	Correlation Matrices.....	251
C-1	Dependent Variable EM.....	254
C-2	Dependent Variable GY.....	255
D-1	Dependent Variable EM (with RI_t , without FIS).....	258
D-2	Dependent Variable EM (with RI_t , RI_{t-1} , without FIS).....	258
D-3	Dependent Variable EM (with RI_t , RI_{t-1} , RI_{t-2} , without FIS).....	259
D-4	Dependent Variable EM (with RI_t , RI_{t-1} , RI_{t-2} , RI_{t-3} , without FIS).....	259
D-5	Dependent Variable GY (with RI_{t-1} , without FIS).....	260
D-6	Dependent Variable GY (with RI_t , RI_{t-1} , without FIS).....	260
D-7	Dependent Variable GY (with RI_t , RI_{t-1} , RI_{t-2} , without FIS).....	261
D-8	Dependent Variable GY (with RI_t , RI_{t-1} , RI_{t-2} , RI_{t-3} , without FIS).....	261
6-1	Summary of Policy Conclusions and Other Explanatory Variables.....	267

LIST OF FIGURES

Figure	Description	Page
1-1	The Impact of an Exogenous Increase in Aggregated Demand in a Small Open Region.....	6
4-1	Dynamic Path of Variable A.....	154
4-2	Stability of Real Per-Worker Growth of Income.....	160
4-3	Graphical Explanation of Policy Implications of Model I.....	162
4-4	Labor Supply.....	170
4-5	Stability of Model II.....	177
4-6	Real Per-Worker Income Growth.....	178
5-1	Forecasting Accuracy Test (Employment Rate).....	241
5-2	Forecasting Accuracy Test (Real Per-Worker Income Growth).....	243
A-1	Evolution of GY Through Time.....	246
A-2	Evolution of EM Through Time.....	246
A-3	Evolution of W Through Time.....	247
A-4	Evolution of RGK Through Time.....	247
A-5	Evolution of RGE Through Time.....	248
A-6	Evolution of UN Through Time.....	248
A-7	Evolution of RGL Through Time.....	249
A-8	Evolution of RI Through Time.....	249
A-9	Evolution of FIS Through Time.....	250
A-10	Evolution of RMU Through Time.....	250

INTRODUCTION

Regional disparities have been a pervasive feature of the Canadian economic landscape since well before the turn of the century. The economic, social, cultural and political structure of the country has been shaped and conditioned by the existence of regional disparities. Their persistence continuously confronted Canada with a main problem of public policy. To cope with the disparity problem numerous regional policies have been designed and implemented. All these policies aimed to reduce disparities by increasing the income, employment, and fiscal capabilities of depressed regions. Nearly all such policies have received scholarly as well as political criticism for their ineffectiveness or distorting consequences. However, we cannot contend that the entire public policy effort, aimed explicitly or otherwise at diminishing regional disparities, has been ineffective - nor that the resources devoted to this endeavour has been inadequate.

Any further exploration of this subject should:

(i) employ a model with analytic features concordant with the region's actual economic conditions, and (ii) study each policy with explicit attention paid to the influences on its effects of, inter alia, other public policy efforts.

Numerous demand-determined models have been constructed to evaluate regional policies. Analytic work so far has been limited to demand-affecting policies and has studied them only in aggregated form. However, demand-affecting policies may either offset or reinforce each other, and such influences are omitted when policies are aggregated. At the same time, we need to evaluate supply-affecting policies, and this is best performed individually by supply-determined models.

To our knowledge, there is no regional model which considers both supply- and demand-affecting policies together and in disaggregated form. A central purpose of this dissertation is to remedy such shortcomings.

The first chapter reviews the literature pertaining to the theoretical constructs of Chapter IV. Chapter II reviews the full range of regional policies introduced since Confederation. Chapter III analyses the structure of the Newfoundland economy since its attributes make it a most appropriate region for purposes of this study. Chapter IV introduces three dynamic long-run supply-determined regional growth models which incorporate a number of policy instruments. In Chapter V two of these models are tested on Newfoundland data. Finally, a summary and some concluding notes are given in Chapter VI.

CHAPTER I

A BRIEF SURVEY OF REGIONAL GROWTH MODELS

In a stylized fashion, it is possible to categorize regional growth models into two classes - short-run or demand-determined, and long-run or supply-determined. Demand-determined models are typically short run ones where factors are not easily mobile between regions. Hence, demand fluctuations are the major determinants of real income and unemployment changes within the region. In the long run, as factors become mobile, supply considerations enter the picture and increasingly affect regional income and employment. Such long-run models will be referred to as supply-determined.

The intention of this chapter is to review the literature which has contributed to the specification of long-run models to be presented in Chapter IV of this dissertation. Even though long-run regional growth models are those relevant to this study, the main characteristics of the demand-determined models (in section I of this chapter) will be briefly outlined to serve as a point of comparison. Section II is then devoted to a critical survey of the long-run models. Finally,

section III will present some brief conclusions and suggestions relating to the fruitful extension of the models just outlined.¹

I - DEMAND-DETERMINED MODELS

Regional models in this category are essentially Keynesian and bear a close resemblance to Klein's (1953) national forecasting model. The model was introduced into the regional economic development literature by Bell (1967), followed by Glickman (1971), and was later improved on by Hall and Licari (1974). Since their introduction, these models have been further disaggregated and used by econometricians in the analysis of regional growth, mainly in the United States. Such models maintain that the rate of economic expansion of a region is linked to its ability to export products and to derive income from outside the regional boundaries. Export income may also be capital income from previous "out-region" investments and transfer payments from the federal government. However, in general, "export" income is a function of the GNP of the country as a whole.

-
1. It should be noted that there have been numerous attempts to synthesize supply- and demand-determined regional growth models. Those models will be categorized as supply-determined if they are long-run models and demand-determined otherwise.

These models are based on a regional accounting equation in which aggregate demand is identified to be the sum of consumption, investment, government and net export expenditures. Consumption is a function of disposable income. Investment has both an autonomous component and one which is induced by changes in regional income. Government transfers to the business sector are part of investment expenditures. Imports are consumed by local governments and the private sector, as well as by individuals. They are functions of regional income. One-sector models incorporate an aggregate production function, whereas for multisector models, a production function is specified for individual sectors. Regional supply is then determined by the aggregate demand (which is also used to calculate the Keynesian multiplier for the region). Consequently, employment will be endogenously determined by using a production function.

Demand-determined models ignore supply constraints. Thus, the main constraint in these models comes from the "export" sector, which is purely exogenous to the system. Fluctuations in aggregate demand are due to exogenous fluctuations in the export sector. The crucial implicit assumption in these models is that there exist large supplies of unemployed factors in the region. This assumption leads to a perfectly elastic supply schedule.

If aggregate demand increases by an exogenous factor - either an increase of demand for the region's exports or an expansionary policy of the federal and provincial governments - it is assumed income and employment in the region will increase. Consider Figure 1-1.

FIGURE 1-1
THE IMPACT OF AN EXOGENOUS INCREASE
IN AGGREGATE DEMAND IN A SMALL OPEN REGION

If aggregate demand shifts from D_0 to D_1 , income of the region should increase from Y_0 to Y_1 , which will also increase employment in the region. However, this may not happen if all the additional income is devoted to the

consumption of imports from outside the region.

These models, as specified, are not wholly capable of evaluating the effectiveness of regional policy because of their total neglect of supply side factors. Consequently, the models have to be respecified to incorporate such factors. Another shortcoming of a demand-determined model is its aggregated treatment of policies. Given that many policies have offsetting effects, the model may underestimate or in some cases overestimate the impact of these policies. For a point of reference, Table 1-1 summarizes the structure of some of the existing demand-determined models.

TABLE 1-1

STRUCTURE OF SELECTED EXISTING DEMAND-DETERMINED MODELS

	TYPE OF MODEL	NO. OF SECTORS	NO. OF EQUATIONS	CASE STUDY	ESTIMATION TECHNIQUE
Bell (1967)	recursive	1	21	State of Massachusetts	OLS 2SLS
Glickman (1971)	block recursive	3	26	Philadelphia	OLS 2SLS
Glickman (1977)	block recursive	3	228	Philadelphia and suburbs	OLS 2SLS
Hall and Licari (1974)	recursive	4	29	Los Angeles	OLS 2SLS
Foster (1977)	recursive	23	12	Nova Scotia	OLS
Olfert (1977)	dynamic recursive	1	26	-	was not estimated

Note: Interregional models were disregarded.

II - SUPPLY-DETERMINED MODELS

Long-run supply-determined regional growth models owe their intellectual heritage to neoclassical growth models of Solow (1956) and Swan (1956). Such models have the following assumptions:

- 1 - There is only one composite good for the region.
- 2 - The production of the good is a function of capital (K) and labor (L). It is well-behaved with constant returns to scale.
- 3 - The stocks of capital and labor are fixed in the short run and expandable in the long run via accumulation, reproduction, migration and birth.
- 4 - There is perfect competition in both the input and output markets.

In such a world, well-known efficiency conditions require the real wage rate to be equal to the marginal product of labor, which is itself a function of the capital-labor ratio. At the same time, the real rate of return should be equal to the marginal product of capital which - under constant returns to scale - is an inverse function of the capital-labor ratio. From these two equilibrium efficiency conditions we can see that the region with higher endowments of capital has a relatively higher marginal product of labor

and a lower relative marginal product of capital. In such a world, it is assumed that capital will move freely from high-wage regions to low-wage ones while labor will move in the opposite direction. This process will continue until wage-rental ratios become identical in all the regions.

It is generally assumed that the real wage rate in a region with a higher capital-labor ratio is higher, and the real rate of return to capital is lower, relative to a region with lower capital-labor ratio endowments. By assuming zero transportation costs and completely malleable capital, the low-wage regions experience the highest rate of growth of capital and high rates of increase in wages. Such a one-sector regional model may be represented as follows.

Let the region have a production function of Cobb-Douglas form, with constant returns to scale:

$$(1) \quad Y = AK^{\alpha} L^{(1-\alpha)}$$

where Y is the output of the region, A is a constant and $0 < \alpha < 1$. The rate of growth of output in the region can be written as a weighted average of the rates of growth of the inputs, i.e.

$$(2) \quad \dot{Y} = \alpha \dot{K} + (1 - \alpha) \dot{L}$$

where a dot means percentage rate of change. By assuming α (input elasticity of capital) is constant, we will have constant factor shares. The marginal product of each input will depend on the initial level of output per worker and the rate of change in the capital-labor ratio.

It is usually assumed that labor and capital move between regions in response to factor price differentials,² that is:

$$(3) \quad \dot{K} = F(r - r^n)$$

$$(4) \quad \dot{L} = f(w - w^n)$$

where r = the region's rate of return on capital,

r^n = the national average rate of return on capital,

w = the region's wage rate,

w^n = the national average wage rate.

Smith (1975) tests this type of model for different states in the United States. His empirical work confirms the hypothesis that (a) migrants move in response to wage

2. Refer to Borts (1960), Borts and Stein (1964) and Smith (1975).

differentials; (b) the growth of employment is directly related to the rate of net migration; (c) capital moves interregionally in response to a higher rate of return; and (d) the growth rates of states induce convergence of income per worker. Ghali et al. (1978) modify Smith's model by using interregional differentials in the growth rates of output, both as a proxy for expectation and as an additional determinant of input growth. In a further paper (1981), they make other modifications by expressing all the determinants of factor mobility as percentages of national averages with a one-period lag. Then they estimate the model, and their empirical work confirms the above-mentioned hypothesis.

If other factors affecting growth are considered, then such conclusions may not hold. For instance, Borts (1960) and Borts and Stein (1964) show in their two-sector model that a high money wage region with a relatively higher marginal efficiency of investment can grow faster than a region with low money wages. This can happen because of non-economic reasons, or because of a higher growth rate in savings within the region, and lack of information about investment alternative elsewhere. One can also demonstrate that a high wage region may grow more rapidly than a low-wage region if the demand for its exports grows. Such a model was tested by Borts (1960, pp. 328-331) for 48 states of the United States from 1919 to 1953. His empirical

investigation casts a doubt on the hypothesis that wage differentials are a significant factor affecting capital mobility, as such an effect can be eliminated by migration. Nevertheless, the role of demand still had a strong influence on the relative movements of capital and on the improvement in wages in the different states.

The neoclassical model of growth was originally criticized by Myrdal (1957). He maintains that regional growth is a disequilibrating process, in which the forces of the market will increase (rather than decrease) inequalities among regions. His argument can be outlined as follows. Market forces lead to the build-up of increasing-returns activities in certain areas of the economy. This build-up becomes self-sustaining because of increasing internal and external economies at these centers of agglomeration. Depressed regions have some favorable advantages for growth, such as cheap labor and natural resources, but these favorable advantages will be outweighed by disequilibrating flows of labor, capital, goods and services from poor to rich regions (Richardson, 1973, p. 29).

Kaldor (1970) followed Myrdal in attacking the predictions of neoclassical theory. His arguments are important for this study, especially his proposition concerning

labor subsidies.³ He argues that once a region gains a growth advantage, it will tend to sustain that advantage through the process of increasing returns to growth itself. Kaldor's main emphasis is on the demand for the exports of the region, and labor supply behavior. The demand for its export is exogenous to the model, while labor supply behavior takes effect through a quasi-endogenous factor, efficiency wages. He defines efficiency wages as the ratio of the money wage index to the productivity index and claims that the region with a higher growth rate also exhibits a higher productivity rate, which will by itself lead to a lower efficiency wage rate. On the other hand, lower efficiency wage rates will lead to higher growth rates. This explains why the relatively fast-growing regions tend to acquire cumulative advantages over the slow-growing ones.

As Dixon and Thirlwall (1975, p. 201) have pointed out, Kaldor's main argument is based on Verdoorn's law.⁴ Kaldor proposes a flat-rate subsidy per unit of labor as a policy device for reducing persistent regional growth rate disparities. In his view, such a subsidy can reduce the

3. This subsidy is considered in Chapters IV and V.

4. According to Verdoorn's law (or Verdoorn's effect) the growth of labor productivity is partly dependent on the growth of output itself (Verdoorn, 1949).

efficiency wage rate. A lower efficiency wage rate is associated with lower domestic prices, including export prices. Consequently, exports of the region will be more competitive, and the quantity demanded of the exports will go up. This will lead to higher growth for the region, which through Verdoorn's effect will reduce the efficiency wage and restart the cycle. He concludes that wage subsidies can permanently raise a lagging region's growth rate. Kaldor's proposition is a strong one, and it is not known yet at least in the Canadian context, if Verdoorn's law holds.

A further critique of the neoclassical theory of regional growth is presented in the growth pole approach of Perroux (1953) and Hirschman (1958).⁵ For Perroux all economic forces center around a certain 'pole' or foci, implying economic space is a field of forces. Hirschman's prescription for the underdevelopment of a region is to develop a growth pole or particular growth poles. The key suggestion is to introduce master industries which have the ability to alter the whole pattern of economic relationships within a

5. The significance of this theory in the study is that the Department of Regional Economic Expansion (DREE) appears to use this theory for one of its policy enactments, the Regional Development Incentives Act (RDIA). This point will be discussed in Chapters II, IV and V.

region. Such master industries will increase regional development by forward and backward linkages. Backward linkages are related essentially to suppliers of raw materials which master industries require for processing. Forward linkages are related to the activities that grow up along the market chain of the product of the master industry.

In this theory a master industry can bring changes to the area around it in two ways (i) by encouraging new companies to supply it with the materials which are needed (backward linkages), and (ii) through the development of external markets for its products (forward linkages). A master industry can be successful in contributing to regional growth by producing at a lower cost than elsewhere. This objective can be achieved either through the introduction of cost reducing technology and/or by achieving a large size. The former reduces marginal costs at any level of output, and the latter produces economies of scale (Matthews, 1977, pp. 132-133).

As outlined, the growth pole theory has the following shortcomings:

1 - It relies on the master industries being able to produce and supply the market area at lower prices than similar industries located elsewhere. If another industry of the same size, but located closer to the metropolitan area is established, the master industry loses its advantage.

2 - The low supply prices of the master industry may result from the introduction of capital-intensive technology. This would have an adverse effect on regional employment, ceteris paribus.

3 - As Matthews (1977, p. 133) emphasizes, the main flaw of this model results from its neglect of its social impact, since it is formulated almost exclusively in economic terms. The social impact of the model may undermine its usefulness. However, it should be noted that this problem also exists for other models of similar type.

In spite of the above-mentioned shortcomings, the policy makers, i.e. DREE, now DRIE, continue to use the growth pole model as a basis for their policy decision to increase growth in poor regions by relocating firms from developed regions to depressed ones. However, there are other elements which should be considered before using the model for policy purposes. For instance, the region must have the potential for growth and development. In other words, the capacity

and the potential of the region are the main determinants in making successful the policy applications resulting from a theory.⁶ In addition to the exponents of the growth pole model, criticism of the neoclassical theory of regional growth was also made by Richardson who raised the following questions:

- 1 - What size of urban agglomeration is necessary to attract outside industries on any particular scale?
 - 2 - What spatial distribution of population within a region is efficient?
 - 3 - Is distance between regions a relevant factor in explaining regional growth differentials?
 - 4 - How important are agglomeration economies as determinants of regional growth?
 - 5 - Are the disadvantages of lagging regions remediable, particularly by appropriate injections of public investment?
 - 6 - How does the spatial structure of the national economy influence interregional factor mobility and diffusion of innovation, and hence the dispersion of regional growth?
 - 7 - How important are non-economic influences such as locational preferences, community attitudes, and political constraints on regional growth rates? What is the role of urbanization in regional development? (Richardson, 1973, p. 5)
-

6. Chapter III will show how the region under study may have many obstacles to its growth and development such as to render futile the application of existing theory.

Richardson's own growth model attempts to address the above issues. His model incorporates a Solow-type production function where: (a) the rate of growth of capital stock depends on agglomeration economies and the capital return differential between the region and the rest of the economy, (b) the supply of labor is related to locational preferences, the wage differential, the natural population growth, and agglomeration, (c) locational preferences are a function of agglomeration economies, population potential, length of residence, wage differential and cost of movement between the region and the closest high-income region, (d) technical progress in the region depends on agglomeration economies, the growth of capital stock, the standing of the region's leading city in the nation's urban hierarchy, and the national rate of technical progress.

Owing to the difficulty of finding data on the size and spatial distribution of capital stock for a region, it may not be possible to test Richardson's model directly. However, it has not escaped criticism on other grounds. For example, Bøventer (1975) maintains that it is, in many ways, not operational, since its formulations are more in the spirit of an explanatory model. Moreover, the time structure of the system of equation is left open. Lead and lag relationships are not discussed at all. We need to

distinguish between the level of technical knowledge and its rates of progress in Richardson's model. It should be noted that Richardson (1975) accepts some of the problems related to his model raised by Böventer.

Böventer (1975) introduces a model in which he tries to solve the problems in Richardson's model, but his own has drawbacks. None of his structural equations (income, labor force, investment) has a precise functional form. Although his model includes a number of variables which deal with the structure of the regional economy, and one which is related to changes in industrial structure, it is not testable since data at the regional level are not available, nor is the role of price changes considered.⁷

Some attempts have been made to modify the neoclassical regional growth model in the light of Richardson's (1973) criticism. Lande and Gordon (1977), for instance, construct a model which considers the existence of agglomerative industries, and allows for a spatial distribution

7. For more discussions on issues raised by this model, see Miernyk (1979).

with disaggregated production functions. According to their empirical results, some labor moves over space in order to maintain a certain industrial affiliation, while other workers switch industries (occupations) in order to maintain a certain spatial affiliation. In other words, some laborers move to higher income regions, but maintain their occupations, while others, responding to a strong locational preference and substantial opportunities in another local industry, choose not to migrate.

Moreover, Anderson (1976) in his three-sector growth model shows how a higher wage rate could generate higher expected growth for the region. Higher wages lead to a next-period inflow of labor, which increases the size of the region. This, in turn, induces changes in regional technology and leads to agglomeration economies. As Pred (1966) emphasizes, interaction among production units in large and concentrated regions leads to innovation and to the sharing of overhead costs of production in a process of agglomeration. These effects tend to shift the demand curve for labor and to raise both nominal and real wage rates. Consequently, new immigrants will be attracted and a possible reduction in production costs occurs. These effects, by themselves, will create higher

expectations for future growth. As a result, the region will attract more entrepreneurship and investment. In the long run, both greater entrepreneurial activities and higher investment should generate greater capital formation which will lead to higher growth for the region.

None of the above supply-determined models considered the impact of regional policies on output supplied by the region. Recently, several multi-sector models which consider the impact of an external shock, possibly induced, on a sector of the region and its spillover to other sectors have been developed.⁸ For instance, Flatters (1981) analyzes the impact of technological change on regional employment using a two-sector model. Copithorne (1981) develops a two-sector model for Newfoundland, in which each sector has a constant returns to scale production function. One sector includes natural resource export products and the other non-tradable domestic goods and services. Both sectors use capital and labor as their inputs, but the natural resource sector also uses resource inputs. The model has a balance of payments constraint which equates the value of import goods to the

8. These models are considered general equilibrium models. For examples see Norrie and Percy (1982b, pp. 16-26).

value of export goods plus transfers from outside. Also specified is a demand function for the region, derived from a given utility function. From perfectly competitive equilibrium conditions Copithorne derives a demand for labor in each sector. As is the tradition for Newfoundland, both the wage rate and the rental rate of capital are exogenous.⁹ The labor supply function is similar to that of Borts and Stein (1964, p. 79), but in an explicit form. The model derives an unemployment equation using the labor supply equation and the aggregate labor demands from the two sectors. Policy aspects are introduced through the demand side. A notable feature of the study is an attempt to illustrate the ability of transfers to destroy the effectiveness of out-migration as an anti-unemployment tool. The critical question arising here is: what is the impact of transforming regional policies on the region's unemployment rate? Unfortunately, Copithorne's model, similar to other existing regional models, does not deal with these policies. This model was not tested empirically.

9. Since Newfoundland is a small, open region and no constraints on capital mobility are in place, the province's rate of return on capital is generally considered to be exogenously determined. Newfoundland's wage rate is also believed to be exogenously determined as borne out by numerous empirical studies conducted on the province's labor market. For more details refer to Chapters III and IV.

One obvious problem with all models like Copithorne's is that they are comparative static in design. They do not consider the transition period between two equilibria.¹⁰ As Norrie and Percy (1982b, p. 23) mention, these models assume that the economy is in an initial equilibrium, and ask what adjustments in endogenous variables would be required to reestablish such an equilibrium condition in the event it is disturbed by some exogenous shock. How the economy adjusts to a new equilibrium is not explicitly stated in these models. To study the impact of a policy adjustment path is very important, as Norrie and Percy (1982b, p. 23) make clear: "...the path of adjustment is as interesting as the structure of the new equilibrium itself. Some form of dynamic optimization model is desirable."

To examine inter-equilibria transition a dynamic general equilibrium model is necessary. An example of such an existing model for Newfoundland is the one developed and tested by Swan and Kovacs (1981). This is a one-sector model with m firms, each having a Cobb-Douglas production function exhibiting first increasing and then decreasing

10. For the importance of transition period and transition path on the efficiency of the economy, refer to Kia (1983).

returns to scale. From the equilibrium condition of each firm, firm-specific labor demands are obtained, and then aggregated to form the regional demand. Using the aggregate demand for labor and assuming a specific labor supply, a dynamic equation for the regional unemployment rate is calculated. The model also presents an equation for the rate of change of money wages as a function of the inflation rate, the unemployment rate, wage parity, and generosity of unemployment insurance.' The analysis, while one of the most articulate existing models for Newfoundland, has some shortcomings. In particular: (i) government policies are treated in aggregated form; (ii) their influences are only on the demand side of the model and (iii) the participation rate is assumed constant, while empirical evidence indicates this rate has been rising in Newfoundland (see Chapter III).

III - CONCLUSIONS

According to standard regional growth theory, regions with relatively high capital-labor endowments can be expected to have a relatively high wage-rental ratio. Capital flows from high wage regions to low wage regions and labor flows in the opposite direction. A high wage region may grow more rapidly than a low wage region, if demand for its exports (relative to other regions) grows faster - or due to non-economic reasons. The underlying assumptions of the theory are also a matter for discussion. In particular, the assumptions of perfect competition, zero transport cost, constant returns to scale, etc. should be modified. By considering agglomeration economies and allowing for space, other authors have developed different regional growth models. However, such models cannot be tested empirically.

Is the growth of a region supply-constrained or is it demand-determined? That issue is not yet resolved in the literature. For example, in Borts and Stein (1964) the supply of labor in a region is perfectly elastic, and the demand for labor determines employment and wages. However, a model like theirs usually considers labor as a homogenous factor. In reality, labor is heterogeneous, including skilled, semi-skilled and unskilled labor. We need to consider how these components change or how the quality of the labor force grows.

It can be argued that reward differentiation will induce laborers of different kinds to move to different regions, and in the long run, the scarcity of skilled labor in different regions will be eliminated. But in reality this may not be the case, because the wage rate of skilled labor may grow in all regions at the same time. On the other hand, what can be obtained with given wage levels may be more important than how high the wage level is, e.g. wages in Ontario may provide better access to universities, libraries, medical care, roads, entertainment, etc. than in Newfoundland. These factors, among others, can reduce further labor mobility.

As can be seen from this brief survey, the supply-determined models, although some capable of being used to evaluate all regional policies, have not yet been used for this purpose. The central goal of this dissertation is to develop and test such a supply-determined model in order to independently evaluate various regional policies for Newfoundland. The regional supply models developed for this purpose are dynamic and long run in nature, allowing us to evaluate the impact of both demand- and supply-determined regional policies (as well as their adjustment paths) on the Newfoundland economy from 1954 to 1982. The models are presented in Chapter IV.

CHAPTER II

A CLASSIFICATION OF FEDERAL REGIONAL POLICIES IN CANADA

INTRODUCTION

The goals of regional policies have been the reduction of disparities and the creation of self-sustaining growth within the regions of Canada. Lithwick (1982) studied the evolution of the regional policies in Canada in a broad sense and concluded that two types of policies have been pursued.

1 - Compensating Policies: Federal government transfers to the provinces and individuals intended to ensure an adequate minimum level of private and/or public goods.

2 - Transforming Policies: Federal government involvement in structural changes to discourage the misallocation of resources and encourage new ways of achieving regions' economic potentials.

Transformation involves long-term adjustment processes, while compensation is of short-term nature (Lithwick, 1982, p. 276). Professor Lithwick also believes that "Once again, two conflicting views persist. One sees regions as essentially autonomous, and hence regional policies must emphasize intraregional strategies.

The alternative view sees regions as economically interdependent, so that policies for one region must take into account spillovers (linkages, leakages) onto other regions. As a result, interregional strategies become an important element in this conception." (p. 276)

This approach is extended by proposing that not all supply-affecting regional policies are necessarily transforming ones. They may have either a transforming or a distorting impact in the long run. A supply-affecting policy may, for instance, shift the region's marginal cost curves down and to the right while it is in force. If marginal cost curves remain in the neighborhood of their new positions after the policy has been terminated, the policy may be said to have had a transforming effect, while if the curves shift above and to the left of their original positions, the effect has been a distorting one. While the nature of a policy (compensating or supply-affecting) may be determined ex ante, and categorized accordingly, its impact is an empirical question and the subject of an empirical test. Such tests are conducted later in the empirical chapter.

Professor Lithwick's broad evaluation of regional policies in Canada will be summarized as follows. Prior to Confederation, regional policies were transforming policies in largely autonomous colonies. MacDonald's National Policy

shifted the regional policies to transformation with leakage to the other regions. The equalization policies of the 1950's changed policies to compensation, with the linkage to the other regions. Since 1960 we have had both compensating and transforming policies. Both kinds of policy consider regions to be largely autonomous. Recent compensating and transforming policies may have cancelled each other's impact. (Lithwick, 1982, p. 278)

The Department of Regional Economic Expansion (DREE) was established in 1969 to coordinate policies with a shift in emphasis towards industrial incentives and infrastructure as well as social adjustment and rural economic development. In the middle of the 1970's, a new instrument, the General Development Agreement (GDA), was developed. It was intended to coordinate federal resources with provincial governments' resources as well as private resources.

This chapter attempts to identify and categorize the full range of particular regional policies. In the first part, all unconditional, largely compensating, grants given by the federal government are detailed. The second part is devoted to conditional grants that are compensating or transforming in nature. The third part concerns the

Department of Regional Economic Expansion (DREE) and is followed by a short conclusion.¹

I - UNCONDITIONAL GRANTS

Unconditional grants have been paid to provinces by the federal government since Confederation under the terms of the British North America Act. They are unconditional in that the provinces have been able to use them as desired. The four most important unconditional grants currently in use will be dealt with in this chapter.

1 - Equalization Payments:² A crucial aspect in reaching agreement on Confederation was the federal government's commitment to make financial subsidies to the provinces. Under the terms of the 1952 Tax Rental Agreements, the provinces leased their right to levy individual and corporation income taxes, special corporation taxes and succession duties to the federal government in

-
1. Unconditional grants will be dealt with first since they are mostly compensating policies, and have been paid to each province continuously since Confederation. Conditional grants, on the other hand, were paid to the provinces under policies of limited duration. They were both compensating and transforming.
 2. Prior to 1971, equalization payments were implemented under different acts and agreements (and various titles).. See Kia (1985) on the evolution and the resulting structure of equalization payments.

exchange for a rental fee calculated by making upward adjustments to a guaranteed minimum payment. These upward adjustments were for increases in gross per capita national income and provincial population. The province of Ontario retained the right to levy succession duties and the province of Quebec did not sign the 1952 Tax Rental Agreements. The grants were paid under the Agreement until 1957. These payments are shown in Appendix Table A-1.

In 1958 the federal government introduced the Federal-Provincial Tax-Sharing Arrangements Act.³ All provinces received revenues from "standard rates of taxation" equal to the average of the two highest per capita provincial yields. Quebec did not sign the 1958 Arrangements Act, but received the tax equalization payment. Ontario agreed to rent only its personal income tax rights. Payments were made under the Tax Sharing Arrangements in 1958, and under the Federal-Provincial Tax-Sharing Arrangements from 1959 to 1962.

3. A good historical study of tax rentals and tax-sharing arrangements can be found in Careless (1977), Chapter 3, pp. 33-42.

In 1962 a significant change in equalization payments took place: 50 per cent of natural resource revenues were added to the formula. The main and immediate impact of this change was the reduction of equalization payments to Alberta and British Columbia and the increase of payments to the provinces that had negligible revenues from this source. Starting from 1963 these payments were made under the Federal-Provincial Fiscal Arrangements. In 1964 there was another significant change in equalization payments: any province that received a per capita yield from natural resources above the national average received lower equalization payments. The reduction in their equalization income was 50 per cent of their natural resources income. Table A-2 of the Appendix to this chapter presents federal government expenditures under this Arrangement. As the table shows, Alberta receipts fell from \$58 million in 1962 to \$14 million in 1963. This change also occurred for British Columbia where the payment was reduced from \$74 million in 1962 to \$2 million in 1963. As the income from natural resources of these two provinces increased, their payments fell. In 1964 Alberta's payment decreased from \$14 million to \$10 million and British Columbia's payments were reduced from \$2 million in 1963 to \$190,000 in 1964.

In 1967 these payments were modified according to the Federal-Provincial Fiscal Arrangements Act, 1967, with respect to: (a) tax equalization; (b) provincial revenue stabilization; and (c) provincial abstention from the succession duty field. Additional adjustment grants were also made to all Atlantic Provinces. These grants were the response of the federal government to the widespread consensus of "have-not provinces" that federal payments would result in the perpetuation of substantial fiscal disparities among provinces. It should also be mentioned that the change made to equalization payments include all provincial government revenue sources.

Since 1971 these payments have been called "Equalization Payments". However, the main purpose did not change. As before they made it possible for provinces with tax bases of below-average productivity to provide reasonable standards of public services without having to resort to levels of taxation above the average of all provinces (Government of Canada, 1977, p. 59).

There was a modification in 1977 in the equalization payments formula. Accordingly, only half of provincial revenues from non-renewable natural resources could be taken into account. The 1977 formula was criticized by many studies as well as government officials (see Kia, 1984).

The formula was modified in 1982 so that the payments guarantee that a province's revenues from each revenue will be raised to a level determined by the per-capita average of the five representative provinces (Ontario, Quebec, Manitoba, Saskatchewan, and British Columbia).⁴

2 - Subsidies: Another unconditional grant that provincial governments have been receiving since Confederation is called "Subsidies". These subsidies are paid annually under the terms of the British North America Act. They include various additional annual subsidies based on fiscal needs which have been introduced over the years.

The purpose of these subsidies is to provide a source of revenue to the provinces and to compensate for revenue lost on joining the Dominion (Government of Canada, 1975, p. 112). Adjustment grants of \$35 million were introduced in 1958-59, to be paid annually until 1966-67 as well as the transitional and additional grants paid to Newfoundland under the terms of the Union. These payments are shown in Appendix Table A-4.

4. These changes and all payments are shown in Appendix Table A-3.

3 - Share of income tax on power utilities: The provinces have also been receiving a share of the income tax collected by the Government of Canada from corporations whose main business is the distribution (or generation for distribution) to the public of electric energy, gas or steam. These payments are not contingent upon a province signing a tax rental agreement. Provinces have been receiving 95 per cent of this federal income tax. Federal government payments to Newfoundland and all provinces combined are shown in Table 2-1.

TABLE 2-1

SHARE OF INCOME TAX ON POWER UTILITIES
1954-1982

Year	Newfoundland (\$000)	Canada (\$000)
1954-58	1,020	36,049
1959-63	912	34,058
1964-68	1,389	38,586
1969-73	8,536	174,478
1974-78	9,845	170,489
1979-82	33,526	374,037

Source: Federal Government Finance, Statistics Canada, catalogue number 68-211.
Annual publication.

4 - Compensation due to withdrawal from joint programs: These unconditional grants include payments to the province of Quebec, under the established Programs (Interim Arrangements) Act, with respect to its withdrawal from the following joint programs: the Hospital Insurance and Diagnostic Services; Old Age Assistance; Blind Persons Allowances; Disabled Persons Allowances; Unemployment Assistance; Canada Assistance Plan; Technical and Vocational Training and other miscellaneous health and welfare services. This payment was given to the province of Quebec from 1967 to 1975 inclusive. During this period Quebec received \$1,648,247,000 under this compensation program.

II - CONDITIONAL GRANTS⁵

Conditional grants are directly related to the expenditures made by the receiving governments. These grants are divided by their impact on the region. Their impact can be either demand-stimulating (compensating policies) or supply-affecting (transforming policies). Both policies can have short-run and long-run effects. A short-run transforming

5. For definitions and purposes of all programs mentioned in this section, refer to Federal-Provincial Programs and Activities, Government of Canada, 1975, and Federal Government Finance, Statistics Canada, catalogue number 68-211.

policy is defined as one that has a supply effect only for the period the policy is in force. A long-run policy, by contrast, is one the impact of which remains in effect after it has been terminated.

A - Conditional Compensating Policies⁶

This category includes health, social welfare, civil defence and recreational and cultural services.

Health: There have been many programs related to health since Confederation. For example, General Health Grants were established in 1948 as a step in the development of adequate provincial health services. These grants were given for hospital construction, general public health, tuberculosis control, mental health, venereal disease control, disabled children, professional training, cancer control, public health research, laboratory and radiological services, medical rehabilitation, child and maternal health and many others. Other programs in this category include the Hospital Insurance Program, Extended Health Care Services, Health Resources Fund, Hospital Insurance and Diagnostic

6. Policies in this category are national but produce regional impacts.

Services, Medical Care, and Professional Training Program. Federal government contributions to Health Grants are detailed in Appendix Table A-5.

Social Welfare: The federal government has been giving many grants in this category to the provinces. These include Old Age Assistance, Blind Persons Allowances, Disabled Persons Allowances, Unemployment Assistance, Canada Assistance Plan and many others. The contributions of the federal government under the social welfare program are given in Appendix Table A-6.⁷

Civil Defence:⁸ The programs in civil defence include Protection of Persons and Properties, Emergency Planning, Purchase or Sale of Utilities and Municipal Services, Financial Assistance Program, Firearms Financial Agreement, Canadian Police Information Centre, Maintenance

7. Cox and Johnson (1983) study the impacts of health, social welfare and equalization in Ontario, Quebec, the Atlantic Provinces and Manitoba. The study finds that conditional grants for health and social welfare cause expenditures from the provinces' own sources on these programs to increase (except for social welfare expenditure in Quebec). It concludes that provincial deficits and/or taxes will rise as a consequence.
8. Policies in this category are once again national, yet produce regional impacts.

of Paroled Inmates Apprehended Under Warrant Suspension, Police Service Under Contract, Agreements for Community Assessments and Parole Supervision Services, Exchange of Correctional Services between Federal and Provincial Governments, Consultation Centre Activities and many others. Table A-7 of the Appendix shows the total contribution of the federal government to these programs.

Recreation and Culture Services: The federal government contributes in many ways to these purely demand-stimulating, essentially compensating programs. The grants in some cases were given to provincial governments and in other cases to municipalities. The programs include Camp Ground and Picnic Area Development, Fitness and Amateur Sport, and the Centennial Commission. Data on federal government grants are given in Appendix Table A-8.

B - Transforming Policies

Transforming policies can be found in the following sectors: (1) labor market; (2) transportation; (3) agriculture and settlement; (4) industries; (5) urban areas; and (6) housing.

Labor Market: Grants for the labor market are divided into two categories: (i) education and (ii) employment

(i) Education: Educational training increases the supply of skilled workers, so that educational grants have a long-run supply impact by reducing the marginal costs of education. Consequently, the supply curve of skilled workers will shift to the right and this will generate lower wage rates for any given demand for labor. On the other hand, these grants can have a long-run effect on the demand for labor as well. This occurs through a rise in the productivity of workers which by itself shifts the marginal product of the workers.

Such grants do not necessarily lead to growth and development of the receiving regions since any trained worker can move out of the region. Empirical study is the only way to verify the impact of educational grants on such regions. These grants include the following:

(a) Vocational Training: Following the Vocational Training Co-ordination Act, 1942, a new Act, the Technical and Vocational Training Assistance Act, was passed, effective December 20, 1960, whereby agreements may be entered into with the provinces to provide financial assistance for the development and operation of technical and vocational training facilities and programmes throughout Canada. An amendment authorized agreements with any province for a

federal contribution of 75 per cent of capital expenditure on trade and vocational schools, technical institutes and vocational high schools. Earlier vocational training agreements had been in effect since 1939. Capital assistance grants, however, were paid to the provinces from 1962 to 1972 as given in Table 2-2 below for Newfoundland and all provinces combined.

TABLE 2-2

CAPITAL ASSISTANCE GRANTS ON VOCATIONAL TRAINING

Year	Newfoundland (\$000)	Canada (\$000)
1962	2,681	17,901
1963	12,932	179,626
1964	4,920	102,037
1965	311	52,758
1966	118	41,555
1967	73	94,500
1968	999	119,019
1969	200	105,949
1970	-	88,359
1971	8,573	170,298
1972	4,130	75,442

Sources: 1961-65: Government of Canada, Public Accounts. Annual publication.

1966-72: Government of Canada, Manpower and Immigration. Annual publication.

b) Canada Manpower Training Program: This program was designed to provide occupational training to improve adults' capacity or opportunity for employment. The

institutional training portion of the program is composed of the following elements: Occupational Skill Training, Apprentice Training, Language Training, Basic Training for Skill Development, Work Adjustment Training and Basic Job Readiness Training. In addition, allowances are paid to individuals enrolled in full-time training courses. The program started in 1961 and is continuing indefinitely (Government of Canada, 1975, p. 190). The federal government expenditures on this program for Newfoundland and Canada are given in Table 2-3.

TABLE 2-3

CANADA MANPOWER TRAINING

Year	Newfoundland (\$000)	Canada (\$000)
1961	234	8,452
1962	293	17,828
1963	262	28,288
1964	830	34,394
1965	513	34,475
1966	781	37,823
1967	3,201	72,521
1968	5,523	85,636
1969	4,348	267,203
1970	10,911	245,044
1971	12,215	289,376
1972	11,969	328,436
1973	12,985	343,497
1974	17,670	363,195
1975	17,606	401,192
1976	23,183	506,627
1977	24,216	547,582
1978	23,697	572,148
1979	25,084	737,390
1980	20,742	532,197
1981	27,244	770,617
1982	33,083	983,188

Sources: 1961-65: Government of Canada, Public Accounts. Annual publication.

1966-82: Government of Canada, Manpower and Immigration. Annual publication.

(ii) Employment: Employment grants have a direct short⁹ and long run impact on the labor market.

a) Winter Work Projects in Municipalities: In an effort to alleviate seasonal unemployment, the federal government in 1958-59 instituted contributions to the provinces, to be passed on in most cases to the municipal governments, amounting to one half the labor costs on certain projects in municipalities carried out in the winter months. This grant has a short-run supply effect since as soon as it is cut its effect stops. The program covers the period from 1959 to 1970 as shown in Appendix Table A-9.

b) Youth Job Corps Program:¹⁰ This program provides employment opportunities for unemployed youth through projects developed by federal departments and agencies which will improve participants' employability.

c) Summer Job Corps: This program reduces summer youth unemployment by creating short-term jobs, with priority given to students and recent graduates in those provinces where the youth unemployment rate exceeds a pre-determined national youth base rate. This program started in 1977.

9. The short-run, supply-affecting policies may not be considered transforming policies in the sense of Lithwick (1982).

10. This program is national but with regional impacts.

d) Young Canada Works Program:¹¹ This program creates employment for students during the summer months by utilizing the expertise of local organizations in the development of employment generating projects in areas of community needs. This program started in 1975. Federal government expenditures on this program for Newfoundland and Canada are given in Table 2-4.

TABLE 2-4

YOUTH CANADA WORKS PROGRAM

Year	Newfoundland (\$000)	Canada (\$000)
1975	2,831	32,745
1977	3,612	45,999
1978	1,987	42,188
1979	2,657	53,351
1980	2,580	57,475
1981	2,960	67,867

Sources: 1975-80: Government of Canada,
Manpower and Immigration.
Annual publication.

1981: Government of Canada,
Federal-Provincial Programs and
Activities. 1981-82.

11. This program is also national with regional impacts.

e) Local Employment Assistance Program (LEAP): This program provides funds to be disbursed primarily as wages for projects that promise to create worthwhile employment opportunities for those people who would probably remain unemployed despite normal labor market activity. This program is a continuing one and has been effective since 1973. It is financed entirely by the federal government although provincial and municipal governments provide assistance through capital contributions, cost-sharing or the provision of support services. Federal funds are used primarily for wages and employee benefits. The federal government expenditures for Newfoundland and Canada are given in Table 2-5 below.

TABLE 2-5

LOCAL EMPLOYMENT ASSISTANCE PROGRAM

Year	Newfoundland (\$000)	Canada (\$000)
1973-74	3,405	13,914
1975-76	723	10,000
1976-77	922	15,100
1977-78	1,580	20,591
1978-79	1,599	25,062
1979-80	2,089	49,043
1980-81	1,884	58,045
1981-82	2,588	65,200

Source: Federal-Provincial
Programs and Activities.
1976, 1981-82.

f) Local Initiatives Program (LIP): This program provided employment and community betterment during the winter months and had as its primary objectives the reduction of high seasonal unemployment and high regional or area specific unemployment with minimal impact on labor force participation rates. The program was announced in 1971 and was in effect from 1973 to 1977. The federal expenditures on this program in Newfoundland and Canada are given in Table 2-6 below.

TABLE 2-6

LOCAL INITIATIVES PROGRAM

	1973	1974	1975	1976	1977
Newfoundland (\$000)	12,700	4,507	8,446	12,039	21,111
Canada (\$000)	204,900	72,821	84,356	134,000	187,100

Source: Federal-Provincial Programs and Activities, 1977.

g) Canada Works Program: This program which replaced the Local Initiatives Program in 1977-78 was designed to create employment opportunities for unemployed Canadians by utilizing their skills to provide useful services and facilities to their communities. The federal government expenditures for Newfoundland and Canada are given in the following table.¹²

12. The program continued in 1981 under Canada Community Development Projects.

TABLE 2-7

CANADA WORKS PROGRAM

	1978	1979	1980	1981	1982
Newfoundland (\$000)	36,074	17,110	19,574	17,626	15,283
Canada (\$000)	334,940	173,358	99,560	110,058	113,400

Sources: 1978-80: Employment and Immigration. Annual publication.

1981-82: Federal-Provincial Programs and Activities. 1981-82.

h) Federal-Provincial Agricultural Manpower Agreements:

The purpose of this program was for Canada and the provinces to carry out a joint agricultural manpower program in respect to the recruitment and movement of agricultural manpower, research and promotion of improvements in working and living conditions and other measures to the development and utilization of agricultural manpower. The program started in 1972 and ended in 1981. The province of Newfoundland was not a party to the Agreements. Federal government expenditure for this program was \$5.171 million.

i) Manpower Mobility Program: This program was authorized December 13, 1965. Loans and grants were made available, under specified conditions, to unemployed workers to enable them to move to the nearest areas in which they could obtain suitable employment. In 1969, the program was modified, loans were eliminated, leaving only grants. They

include (i) Trainee Travel Grants: the purpose was to enable unemployed workers to take adult occupational training courses in locations other than their own, (ii) Exploratory Grants: the purpose was to assist unemployed workers to search for employment opportunities in other areas, (iii) Relocation Grants: the purpose was to help unemployed workers to take up employment in locations other than their own. The federal government expenditures on these grants for Newfoundland and Canada are shown in Table 2-8.

TABLE 2-8

MANPOWER MOBILITY PROGRAM

Year	Newfoundland (\$000)	Canada (\$000)
1969	368	4,248
1970	441	5,914
1971	507	7,285
1972	495	8,897
1973	699	11,599
1974	1,099	11,482
1975	-	11,397
1976	922	12,958
1977	1,283	8,782
1978	1,302	10,484
1979	1,227	10,742
1980	1,066	9,566
1981	1,453	7,728
1982	987	8,067

Source: Employment and Immigration.
Annual publication.

j) Relocating Families from Isolated Fishing Areas: The province of Newfoundland received the following federal grants (Table 2-9) for relocating families. The purpose of the program was to provide financial assistance to families moving within the province from small, declining centres to centres where employment opportunities exist and where a fuller range of education and other public services are available. In 1972 the program was transferred to the Department of Regional Economic Expansion (Government of Canada, 1975, p. 344).

TABLE 2-9
FEDERAL GRANTS FOR RELOCATING FAMILIES
(Newfoundland)

1966	\$ 150,016
1967	500,000
1968	1,425,000
1969	1,400,000
1970	1,400,000
1971	168,000
1972	298,000
1973	232,000
1974	413,000
1975	168,000

Source: Federal Government Finance. Annual publication.

k) Area Development Agency (ADA): The Area Development Agency provided industrial development grants to industry as a means of improving employment opportunities in areas experiencing severe problems of unemployment, underemployment or declining employment opportunities. Established under the Department of Industry Act, 1963, the Agency used various

criteria to determine the Canada Manpower Centre and Census division most in need of assistance (Department of Regional Economic Expansion, 1969, p. 14). In 1965, the program was modified and continued under the Area Development Incentives Act (ADIA). Under this program, grants were related directly to the eligible capital costs of new machinery, equipment and buildings. The amount of the grant was based on a rate of one third of the first \$250,000 of eligible capital costs, plus one quarter of the next \$750,000, plus one fifth of any remaining eligible capital costs. The maximum grant for any new facility or expansion was set at \$5 million. In addition to such payments, approved projects were also eligible for accelerated capital cost allowance, thus producing a reduction in the amount of income tax payable (Department of Regional Economic Expansion, 1971, p. 14).¹³ Federal government expenditures on ADA for Newfoundland are given in the following table.

TABLE 2-10

AREA DEVELOPMENT AGENCY
(Newfoundland)

YEAR	1966	1967	1968	1969
ADA (\$)	6,576	95,592	36,975	3,039,271

Source: Sessional Paper 97C. National Library Archives, Canada.

13. This program was later continued under the Regional Development Incentives Act (RDIA) under the authority of DREE.

Transportation and Communication: All programs in this category have a long-run effect.

a) Trans-Canada Highway:¹⁴ In 1950 the federal government commenced making contributions to the provinces towards the cost of building a paved trans-Canada highway. Under the original terms, contributions were not to exceed 50 per cent of the cost to a province. In order to accelerate the completion of the highway, larger grants were arranged in 1956. For example, Newfoundland ended up with a grant equal to 90% of the cost. Federal grants up to March 31, 1964 amounted to \$413 million. This infrastructural grant produces long-run supply effects. They consist of reducing the costs of access to input markets and the transportation costs of supplying outputs to other markets.

b) Railway Grade Crossing Fund:¹⁴ The purpose of this grant is to assist financially the railway, highway, municipal and utilities authorities in actual construction costs for the protection and safety of the public in respect of highway/railway crossings (Government of Canada, 1975, p. 420). Being of an infrastructural nature, this grant also has a long-run supply effect.

c) Roads Leading to Resources:¹⁴ In 1958-59 the first payments were made under a program to assist the provinces in

14. The federal government expenditures on this grant for Newfoundland and Canada are included in the data given in Table 2-11.

the development of roads leading to resources. Expenditures up to March 31, 1964, under this program, were nearly \$53 million in which all provinces shared.

d) Trunk Highway Program:¹⁵ The federal government contributed \$47 million to this program from 1968 to 1970 in the Atlantic region.

e) Financial Assistance to the Construction and Operation of Municipal and Other Airports:¹⁵ The purpose of this program is to provide municipalities and other public bodies with financial assistance for the construction and operation of airports. The part of this grant paid for the operation of airports has only a short-run effect on marginal costs since the curves return to their original position once payments are terminated. It should also be noted that from 1960 to 1982, the federal government gave some short-run grants towards expenditures on railroads and water to some provinces. These grants were mostly in effect for a very short period. It must also be emphasized that the above programs represent only those directly affecting the labor market. There are many other regional programs which have an indirect impact on the labor market and will be dealt with later in this chapter.

15. The federal government expenditures on this grant for Newfoundland and Canada are included in the data given in Table 2-11.

TABLE 2-11

TRANSPORTATION AND COMMUNICATION*

Year	Newfoundland (\$000)	Canada (\$000)	Year	Newfoundland (\$000)	Canada (\$000)
1954	877	14,452	1969	13,693	69,188
1955	2,018	19,510	1970	14,968	61,406
1956	2,296	17,947	1971	9,721	55,955
1957	1,171	28,510	1972	11,406	44,160
1958	861	52,080	1973	5,557	49,265
1959	4,753	58,192	1974	11,048	55,862
1960	5,692	67,913	1975	3,831	44,714
1961	7,382	70,844	1976	863	86,598
1962	3,352	55,983	1977	793	166,155
1963	1,767	50,334	1978	368	134,891
1964	12,114	56,866	1979	10,455	189,360
1965	24,107	93,831	1980	18,531	150,342
1966	26,248	104,285	1981	6,371	115,578
1967	12,715	110,803	1982	11,934	129,644
1968	13,449	99,797			

* Includes Trans-Canada Highway, Railway Grade Crossing Fund, Roads Leading to Resources, Water, Trunk Highway Program, Access Roads to Fishing Ports, Air, Road, Rail.

Source: Federal Government Finance, Statistics Canada, catalogue number 68-211. Annual publication.

Agriculture and Settlement: Since Confederation, the federal government has been giving grants and contributing towards the costs of many supply-affecting (transforming) programs. They include:

a) Prairie Farm Rehabilitation Act (PFRA): The PFRA was passed in 1935 and amended in 1937 and 1939. It provided for technical and financial assistance for development of water supplies, adjustment of land use, and distribution of trees in the agricultural areas of Manitoba, Saskatchewan and Alberta. On July 12, 1968 the organization was transferred from the Department of Agriculture to the

Department of Forestry and Rural Development and in 1969 became part of the Department of Regional Economic Expansion.

b) Maritime Marshland Rehabilitation Act (MMRA): This Act (1948) gave the federal government responsibility for providing main protective works for approximately 100,000 acres of agricultural marshland in the Maritime provinces. At the same time, the governments of Nova Scotia, New Brunswick and Prince Edward Island undertook to ensure proper utilization of the rehabilitated marsh areas. In 1969 the administration of the Act was transferred to the Department of Regional Economic Expansion. In 1966 agreements signed between Canada and the three Maritime provinces provided for the transfer from the federal to the provincial governments of the operation and maintenance of works constructed under the MMRA program. This transfer was completed in 1970. As part of the agreement Canada provided engineering services to the provinces for soil and water conservation programs. MMRA was also designed as an operating arm of ARDA in 1963, and became the engineering agency for services outlined in the ARDA agreement (Department of Regional Economic Expansion, 1969, p. 31).

c) Agricultural Rehabilitation and Development Act: This program started in 1963 and was intended to alleviate the high incidence of low incomes in rural (agricultural) areas. It emphasized soil and water conservation and land use

conversion programs. The program ended in 1968. Originally under the Agricultural and Rural Development Act (ARDA), it continued under the Department of Regional Economic Expansion. The contributions of the federal government for Newfoundland and Canada are indicated in Table 2-12.

d) Agricultural and Rural Development Act (ARDA): In 1968 the poverty of rural, non-agricultural land was recognized and the original program (Agricultural Rehabilitation and Development Act) was expanded, while the land used programs of its predecessor were continued. Table 2-12 provides the relevant federal government contributions to Newfoundland and Canada.¹⁶

16. It is believed that ARDA programs depopulated rural areas. This view was first introduced by Buckley and Tihanyi (1967, p. 17) who claimed that the programs did not have any impact on low income farmers. They argue that these programs encouraged farmers to move out of rural areas in order that small farms be converted into larger ones. They considered them programs of "adjustment". According to Matthews (1977, p. 132), the formulation of Buckley and Tihanyi (1967) had a considerable impact on decision makers and consequently, in 1965, the Fund for Rural Economic Development (FRED) was established to provide comprehensive development planning for selected regions of Canada. Most of such planning was intended to move populations. Moreover, Careless (1977, p. 183) concludes that the benefits of both ADA and ARDA were biased in favor of richer provinces.

TABLE 2-12

AGRICULTURAL REHABILITATION AND DEVELOPMENT
AND ARDA

Year	Newfoundland (\$000)	Canada (\$000)
1963	-	542
1964	-	3,412
1965	240	7,759
1966	348	10,160
1967	465	13,728
1968	427	19,394
1969	500	24,486
1970	756	46,706
1971	365	53,100
1972	127	14,518
1973	320	19,794
1974	794	24,017
1975	1,715	27,462
1976	1,535	26,646
1977	1,545	27,018
1978	2,335	20,033
1979	504	16,205
1980	18	10,373
1981	35	10,909
1982	38	11,659

Source: Federal Government Finance, Statistics
Canada, catalogue number 68-211.
Annual publication.

e) Funds For Rural Economic Development (FRED): The program's objectives were to provide assistance to those areas requiring resources beyond those supplied by ARDA. It covered land management, education, infrastructural

investment and industrial development especially in the primary sector. It also covered tourism and manufacturing agreements with all of Prince Edward Island and parts of New Brunswick, Quebec and Manitoba. Federal contributions to this program for the 1972-82 period were \$459.8 million. Newfoundland did not receive any grants under this program.¹⁷

~~Industries:~~ Industries: In recent years and especially after the establishment of DREE, regional policy initiatives with an emphasis on industry relocation were introduced by the federal government. Their orientation seems to have been influenced by "growth pole" theories of Perroux and a belief in the efficacy of economic growth centres on the part of policy makers and some economists. This section deals with transforming policies for the manufacturing, housing and other industries as well as the natural resource sector, including fisheries, forestry, energy and mines.

-
17. A large number of agriculture and settlement programs of minor importance (for the province of Newfoundland) were implemented, e.g. the Okanagan Flood Control Project; Water Conservation and Flood Control Project; Crop Insurance; 4-H Assistance; Transport of Fodder; Bedding and Cattle; Agricultural Lime Assistance; Replacement of Maple Sap Buckets; Land Protection; Unharvested Crops, etc.

Fisheries:

The major policy issues in the fisheries are centered on areas of resource management and harvesting, processing development, marketing and quality control. Resource management concerns primarily the biological aspects of the resource, including the protection and conservation of fish stocks. Controlling the level of harvest in Canada's Atlantic fisheries is the purpose of the resource harvesting sector. The processing, quality control and marketing sector facilitates a market for the fishermen's catch and a source of income and employment for a large segment of the population of fishing communities. Finally, the resource development sector of these policies focusses on cases of resource decline, cost increases and market slump. Many of the federal grant and subsidy programs since Confederation are either relatively small or not relevant to the Newfoundland economy.¹⁸ Only the relevant and significant grants are reviewed here. They are:

18. They include Newfoundland Bait Service; Fishhandling (limited to Newfoundland with 1981 federal expenditure of \$2,978,000; Newfoundland Works Program (one year, 1962, only with federal expenditure of \$266,632); Fishing Bounty; Deep-Sea Fisheries Act, covering only Nova Scotia, Prince Edward Island, New Brunswick and Quebec; Assisting in the Construction of Bait Freezing and Storage Facilities (in effect since July 1959, covering Nova Scotia, Prince Edward Island and New Brunswick) and many others.

a) Fisheries Development: Its purpose was to provide for federal financial participation in fisheries development projects and programs undertaken by the various provinces under cost-sharing arrangements. Under the Fisheries Development Act, the Ministry instituted projects which lead to (i) a more efficient exploitation and development of new fisheries resources, (ii) the introduction and demonstration of new types of fishing vessels and equipment and techniques to fishermen and (iii) the improvement of handling, processing and distribution of fishery products and the development of new fishery products.¹⁹ Federal government expenditures for Newfoundland and Canada are indicated in Table 2-13.

19. The program contained no grants.

TABLE 2-13

FISHERIES DEVELOPMENT

Year	Newfoundland (\$000)	Canada (\$000)
1962	608	159.9
1963	764	6,325
1964	814	6,719.5
1965*	919.4	7,388
1966	1,038.8	8,152.4
1967	1,201.5	9,679
1968	1,411	7,042.6
1969	1,526.4	11,564.8
1970	1,948	14,458.9
1971-73	**	**
1974	591	1,380
1975	600	1,310
1976	440	1,214
1977	200	687
1978	100	313.5

* In 1965 this program went under the Fisheries Management and Development Programs (Public Accounts 1965, sect. 16.4).

** The data for this period were not available in a disaggregated form from any source.

Sources: 1962-70: Public Accounts. Annual publication.
 1974-77: Federal-Provincial Programs and Activities, 1977.
 1978: Department of Fisheries and Oceans Annual Report.

b) Construction of Vessels: The purpose of this program is to provide fishermen with financial assistance for the construction of new fishing vessels and for the conversion and modification of existing vessels with a view to increasing the productivity and efficiency of the Canadian

fishing fleets. The distribution of federal government contributions for Newfoundland and Canada are indicated in Table 2-14.

TABLE 2-14

CONSTRUCTION OF VESSELS

Year	Newfoundland (\$000)	Canada (\$000)
1954	6.8	148
1955	82	221
1956	41.6	258
1957	10.3	389.8
1958	25.8	331.9
1959	1.1	349.6
1960	34	474.5
1961	19	345.8
1962	66	302
1963	36	500
1964	42.8	500
1965	248	800
1966	119	1,771
1967	302.4	2,149.6
1968	1,116.8	6,248
1969	428	1,296.4
1970	397	565
1971	621	1,314
1972	1,437	2,700
1973	2,110	4,200
1974	4,344	10,925
1975	1,322	4,980
1976	900	4,000
1977	-	463
1978	850	4,065
1979	3,635	10,712
1980	2,902	8,500
1981	2,902	8,500
1982	704	2,244.8

Sources: 1954-69: Department of Fisheries and Forestry.
Government Programs of Assistance for Fishing
Craft Construction in Canada: An Economic Appraisal.
 June 1970.
 1970-77: Federal Government Finance, Statistics Canada,
 catalogue number 68-211. Annual publication.
 1978-82: Department of Fisheries and Oceans. Annual Reports.

Forestry:

Between 1954 and the establishment of DREE the forestry's long-run, supply-affecting regional policies were limited to Forest Inventories, Reforestation, and Spruce Bud Worm Control Programs. Though some of these policies have continued, the Forest Access Roads and Trails Program was added in 1958, the Forest Fire Protection Program in 1959, Forest Stand Improvement in 1962 and Woolly Aphid Control in 1967. Federal government contributions for Newfoundland, for the period of 1954 to 1980, amounted to \$5,959,000.

a) Forest Inventories: Under the terms of the Inventory Agreements, the federal government agreed to pay one half the cost of approved programs of the seven participating provinces. These agreements, executed in 1956 (expired March 31, 1962), provided for completion of initial inventories by March 31, 1958, and for maintenance of the inventories thereafter. The initial inventories have been corrected for such disturbances as fire and logging, and allowances have been made for growth and changes in stand-structure.

b) Reforestation: The participating provinces that maintained their reforestation programs on unoccupied Crown lands at a level equal to or above the previous three-year average, received a federal contribution of \$10

per thousand trees planted and \$1 per acre seeded. In addition, the federal government contributed one fifth of the cost of establishing and operating new forest nurseries.

c) Forest Fire Protection: In 1961-62, all provinces participated in the Federal-Provincial Forest Fire Protection Agreement. Federal contributions were available for capital expenditure on fire prevention and suppression equipment, buildings, airfields and improvements and the hiring of aircraft. The allotment to each province was dependent upon the province's past expenditures on fire protection and its forested area.

d) Forest Access Roads and Trails: As a continuation of a program initiated in 1958, a further offer of federal financial assistance to the provinces for the construction of forest access roads and trail was made late in 1960 for the period of December 1, 1960 to November 31, 1961. This was subsequently amended to continue until March 31, 1962. The federal government paid 50 per cent of such costs.

e) Stand-Improvement Operations: The costs of these operations were equally shared between the federal and provincial governments. These projects include cleaning, thinning, pruning and release operations designed to promote the stand and quality of trees.

f) Canada/Newfoundland Forest Resource and Land Capability

Study: The study provides a forest inventory of Newfoundland and Labrador and provides maps and descriptions of land capability according to specifications of the Canada Land Inventory. This ten-year study commenced in 1974 with federal government commitments to finance 90 per cent of its costs up to a maximum of \$5,175,000.

Energy:

a) Atlantic Provinces Power Development Act (APPDA): This Act (1958) provided for agreements between the Atlantic Provinces and the federal government whereby the latter financially contributes towards the generation, control and transmission of electric power. The contributions were to be in the form of long-term loans to cover the cost of constructing thermal electric power plants and high voltage transmission lines, or in the form of subsidies to coal mines to be used for generating electricity. Agreements under the Act are administered by the Northern Canada Power Commission. It is the responsibility of the provincial power commissions to ensure that coal subsidy payments are distributed by the various power producers to industrial power consumers in the form of rebates or reductions in rates for power (Department of Regional Economic Expansion, 1979, pp. 37-39).

b) Atlantic Development Board (ADB): This Board acted as an advisory body on economic problems in the Atlantic region. In 1963, the Board administered a development fund that supported large infrastructure investment projects including power systems, as well as water supply systems, industrial parks, etc. Table 2-15 shows the relevant federal government expenditures in Newfoundland.²⁰

TABLE 2-15

ATLANTIC DEVELOPMENT BOARD

(Federal government expenditures in Newfoundland)

	(\$000)		(\$000)		(\$000)
1968	1,764	1973	40	1978	800
1969	260	1974	70	1979	114
1970	49	1975	123	1980	-
1971	-	1976	162	1981	-
1972	-	1977	-	1982	-

Source: Federal Government Finance. Statistics Canada, catalogue number 68-211. Annual publication.

20. Examples of other energy-related regional programs (not concerning Newfoundland) are: Assistance to Hydro-Quebec Research Institute; P.E.I. Interconnection; Manitoba-Nelson River Transmission System; Nova Scotia-New Brunswick Bay of Fundy Tidal Studies; Saskatchewan High-Ash Coal Testing; Nelson River Transmission Facilities; Nuclear Utilization Facilities, etc.

Mines:

In cooperation with the provincial governments and the Department of Regional Economic Expansion, the purpose of the following programs was to reduce regional economic disparities through discovery and development of mineral resources.²¹

a) Canada-Newfoundland Subsidiary Agreement for Mineral Development: The project includes (i) Geological Mapping and Geochemical Surveys, (ii) Technical and Economic Assessment of Crown Held Properties, and Supporting Activities, (iii) Development and Evaluation of Policies and Strategies for Mineral Resource Management. The program was in effect between 1977 and 1982 and its costs shared by the Department of Energy, Mines and Resources (45%), DREE (45%) and the Newfoundland government (10%). Federal government's expenditure in Newfoundland was approximately \$5.857 million.

b) Canada-Newfoundland and Labrador Mineral Exploration and Evaluation Program: The program includes the following projects: (i) Mineral Inventory; (ii) Mineral Development Planning; (iii) Prospector-Technician Training; (iv) Mineral Evaluation; (v) Analytical Laboratory, and (vi) Geochemical-Geophysical Surveys. The program started in 1971 and ended

21. Of the many programs implemented in this sector, only those concerning Newfoundland will be dealt with.

in 1976 with total costs of \$2.698 million which was shared equally by the Department of Energy, Mines and Resources and DREE. The historical distribution of the federal government's expenditures on mineral and mines programs is given in Table 2-

TABLE 2-16

MINERALS AND MINES

(Federal government expenditures in Newfoundland)

Year	(\$000)	Year	(\$000)
1972	74	1977	251
1973	612	1978	-
1974	614	1979	1,133
1975	639	1980	1,632
1976	623	1981	1,468
		1982	1,373

Source: Federal Government Finance. Statistics Canada. Catalogue number 68-211. Annual publication.

Housing (slum clearance, urban renewal, etc.):

Under the following programs the federal government made contributions as shown in Appendix Table A-10.

a) Non-Profit Housing Program:²² This program attempts to supply adequate low and moderate income rental accommodation for families and individuals who are unable to afford such housing on the free market.

22. This is a national program producing regional impacts.

- b) Residential Rehabilitation Assistance Program:²³ This program attempts to assist in the rehabilitation of substandard housing and to promote its subsequent maintenance.
- c) Rural and Native Housing Program: Its intent is the acquisition, construction or rehabilitation of 50,000 housing units within a five-year period with the participation of the client group of planners, developers and managers of housing projects.
- d) Public Housing Program:²³ This program is intended to provide socially appropriate housing for families and individuals unable to obtain such accommodation at market prices.
- e) Municipal Sewerage and Water Supply Project Assistance: This program attempts to encourage comprehensive land use management and regional development in previously undeveloped areas by assisting provinces and municipalities to finance trunk sewers and to combat water and soil pollution through sewage treatment projects.
- f) Low and Moderate Income Rental Housing Program:²³ This program assists provincially, municipally, or privately owned non-profit organizations in the provision of housing for low income families who are unable to locate or afford appropriate accommodation on the open market.

23. This is a national program producing regional impacts.

g) Loan Assisted Land Assembly Program: This program provides cost-sharing financial assistance through CMHC to municipalities and provinces wishing to assemble and develop land for residential and associated purposes, or to establish land banks for future development of a predominantly residential nature.

h) Non-Profit Housing Program:²⁴ This supplies adequate low and moderate-income rental accommodation for families and individuals who are unable to afford such housing on the open market.

i) Low Rental Housing Program: This program assists provincially, municipally or privately owned non-profit organizations and entrepreneurs in the provision of housing for people of limited means, particularly the elderly and the handicapped.

j) Municipal Sewage Treatment Assistance: This program provides loan assistance to a province, municipality, or municipal sewerage corporation for the elimination or control of water and soil pollution.

k) Public Housing Projects Under Federal-Provincial Partnership: This program provides cost-sharing assistance to provinces and municipalities in the provision of public

24. This is a national program producing regional impacts.

housing either through new construction or acquisition and conversion of existing structures to meet the needs of low-income individuals.

1) Student Housing:²⁵ This program assists in the construction or conversion of existing buildings for students' use.

III - DEPARTMENT OF REGIONAL ECONOMIC EXPANSION (DREE)

As part of his campaign for leadership of the Liberal Party and the position of Prime Minister of Canada, Pierre Elliott Trudeau promised to deal with regional disparities.. After his victory, he kept his promise by establishing DREE in 1969 (Matthews, 1977, p. 132). It was hoped that the works of DREE would lead to large scale industrialization through the establishment of selected urban growth centres to promote growth in appropriate regions.

Soon after its creation, DREE started to carry out the long run transforming regional policies previously operated by other departments. Its objective was to bring all the existing regional policies under one department and one Minister. DREE took the responsibility of some of the

25. This is a national program producing regional impacts.

existing transforming policies and later introduced other transforming policies as it can be seen later in this section.

To achieve its goal DREE used three channels:

1. Industrial incentives
2. Infrastructure assistance
3. Social adjustment and rural economic development

1 - Industrial Incentives

Development incentives were provided during 1970-71 under the Regional Development Incentives Act, the Area Development Incentives Act, and the Special Areas Incentives, with the purpose of encouraging new industrial employment in slow growth regions of the country. These incentives were not to be continuing subsidies. They were made available to help offset the initial disadvantages of industrial investments in areas where additional employment was most needed. The Department provided grants and loans to assist the financing of eligible operations and loan guarantees were extended to selected new commercial operations. ²⁶

26. Examples of such operations are hotels, convention centres, recreation facilities, warehousing, freight handling, shopping centres and business offices as well as manufacturing and processing industries.

As amended in December 1970, the Act provided incentives of three types: a primary incentive, for the establishment, expansion, or modernization of facilities; a secondary incentive, for the establishment of new facilities or expansion into new product lines; and a special incentive, applicable in certain areas for the establishment, expansion or modernization of facilities (DREE, 1971, pp. 10-11). The federal government expenditures under the Regional Development Incentives Act are given in the Appendix Table A-11.

2 - Infrastructure Assistance

The Department's Special Area Program aimed at expanding and improving economic potential of selected areas. In this way the program was intended to enhance their attractiveness as locations for new job-creating activities. The projects included programs related to such infrastructure as water and sewer systems, industrial parks, roads and bridges, port facilities, schools and residential land. The development of new industrial employment in these areas was assisted through the Regional Development Incentives Act and the Government Organization Act. The first Special Area Agreement covered April 1, 1970 to June 30, 1972 (DREE, 1971, p. 16).

Other programs in this category include the Atlantic Development Board (ADB) of 1962, the Maritime Marshland Rehabilitation Act (MMRA) of 1948 and the Federal-Provincial Special Development Loan Program - a new program under DREE. The latter program was approved in 1970 to facilitate the early start of labor intensive public projects which would otherwise have been delayed or not undertaken by the provinces or municipalities. The funds allocated to this Program totalled \$160 million and provinces except Saskatchewan agreed to take advantage of the favorable financing terms.

Based on the number of unemployed persons in excess of 4 per cent of the labor force in each province during the last month of 1970 (with an adjustment for Indians on reserves) the 160 million were eventually allocated as follows:

TABLE 2-17
FEDERAL-PROVINCIAL SPECIAL
DEVELOPMENT LOAN PROGRAM (1970)

NFLD.	\$ 6.77 million
P.E.I.	1 million
N.S.	4.30 million
N.B.	5.38 millior
QUE.	70.30 million
ONT.	17 million
MAN.	8.50 million
ALTA.	6.88 million
B.C.	39.77 million

Source: DREE, 1971, p. 21.

More than 60 per cent of the funds was allocated to highway and related construction and the rest on water and sewerage systems, recreational facilities, senior citizen's homes, and other locally needed buildings and services (DREE, 1971, pp. 20-21).

3 - Social Adjustment And Rural Economic Development

Most of these programs involve cost sharing with the provinces. Some were established under agreements with the objective of increasing the number and quality of viable, long-term employment opportunities and improving access to these opportunities by the residents of the provinces. Through economic and socio-economic development action, they endeavoured to

- a) improve the utilization of natural resources;
- b) develop the potentials arising from the geographic locations of various provinces;
- c) maximize the returns from activities in the provinces by increasing the capability of their private sector to actively participate in provincial, national, and international markets;
- d) ensure that the labor force in depressed provinces have the capability to benefit from and contribute to the initiatives to be undertaken; and

- e) increase the capability of both public and private sectors in the province to identify and realize opportunities.

Previous policies which were taken over and continued by DREE include ARDA programs of 1962 and FRED programs of 1972. The new policies under DREE are:

- a) Special ARDA Agreements: At the end of the 1969-1970 period, the Department was authorized by the government to introduce a new program designed to improve job opportunities for the people of Indian ancestry living in slow-growth areas of the country.
- b) Newfoundland Resettlement Program: The program, which started in 1970, was previously the responsibility of the Department of Fisheries. The aim of the program was to assist households who wished to move from small isolated outposts to communities with better access to health and educational facilities, other social services and employment opportunities. The program ended March 31, 1975.
- c) Manitoba Agricultural Service Centres Agreement: The agreement was signed on August 1, 1972. The Department undertook to provide \$10 million in grants and loans over a five-year period towards the development of sewer and water services. They were intended for selected centres servicing the agricultural areas of the province.

d) Newfoundland Special Highways Agreement: The 1971 Agreement provided for building two bridges and some roads. All projects were completed by 1973 when an amendment was introduced providing for 9 additional projects across Newfoundland.

e) Land Surveying and Mapping Agreements: The purpose of these agreements was to prepare a land title registration information system for the Atlantic region. The expenditures of the federal government are given in Table 2-18.

TABLE 2-18

LAND SURVEYING AND MAPPING AGREEMENTS

(\$000)

	NFLD.	P.E.I.	N.S.	N.B.	TOTAL
1971	59	130	368	317	874
1972	608	268	705	974	2,555
1973	268	2	496	803	1,569
1974	1,051	-	1,026	908	2,985
1975	4,318	-	-	375	4,693
1976	442	-	-	-	442
1977	1,807	-	-	-	1,807
1978	609	-	-	-	609
1979	11	-	-	-	11

Source: Federal Government Finance. Statistics Canada, Catalogue number: 68-211. Annual publication.

f) Canada Land Inventory (CLI): Its objective was to produce data on land capability, primarily for land-use and rural development planning. Land was classified according to capabilities for agriculture, forestry, recreation, wildlife and sports fishing. An important phase of the CLI program during 1968-69 was to test the accuracy of the information compiled to date by providing financial and technical assistance to the provinces to undertake pilot projects in land-use planning. The expansion of urban areas and the contraction of agriculture in many regions make the planning of land-use adjustment schemes increasingly important. Federal government expenditure on CLI for 1972-76 was \$5,334,000.

g) General Development Agreements (GDA): Various policy review recommendations led to the decentralization of the department in 1973-74, and the signing of the ten-year General Development Agreements (GDAs) in 1974. These agreements enabled the federal government, through DREE, to work with provincial governments in formulating a basic strategy for regional development. The GDAs also provided for federal-provincial cost-sharing on project-specific subsidiary agreements which soon became the principal mechanism through which the department's policies were implemented. By the 1975-76 fiscal year - one year after the GDAs had been signed - subsidiary agreements accounted

for 37 per cent of the department's expenditures: more than for any other single program. Since 1977-78, more than half of DREE's annual budget has been spent on subsidiary agreement activities.²⁷ Refer to Appendix Table A-12.

The difference between these agreements and others was that federal and provincial expenditures were augmented by private sector expenditure. The impact of DREE's policies

-
27. Some examples of these subsidiary agreements signed in 1981 and aimed at improving the efficiency of various sectors and activities are given below for the province of Newfoundland.

TABLE 2-19
SUBSIDIARY AGREEMENTS
(Newfoundland, 1981)

Subject	Estimated Total Cost (\$000)	Federal Share (\$000)
Forestry	66,522	58,179
Gros Morne Park Area Development	22,935	20,642
Planning	6,385	4,800
Labrador Interim	22,097	19,662*
Mineral Development	12,458	11,212*
Tourism Development	13,265	11,938
Agriculture Development	16,341	14,707*
Rural Development	14,580	13,122
Industrial Development	26,650	23,985
Forestry	52,093	46,884
Coastal Labrador	38,996	33,800
Pulp and Paper	33,333	30,000
Total	325,655	288,131

* Including financial contributions by other federal departments

Source: Federal-Provincial Programs and Activities, 1980-81 and 1981-82.

were generally regarded a failure. Matthews (1977) claims that their failure followed their bias towards either capital or labor. Coûrchine (1978b) attributes their failure to dependency-creation of DREE policies. Lithwick (1982) suggests that Canadian regional policies - including those of DREE - have been undisciplined, since there has been no consistent, credible understanding of regional problems and appropriate solutions.

This, however, gives rise to several questions: Why did most studies arrive at the conclusion that DREE failed? Why could a federal government department such as DREE not implement a successful policy during 13 years of its existence? Future research must address these important questions. However, one reason for DREE's failure (if it is indeed a failure) was its over-emphasis of the growth-pole theory. (Some of the difficulties with this theory are elaborated in Chapter I supra.) An essential requirement of a growth pole is to have a population centre, thus an urban area. The question for any regional planning endeavor is whether to establish an urban area prior to or after the industries are moved to the region. For Canada, it seems, growth centres tended to appear long before there was sufficient industrial activity to justify the growth poles. The reasons, according to Matthews (1977, p. 133) are the following:

1) Little attention was paid to the creation of jobs in rural areas, consequently many farm workers had to move out and join the pool of unemployed workers in urban areas.

2) The publicity of industrial development in urban areas brought more migrant workers.

3) As more roads, airports, hospitals, sewers and schools are built, more temporary construction jobs at incomes higher than the rural areas will be generated.

4) In some cases government policies actually aided these movements. For example, the Newfoundland Resettlement Program was originally designed to move 70,000 rural inhabitants to more urban areas.

5) It seems Canadian planners believe that high unemployment attracts more industries to the area, since they can be assured of getting a continuing labor supply of willing workers. The result was a massive movement of rural population to urban centres throughout the 1960's.

Matthews (1977, p. 133) claims that one of the major social consequences of Canada's 'growth pole' strategy was its failure to recognize and develop the potentials of Canada's rural communities. Communities tended not to be judged by social, but rather narrow economic criteria.

Industrial incentive programs of DREE have also been widely criticized. For instance, Springate (1972) used surveys to show that one to two thirds of grants were windfall gains because one to two thirds of these firms would have invested in the regions without grants.

Woodward (1974) shows that DREE's industrial incentive programs were capital-biased and led to more employment of capital and less employment of labor. He adds two additional implications of the capital-bias: "First, the cost of each new job in the designated regions attributable to the DREE incentives has been increased by the bias since the number of jobs per dollar of DREE grant has decreased. Second, to the extent that the bias caused extra machinery and equipment to be purchased either from the more industrial regions in Canada or from the rest of the world, areas such as Toronto or Detroit might have their employment increased by the bias." (p. 173)

Matthews (1977, pp. 137-140) argued that industrial incentives program was not only unnecessary but also to some extent counterproductive by prolonging Newfoundland's total dependence on federal assistance. His reasons can be summarized in the following way.

A. Firms that receive incentives generally come from outside

2

1.0

1.1

1.25

1.4

1.6

1.8

2.0

2.2

2.5

2.8

3.2

3.6

4.0

4.5

5.0

5.6

6.3

7.1

8.0

9.0

10.0

11.2

12.5

14.0

16.0

18.0

20.0

22.5

25.0

28.0

31.5

36.0

40.0

45.0

the region: their basic objectives are to extract wealth from the region rather than increase the standard of living of that region. Most of these firms' head offices are in the metropolitan area and their decisions come from people who live outside the region. These firms are attracted to the region because of incentives as well as the low wage criteria of the region. Their arrival is associated with some employment, but not higher wage rates. They know that the depressed region's workers are unorganized²⁸ and that this aspect of the labor market can be exploited. These firms are most likely to institutionalize this advantage in order that regional wage differentials become permanent. However, it is possible that the workers in the region will organize themselves in order to protect themselves from a lower wage rate than elsewhere in the country. This is why some of the most militant labor unions are located in Newfoundland. If these organizations are built, the subsidized industries may not be able to respond to the wage demands of the workers and its consequence may be either shutting down the industry altogether or asking for more incentive grants, sometimes on a permanent basis.

If this happens scarce resources are exploited further. Examples are Newfoundland's defunct oil refinery,

28. Contrary to Matthews' expectations, Newfoundland, a most depressed region of Canada, has the second most organized labor force in the country.

New Brunswick's Bricklin Plant, and the Churchill Industries operation in Manitoba. On the other hand, if the operations are closed the impact on the region's economy will be dramatic since these firms are usually large.

B. Firms' head offices operate within the region: if these firms are local, then the policies could be even more inefficient in the sense that these activities might have been established without the incentives. The existence of incentives only increases the profits of the local entrepreneurs. For Usher (1975) the DREE incentive program is a transfer of income from all Canadians to the rich population of the depressed regions.

According to the Standing Senate Commission on National Finance (1982, pp. 69-70) DREE suffered from a number of weaknesses and experienced some profound failures. But it also had numerous successes and served to weaken some sources of regional disparities. Savoie (1984) finds provincial governments strong supporters of DREE, since they were its principal clients, especially after the introduction of GDA. But he finds (1984, p. 330) a distinct lack of support from the bureaucracy at the federal level, since DREE's regional focus was not compatible with their sectoral perspective.

In general, criticism of DREE has been varied and often founded on conflicting views. According to some, DREE programs were simply an extension of provincial government programs. Others argue that they simply did not go far enough in promoting regional development. Finally, in 1982 there occurred among scholars and practitioners a shift in emphasis away from gap-closing as an objective of regional policy. For instance, Courchene (1981) argues that regional development should be approached through a policy of adjustment accommodation, rather than one of gap-closing. Most programs dealt with in this chapter are of the latter type.

Finally, DREE was eliminated as an independent agency of the federal government. "On January 12, 1982, the federal government announced a major policy and administrative reorganization. This involved establishing a new structure for elaborating and executing regional development policy and adopting a new approach to working with provincial governments. In outline, the announced changes comprise:

1. the extension of responsibility of the Ministry of State for Economic Development to include the regional aspects of development policy; the ministry was retitled the Ministry of State for Economic and Regional Development (MSERD) and will have offices in the capitals of each province;

2. the merger of the Department of Regional Economic Expansion into the former Department of Industry, Trade and Commerce to form the new Department of Regional Industrial Expansion (DRIE);
3. an increased focus on the 'regional' dimensions of the Canadian economy combined with a decision to reduce the federal government's reliance on provincial governments to deliver industrial assistance programs; and
4. increased governmental reliance upon the potential of so-called megaprojects as instruments for promoting economic development." (Standing Senate Committee on National Finance, 1982, p. 65)

In July 1984, a federal reorganization resulted in the elimination of MSERD, with the Department of Fisheries absorbing part of its functions and DRIE absorbing the remainder.

SUMMARY

The federal government has implemented numerous regional policies aimed at reducing disparities between regions since Confederation. These policies were applied through federal grants to the provincial governments as well as to individuals of the regions. Some grants are unconditional, i.e. the provincial governments can use them for any purpose they wish. These include equalization payments, subsidies, share of income tax on power utilities, compensation due to withdrawal from joint programs and grants in lieu of taxes on federal property for municipal purposes. Other grants are conditional such as when the federal government contributes in part to the costs of some project (program) that provincial and/or municipal governments undertake.

Some of these programs have been only demand-stimulating (or compensating). Others have been supply-affecting (or transforming).

Prior to the establishment of DREE, different federal departments undertook various regional policies. In 1969 DREE was established in order to bring all such policies under one department. However, only transforming policies were transferred to DREE which later introduced new transforming policies. In 1982 DREE merged with the

Department of Industry, Trade and Commerce.

The nature of some of these policies have been studied by scholars. According to most of these studies, Canadian regional policies could not achieve their goals and created other problems like dependency and imperfections. To date, there has been no satisfactory and comprehensive study of the impact of these policies in Canada.

APPENDIX A

TABLE A-1

TAX RENTAL AGREEMENTS

(\$000)

	1954	1955	1956	1957
NFLD.	11,825	12,547	12,434	13,805
P.E.I.	3,657	3,913	3,681	3,073
N.S.	19,509	20,475	19,856	22,333
N.B.	16,178	17,047	16,630	17,807
QUE.	-	-	-	-
ONT.	134,448	142,747	138,345	160,558
MAN.	25,039	26,201	25,656	27,889
SASK.	25,254	26,647	25,986	27,432
ALTA.	29,802	31,816	31,593	37,311
B.C.	43,516	46,052	45,393	55,730
YUKON	250	258	271	405
N.W.T.	254	264	271	353
TOTAL	309,732	327,967	320,166	366,696

Source: Financial Statistics of the Government of Canada,
Statistics Canada, catalogue number 68-211.
Annual publication.

TABLE A-2

FEDERAL-PROVINCIAL TAX-SHARING (OR FISCAL) ARRANGEMENTS
(\$000)

YEAR	IMPLD.	P. E. I.	N. B.	QUE.	ONT.	MAN.	SASK.	ALTA.	B. C.	YUKON	N. W. T.	TOTAL
1958	16,028	4,136	26,407	43,060	74,379	32,350	33,071	43,636	58,983	419	520	354,283
1959	16,892	4,277	27,399	55,004	93,322	33,577	34,261	46,341	64,816	422	525	399,100
1960	20,017	4,390	31,945	68,631	106,211	39,452	40,232	55,370	67,853	420	522	461,341
1961	20,460	4,802	32,243	70,366	113,792	40,078	40,578	57,146	73,686	435	538	480,873
1962	20,078	4,781	32,317	60,448	120,652	40,411	40,569	58,385	74,382	446*	567*	479,269
1963	13,919	3,227	23,294	77,859	-177	18,712	28,380	14,218	2,502	1,346*	2,177*	202,295
1964	15,261	3,893	21,342	70,216	-	15,896	23,592	10,452	-190	1,923*	2,528*	182,329
1965	19,248	5,625	29,965	114,898	16,273	25,483	25,653	9,603	3356	2,317*	2,672*	277,473
1966	33,849	9,678	47,657	131,124	16,836	28,298	29,044	6,008	896	2,629*	2,808*	352,003
1967	40,696	10,942	54,318	161,721	19,743	36,754	36,089	4,640	4,635	3,052*	3,301*	426,650
1968	66,223	13,836	77,794	225,280	20,628	45,120	25,198	8,364	-	3,876*	5,494*	555,469
1969	71,127	14,789	88,036	279,645	21,677	45,009	22,377	6,860	-652	5,576*	6,232*	639,272
1970	84,046	17,140	88,142	351,622	26,818	41,768	14,351	7,507	-	6,462*	10,319*	729,240

* Federal tax abatement grant

Source: Federal Government Finance, Statistics Canada, catalogue number 68-211.
Annual publication.

TABLE A-3

EQUALIZATION
(\$000)

YEAR	WFLD.	P.R.E.	S.S.	N.B.	QUE.	ONT.	MAN.	SASK.	ALTA.	B.C.	YUKON	N.W.T.	TOTAL
1971	93,674	21,923	90,135	79,861	545,036	2,053	52,299	42,123	-260	-	-	-	927,036
1972	120,551	23,153	93,766	97,232	511,581	-	56,649	115,615	-	-	-	-	1,020,547
1973	114,447	146,763	25,082	125,236	442,434	-	89,816	173,582	-	-	-	-	1,137,372
1974	156,942	35,037	189,909	145,174	611,635	23,258	127,494	166,514	5,979	1,990	-	-	1,461,941
1975	197,457	43,007	231,448	189,531	1,005,534	214,131	151,854	103,692	44,862	25,463	-	-	2,286,979
1976	191,314	49,048	281,262	202,504	999,204	-	150,468	47,843	-	-	-	-	1,921,643
1977	223,213	59,842	283,387	211,366	1,189,510	-	171,433	-52,285	-	-	-	-	2,086,564
1978	242,851	62,767	365,456	265,233	1,236,720	-	213,462	-12,972	-	-	-	-	2,383,517
1979	324,941	63,896	360,911	314,444	1,251,058	-	227,207	73,526	-	-	-	-	2,615,983
1980	340,013	80,246	418,410	378,493	1,707,062	-	366,067	31,103	-	-	-	-	3,121,396
1981	387,333	89,796	454,163	332,645	1,846,949	-	403,990	71,354	-	-	-	-	3,950,390
1982	464,603	111,454	554,555	437,713	2,399,604	-	404,611	103,697	-	-	-	-	4,478,237

Source: Federal Government Finance, Statistics Canada, catalogue number 68-211.

TABLE A-4

(STATUTORY) SUBSIDIES

(\$000)

YEAR	INTL.	P.E.I.	S.B.	N.B.	QUE.	ONT.	MAN.	BASK.	ALTA.	B.C.	YUKON	N.W.T.	TOTAL
1954	6,369*	657	2,057	1,679	3,301	3,641	1,755	2,041	2,127	1,281	37	13	24,958
1955	5,519*	657	2,057	1,679	3,301	3,641	1,853	2,008	2,228	1,281	37	13	24,354
1956	4,669*	657	2,057	1,679	3,301	3,641	1,820	2,072	2,195	1,281	37	13	23,422
1957	3,819*	657	2,057	1,679	3,242	3,641	2,031	2,080	2,274	1,281	37	13	22,811
1958	2,969*	657	2,057	1,679	3,242	3,641	2,031	2,080	2,274	1,281	40	45	21,996
1959	23,669*	3,157**	9,557**	9,179**	3,242	3,641	2,032	2,080	2,274	1,281	40	45	60,197
1960	17,069*	3,157**	9,557**	9,179**	3,242	3,641	2,045	2,098	2,406	1,281	40	45	53,774
1961	17,069*	3,157**	9,557**	9,179**	3,242	3,641	2,054	2,092	2,356	1,281	40	46	53,738
1962	17,156*	3,157**	9,632**	9,245**	3,964	4,624	2,089	2,116	2,816	1,672	40	45	54,556
1963	20,156*	4,157**	12,632**	12,245**	3,964	4,624	2,089	2,116	2,816	1,672	-	-	64,471
1964	20,156*	4,157**	12,632**	12,245**	3,964	4,624	2,103	2,120	2,852	1,672	-	-	64,525
1965	20,156*	4,157**	12,632**	12,245**	3,964	4,624	2,117	2,124	2,867	1,672	-	-	64,739
1966	9,656	657	2,132	1,745	3,964	4,624	2,117	2,124	2,867	1,672	-	-	31,579
1967	9,656	657	2,132	1,745	3,964	4,624	2,117	2,124	2,867	1,672	-	-	31,759
1968	9,656	657	2,132	1,745	4,023	4,624	2,127	2,155	2,955	1,672	-	-	31,747
1969	9,656	657	2,132	1,745	4,023	4,624	2,127	2,142	2,965	1,672	-	-	31,746
1970	9,656	657	2,132	1,745	4,023	4,624	2,132	2,144	3,008	1,672	-	-	31,794
1971	9,656	657	2,132	1,745	4,023	4,624	2,132	2,144	3,008	1,672	-	-	31,794
1972	9,708	659	2,174	1,774	4,484	5,504	2,142	2,116	3,073	2,117	-	-	33,751
1973	9,708	659	2,174	1,774	4,484	5,504	2,142	2,116	3,073	2,117	-	-	33,751
1974	9,708	659	2,174	1,774	4,484	5,504	2,149	2,108	3,102	2,117	-	-	33,779
1975	9,708	659	2,174	1,774	4,484	5,504	2,156	2,100	3,132	2,117	-	-	33,808
1976	9,708	659	2,174	1,774	4,484	5,504	2,156	2,100	3,132	2,117	-	-	33,808
1977	9,707	659	2,174	1,774	4,484	5,504	2,156	2,100	3,132	2,117	-	-	33,808
1978	9,707	659	2,174	1,774	4,484	5,504	2,182	2,125	3,150	2,117	-	-	34,076
1979	9,707	659	2,174	1,774	4,484	5,504	2,173	2,123	3,206	2,117	-	-	34,001
1980	9,707	659	2,174	1,774	4,484	5,504	2,175	2,140	3,372	2,117	-	-	34,106
1981	9,708	659	2,174	1,774	4,484	5,504	2,176	2,137	3,358	2,117	-	-	34,091
1982	9,710	670	2,259	1,836	4,678	5,063	2,174	2,159	3,497	2,494	-	-	35,586

* Includes transitional grant of 3,950,000

** Includes Atlantic Provinces adjustment grants: P.E.I. 2,500, N.B. 7,500 and S.B. 7,500

Source: Federal Government Finance, Statistics Canada, catalogue number 68-211.
Annual publication.

TABLE A-5

HEALTH
(\$000)

YEAR	MTLD.	P.R.I.	N.S.	N.B.	QUE.	ONT.	MAN.	SASK.	ALTA.	B.C.	YUKON	N.W.T.	TOTAL
1954	857	224	1,519	1,534	9,435	7,416	1,711	1,937	1,826	2,648	53	20	29,380
1955	824	276	1,545	1,463	9,653	8,148	2,039	2,571	2,297	2,964	13	25	31,818
1956	1,011	357	1,565	1,296	10,137	9,278	2,199	2,845	2,562	2,450	15	23	33,736
1957	1,026	300	1,719	1,926	10,291	10,606	2,676	2,095	2,589	3,210	653	35	37,126
1958	1,095	335	1,855	1,813	8,332	9,955	2,241	2,275	2,808	3,807	34	64	34,694
1959	3,745	438	3,494	1,739	15,940	24,922	9,567	11,436	12,302	17,034	35	63	100,715
1960	5,773	869	9,688	5,941	15,177	86,993	13,608	13,638	18,605	24,370	36	69	196,767
1961	5,942	1,460	12,486	9,501	27,989	100,271	16,051	16,944	19,642	26,643	211	351	237,511
1962	7,789	1,727	14,571	11,142	86,081	120,871	18,287	18,428	23,602	29,608	340	455	313,002
1963	9,018	2,136	16,287	12,804	103,414	137,821	19,937	20,760	30,101	34,365	434	999	387,596
1964	10,808	2,332	17,941	14,902	128,276	152,767	22,528	24,399	32,908	37,603	388	702	445,664
1965	11,329	2,476	18,509	15,938	144,599	169,182	23,948	26,058	36,691	41,034	384	704	490,627
1966	13,670	3,043	21,186	16,373	32,614	190,795	26,453	28,688	41,056	45,507	476	1,469	421,330
1967	15,046	3,399	25,774	18,661	9,064	214,044	29,477	31,312	46,697	54,842	399	957	449,672
1968	17,206	3,920	34,890	22,229	13,477	263,276	34,159	35,281	55,592	65,621	528	1,076	567,455
1969	20,246	4,292	34,186	25,453	11,946	319,307	38,369	47,173	68,392	101,664	549	1,051	673,078
1970	33,979	5,026	51,998	31,756	27,473	422,425	62,342	64,337	93,403	125,260	829	1,645	922,711
1971	36,970	5,891	56,563	32,331	66,410	569,305	72,274	69,537	127,023	150,907	755	1,582	1,189,748
1972	42,509	8,283	65,280	51,310	168,415	652,992	82,725	78,627	145,304	170,871	780	2,488	1,469,786
1973	51,860	9,525	70,951	58,590	178,025	727,396	100,208	85,027	159,295	189,280	1,612	5,110	1,637,079
1974	61,121	10,479	78,154	63,779	196,454	784,101	107,106	89,267	175,917	211,138	2,004	5,139	1,784,659
1975	68,564	11,949	90,625	74,804	223,951	938,041	121,382	104,592	204,255	270,156	2,173	6,046	2,116,548
1976	74,770	14,377	107,506	89,146	260,307	1,167,237	140,405	122,054	257,124	338,870	2,527	8,363	2,562,676
1977	92,613	17,705	134,646	115,530	259,313	1,386,807	170,396	153,594	302,146	401,820	4,819	9,061	3,048,452
1978	69,885	13,564	107,843	81,652	745,928	1,060,487	134,484	117,360	234,801	273,350	2,745	9,387	2,851,466
1979	92,446	18,767	138,649	116,159	839,292	1,336,726	179,675	157,587	282,118	370,644	3,624	13,353	3,548,800
1980	108,043	22,578	156,486	129,609	849,820	1,483,228	192,654	177,499	304,765	437,278	4,349	14,222	3,880,731
1981	113,253	25,093	170,619	134,928	837,254	1,537,718	203,314	187,849	327,498	454,834	4,269	15,400	4,012,829
1982	118,660	25,005	175,612	142,235	887,139	1,671,309	207,995	198,064	385,840	466,393	5,557	15,792	4,299,603

Source: Federal Government Finance, Statistics Canada, catalogue number 68-211.
Annual publication.

TABLE A-6

SOCIAL WELFARE TO PROVINCIAL AND LOCAL GOVERNMENTS

(\$000)

YEAR	WFLD.	P.R.F.	M.S.	M.B.	QUE.	ONT.	MAN.	SASK.	ALTA.	B.C.	YUKON	N.W.T.	TOTAL
1954	1,019	114	1,279	1,512	8,245	5,378	1,260	1,156	1,243	2,038	2	18	23,214
1955	1,020	128	1,325	1,556	8,422	5,856	1,275	1,239	1,310	2,406	3	24	24,204
1956	1,126	190	1,560	1,784	10,955	7,243	1,437	1,463	1,685	2,074	4	27	29,548
1957	3,716	305	1,573	1,848	11,746	7,134	2,213	2,199	1,648	5,971	9	31	38,393
1958	3,456	366	2,127	2,332	16,049	11,171	2,523	2,577	2,148	5,278	12	62	46,203
1959	5,266	475	2,962	2,934	20,457	20,586	3,791	3,913	4,492	9,196	15	56	76,143
1960	5,965	560	3,422	3,102	28,281	25,445	4,601	4,239	4,802	10,145	18	92	90,872
1961	5,148	602	4,460	4,137	34,596	26,647	5,545	4,727	5,361	13,567	72	88	102,950
1962	6,723	724	4,623	4,173	57,991	29,324	6,638	6,470	7,012	19,681	58	111	143,728
1963	7,092	931	5,187	4,938	57,615	30,918	7,560	7,718	9,726	19,819	64	130	159,688
1964	7,309	1,157	5,619	5,389	63,023	41,081	8,945	7,848	11,599	20,355	76	192	172,593
1965	8,009	1,209	6,195	5,230	68,589	40,432	8,916	8,092	13,375	22,344	90	221	182,782
1966	8,254	1,599	6,280	6,042	68,464	53,689	10,119	9,131	17,345	28,269	100	209	209,501
1967	13,445	1,866	8,038	5,580	52,795	75,026	11,275	14,415	20,057	29,438	117	313	232,365
1968	20,342	3,507	13,919	10,132	14,678	113,360	19,155	15,639	33,164	40,141	113	260	284,410
1969	22,745	2,855	13,813	12,191	10,376	129,438	16,687	15,783	32,450	41,609	115	264	298,136
1970	20,709	3,386	16,426	13,514	4	135,323	21,384	18,051	32,748	45,093	261	2,189	309,088
1971	23,215	3,851	17,758	16,657	176	183,015	30,171	21,566	41,111	69,949	859	516	408,844
1972	25,845	6,097	22,603	21,477	-70	218,740	38,047	25,139	44,255	70,441	301	1,066	472,941
1973	27,176	6,453	22,900	24,254	561	219,713	37,236	38,001	54,804	71,761	695	942	483,499
1974	29,729	5,565	30,145	32,957	13,332	222,578	60,536	36,925	57,590	89,444	1,010	2,335	562,166
1975	35,441	7,370	32,917	37,843	6,788	327,045	52,860	35,998	70,832	141,924	1,425	6,209	756,652
1976	41,112	10,195	36,326	56,118	192,323	456,575	76,155	49,269	109,037	189,087	1,189	4,808	1,232,184
1977	57,954	13,348	56,441	82,948	411,840	481,556	77,419	66,000	126,284	210,288	1,405	4,294	1,600,221
1978	48,284	7,589	56,280	52,760	386,634	453,637	72,356	61,703	126,590	201,578	2,051	5,391	1,472,853
1979	54,217	10,361	52,939	63,764	589,325	485,747	74,268	61,568	140,269	206,797	2,612	8,998	1,750,866
1980	44,077	10,829	57,451	72,607	525,008	521,910	63,741	62,121	144,151	262,687	1,549	5,936	1,772,067
1981	61,551	22,699	64,731	83,676	650,958	545,425	73,071	75,716	160,712	315,352	6,463	1,666	2,072,220
1982	68,980	16,923	74,910	97,190	686,791	656,228	92,282	90,382	247,722	351,269	4,029	8,818	2,395,524

Source: Federal Government Finance, Statistics Canada, catalogue number 68-211.
Annual publication.

TABLE A-7

CIVIL DEFENCE
(\$000)

YEAR	REFL.	P. E. I.	N. B.	Q. B.	ONT.	MAN.	SASK.	ALTA.	S. C.	YUKON	B. N. T.	TOTAL
1954	3	-	4	-	-	25	34	85	108	-	-	259
1955	21	-	18	-	85	26	43	119	187	-	-	512
1956	31	-	31	-	191	37	39	172	214	-	-	726
1957	33	-	35	-	348	32	49	119	187	-	-	814
1958	14	-	39	-	451	33	43	142	212	-	-	968
1959	25	-	43	-	449	61	51	126	225	-	-	1,025
1960	19	9	82	-	586	91	71	278	350	-	-	1,563
1961	46	14	150	-	798	124	132	405	483	-	-	2,245
1962	29	16	182	427	1,011	151	109	443	566	-	-	3,079
1963	30	17	204	670	1,124	218	166	475	566	-	-	3,810
1964	43	25	190	1,265	1,354	202	155	509	532	-	-	4,424
1965	48	17	238	1,469	1,556	273	167	517	577	-	-	4,927
1966	50	17	207	1,468	1,690	243	198	559	514	10	-	5,100
1967	67	29	268	1,636	1,743	256	200	494	533	-	12	5,345
1968	90	-	208	1,328	1,650	229	203	487	469	-	12	4,797
1969	83	37	139	1,176	1,273	177	157	280	357	-	14	3,747

Source: Federal Government Finance, Statistics Canada, catalogue number 68-211.
Annual publication.

TABLE A-8

RECREATION AND CULTURE SERVICES

(\$000)

YEAR	W.F.O.	P.E.L.	M.S.	M.B.	QUR.	OPT.	MAN.	SAGE.	ALTRA.	B.C.	TURCON	M.M.T.	TOTAL
1956	-	-	-	-	-	-	-	-	-	83	-	-	83
1957	-	-	-	-	-	-	-	-	-	17	-	-	17
1958	-	-	1	3	-	237	27	16	40	168	-	-	492
1959	54	2	24	47	-	924	119	51	138	364	-	-	1,723
1960	53	15	52	58	-	930	179	290	1,222	392	7	5	1,906
1961	70	10	52	71	10	643	181	182	266	410	9	9	2,200
1962	43	8	33	32	29	586	117	59	195	541	14	-	1,714
1963	31	31	31	59	-	25	190	139	201	317	36	35	1,656
1964	22	26	72	75	-	63	82	76	60	59	18	19	934
1965	37	56	38	1,030	-	598	64	30	76	57	250	46	1,767
1966	194	56	129	109	-	4,293	834	608	197	533	36	61	3,356
1967	2,178	38	235	236	2,831	2,301	1,871	1,479	2,952	1,104	292	67	17,376
1968	700	110	473	343	2,701	238	909	621	765	2,544	131	244	11,642
1969	79	57	56	60	-	240	62	62	119	88	132	99	1,052-07
1970	49	35	57	52	401	-	62	62	78	91	79	58	1,264
1971	-	-	-	-	-	-	5,000	-	-	-	45	23	5,049
1972	47	57	78	100	-	-	2,021	-	-	9,838	95	25	12,261
1973	69	1,498	93	84	-	-	364	-	-	-	50	65	2,223
1974	70	87	86	85	-	90	477	-	-	-	72	390	1,357
1975	93	59	111	117	-	95	237	27	-	36	70	80	925
1976	108	77	120	112	-	100	-	-	-	-	66	97	700
1977	-	-	-	-	-	-	-	89	-	-	-	-	89
1978	600	-	-	-	-	-	150	104	-	-	60	-	914
1979	114	-	-	-	500	127	256	-	-	-	58	-	1,255
1980	-	-	115	15	-	101	44	-	-	-	30	-	305
1981	-	-	-	-	-	-	-	-	-	-	-	-	-
1982	-	-	-	300	-	200	-	-	-	-	-	-	500

Source: Federal Government Finance, Statistics Canada, catalogue number 68-211.
Annual publication.

TABLE A-9
WINTER WORKS PROJECTS IN MUNICIPALITIES
(\$000)

YEAR	WFLD.	P.E.I.	N.S.	N.B.	Q.B.	ONT.	MAN.	SASK.	ALTA.	S.C.	YUKON	N.W.T.	TOTAL
1959	-	-	-	61	-	-	51	33	-	104	-	-	249
1960	25	1	338	311	1,426	1,996	383	322	1,069	716	-	6	6,591
1961	39	-	220	196	1,686	2,447	259	769	1,545	1,727	3	-	8,911
1962	216	11	312	324	10,634	5,371	633	1,161	2,531	3,057	-	5	24,253
1963	318	110	80	314	11,548	5,513	754	1,994	2,952	3,163	2	19	26,973
1964	255	73	71	173	10,962	6,032	1,081	1,552	2,971	3,466	1	17	42,723
1965	164	226	76	289	25,170	6,511	1,744	1,653	2,479	4,391	1	19	41,008
1966	236	283	111	575	24,785	6,366	1,113	1,331	2,215	3,974	-	19	38,666
1967	355	420	470	475	19,563	7,460	1,263	2,181	2,895	3,483	-	101	30,377
1968	213	640	420	212	15,083	6,630	754	1,299	2,548	2,495	-	63	21,514
1969	123	178	39	137	10,464	5,436	604	683	1,903	1,883	2	62	378
1970	-	7	1	-	28	342	-	-	-	-	-	-	-

Source: Federal Government Finance, Statistics Canada, catalogue number 68-211.
Annual publication.

TABLE A-10

HOUSING
(\$000)

YEAR	W.F.L.D.	P.E.I.	N.B.	N.S.	Q.B.	ONT.	MAN.	SASK.	ALTA.	B.C.	YUKON	N.W.T.	TOTAL
1954	-	-	-	-	-	372	-	-	-	-	-	-	372
1955	-	-	-	-	-	525	-	-	-	-	-	-	525
1956	-	-	-	-	-	-	-	-	-	-	-	-	-
1957	-	-	-	-	-	-	-	-	-	-	-	-	-
1958	-	-	-	-	-	-	-	-	-	-	-	-	-
1959	-	-	144	-	2,464	740	-	-	-	-	-	-	3,348
1960	15	-	270	-	-	521	-	-	-	-	-	-	746
1961	-	-	329	-	-	1,511	-	-	-	-	-	-	1,840
1962	-	-	268	150	1,046	1,460	-	-	-	215	-	-	3,131
1963	-	-	284	636	-	2,876	-	-	-	426	-	-	4,222
1964	-	-	79	370	1,912	997	60	-	-	622	-	-	3,649
1965	-	-	338	268	778	2,367	530	-	-	809	-	-	4,790
1966	13	-	517	334	1,913	2,927	709	-	-	693	-	-	6,906
1967	7	-	362	225	936	3,943	1,138	4	15	1,311	-	-	7,943
1968	317	-	1,405	341	434	3,397	555	118	1,568	1,615	21	-	9,991
1969	314	-	3,226	155	1,442	6,871	881	89	1,045	1,275	35	-	15,333
1970	1,024	-	3,023	3,645	3,694	12,758	770	41	383	1,099	-	-	26,437
1971	2,196	-	675	2,336	7,787	10,902	1,064	52	467	1,350	20	-	26,852
1972	1,781	-	683	1,121	7,679	11,384	463	-	1,195	756	2	-	25,064
1973	1,608	-	178	340	11,930	5,198	1,864	9	1,558	1,018	-	-	23,695
1974	1,167	-	113	267	7,953	4,679	161	12	668	1,767	24	-	16,811
1975	1,634	-	171	1,218	6,776	7,944	335	3	557	1,548	68	-	20,256
1976	1,635	27	294	364	5,568	9,418	1,580	81	505	914	140	-	20,256
1977	1,521	413	870	1,041	10,171	13,856	719	1,798	3,568	3,819	178	-	37,952
1978	1,350	3,281	6,053	5,657	17,487	17,145	1,091	6,132	5,040	14,075	193	-	77,504
1979	1,302	6,072	4,778	4,751	19,705	23,219	1,274	8,931	6,232	26,149	82	-	90,515
1980	1,992	1,765	2,266	1,608	17,249	18,637	2,283	5,368	13,134	9,516	178	-	72,976
1981	1,235	359	2,146	1,657	6,727	9,907	2,520	1,522	6,180	3,643	208	-	35,993
1982	103	72	1,414	622	12,739	8,932	2,136	884	1,678	1,642	208	-	30,430

Source: Federal Government Finance, Statistics Canada, catalogue number 68-211.
Annual publication.

TABLE A-11

RDIA
(\$000)

YEAR	WFLD.	P. R. I.	H. S.	H. S.	QUE.	ONT.	MAN.	SASK.	ALTA.	B. C.	YUKON	N. W. T.	TOTAL
1970	-	-	-	-	-	-	34	-	-	-	-	-	34
1971	40	116	547	5,450	4,029	577	971	148	827	214	-	-	12,160
1972	390	840	3,090	4,571	16,792	2,363	3,134	2,737	1,141	1,274	-	-	8,286
1973	1,053	222	4,431	4,616	22,982	9,600	12,231	722	2,022	771	-	-	15,796
1974	854	1,254	8,714	6,279	36,470	5,912	2,868	1,345	11,819	284	-	-	16,316
1975	1,349	254	9,027	5,809	36,234	7,027	5,623	1,734	1,910	740	-	-	10,007
1976	1,167	829	9,624	7,018	32,964	13,606	5,269	4,702	5,721	879	-	-	16,571
1977	1,440	1,944	9,372	11,326	33,332	7,817	9,475	2,232	4,695	115	-	-	16,517
1978	1,183	3,123	7,008	5,769	28,905	6,785	6,154	3,358	697	141	-	-	10,350
1979	3,968	1,330	4,862	3,328	33,180	6,797	6,383	3,261	1,625	2,157	-	-	66,871
1980	5,533	2,143	10,857	11,974	53,404	8,451	11,132	2,859	816	1,619	16	114	106,624
1981	3,380	1,970	11,400	10,336	63,267	5,207	9,665	6,430	2,225	2,120	29	192	117,647
1982	1,912	2,143	7,500	7,055	74,745	11,692	14,875	5,810	191	785	219	538	127,014
1983	4,366	1,605	9,590	9,213	87,113	6,320	16,339	3,219	3,606	1,330	10	19	142,442

Source: Federal Government Finance, Statistics Canada, catalogue number 68-211.
Annual publication.

TABLE A-12

GDA
(\$000)

YEAR	WFLD.	P. E. I.	N. S.	N. B.	Q. B.	ONT.	MAN.	SASK.	ALTA.	B. C.	YUKON	N. W. T.	TOTAL
1975	35,644	-	4,606	26,450	18,820	4,642	8,005	468	2,887	2,500	-	-	104,022
1976	44,332	-	10,423	33,460	38,060	15,348	12,116	9,584	4,701	2,779	-	-	180,403
1977	44,471	-	31,786	34,259	42,733	9,871	13,025	12,110	4,405	3,483	-	-	196,253
1978	54,499	-	34,370	43,375	117,639	10,907	16,643	9,365	5,548	7,392	-	-	287,718
1979	51,267	-	46,249	46,548	130,725	5,998	10,623	10,676	7,783	7,692	-	-	317,561
1980	61,276	-	38,899	51,560	118,558	16,880	16,907	18,994	7,560	21,915	446	14	359,109
1981	38,410	-	43,695	50,856	94,352	26,990	20,861	12,207	7,633	30,108	1,564	192	326,877
1982	35,071	-	55,422	44,786	97,698	33,891	17,795	25,418	5,991	23,916	1,286	538	341,810
1983	22,723	-	26,274	29,127	30,213	18,242	11,834	15,487	7,015	8,922	1,679	19	172,535

Source: Federal Government Finance, Statistics Canada, catalogue number 68-211.
Annual publication.

CHAPTER III

THE REGION, NEWFOUNDLAND

INTRODUCTION

The purpose of this chapter is to introduce a region appropriate for the study of the evaluation of regional policies. The choice of Newfoundland is dictated by the fact that this province is the most depressed region within Canada.

This chapter focusses upon both the existing avenues for, and the obstacles (both natural and man-made) to Newfoundland's growth and development. It should be emphasized at the outset that this chapter does not purport to provide a comprehensive description of the Newfoundland economy, but merely intends to outline those features which will be usefully employed in later analytic work. The reader may also find this chapter helpful in explaining some of the assumptions made, or results obtained, in later chapters. Other information on the Newfoundland economy, in a most comprehensive form, may be found in Newfoundland and Labrador, the First Fifteen Years of Confederation, edited by R.I. McAllister, especially Chapter 8. A number of recent studies of particular importance will be cited later in this chapter.

Section I introduces the natural environment, i.e., geographical, climatic, and topographical features of the region, and views them in the context of natural obstacles to the region's growth. Section II studies population, employment, income and migration and their relationship to the region's economic evolution. Section III discusses the region's production sector, especially energy, oil and gas industries. Finally, in section IV the market environment in Newfoundland and some conclusions for the chapter will be presented.

I - NATURAL ENVIRONMENT

Newfoundland is the newest and most easterly province of Canada. It consists of the island of Newfoundland (42,734 square miles, i.e. a little less than that of England) and Labrador (112,826 square miles) on the mainland.

The island, an equilateral triangle in shape, lies across the mouth of the Gulf of St. Lawrence. On the North it is separated from Labrador (part of Newfoundland

since 1809) by the strait of Belle-Isle; on the southwest, it is separated from Nova Scotia by the Cabot Strait; on the east and south, it is bounded by the Atlantic Ocean. Labrador lies between the eastern boundary of Quebec and the Atlantic Ocean (refer to map).

Newfoundland is isolated geographically from world markets; thus creating a first obstacle to her growth and development. All exports from or imports to Newfoundland incur extra-transportation costs (from ship to train and/or truck or vice versa). These costs clearly act as distorting taxes.

Newfoundland has a marine climate and experiences abundant precipitation evenly distributed throughout the year. The winters are cold, but not severe and summers vary from warm to cool. The climate of Newfoundland is affected by her position on the north-east coast of North America and by the cold Labrador current which washes her coast. The sea that bounds the North peninsula is icebound in winter and carries icebergs and causes fog during much of the summer. The southern coasts are ice-free through the year.

Source: Road Atlas Canada, U.S.A., Rolph McNally Ltd.,
Downsview, 1981.

As a result of exposure to Arctic influences, Labrador has an unusually cold climate, which precludes much cultivation. Recent glacial activity has removed the pre-Pleistocene soil cover and most vegetation. A combination of heavy rainfall, a low evaporation rate and coniferous vegetative activity has rendered the remaining material highly acidic. Northern plateau areas are similar in character to the muskeg regions of the Canadian Shield, while coastal areas incorporate marine sands and clays. Better soil is found in sheltered valleys to the south, where morainic sand and clay deposits have formed alluvial soils. (Encyclopedia Americana, 1973, p. 275)

Both unfavorable climate and soils create a second obstacle to the growth and development of Newfoundland since they cause a very weak agricultural industry. The province consequently must import most of its food throughout the year.

II - POPULATION, EMPLOYMENT, INCOME AND MIGRATION

A) Population

Population growth in Newfoundland is a key factor in its economic history. As Matthews (1979, p. 90) noted, "The Newfoundland population has grown so rapidly that her economic gains have largely dissipated." When Newfoundland joined Confederation she already had a very rapidly growing population as a result of the post-war baby boom. A bonus given for every child in Canada added to this population growth. This baby boom lasted well into the 1960's.

Newfoundland had the highest birth rate of any province between 1950 and 1970. This large juvenile population also served to lower the death rate to the lowest in Canada. The problem with a high juvenile population is that a relatively small proportion of the population must support the rest. By 1966, over 51 per cent of the population were in the age group 0-19 while those over age 65 comprised another 5.9 per cent. In 1968 less than 24 per cent of the population were employed (Matthews, 1979, p. 90).

The high birth rate and large juvenile population also served to eat up the very real economic gains achieved since Confederation. From 1971 to 1981, the natural increase rate fell in Newfoundland by some 34 per cent and in Canada by some 13 per cent. This 34 per cent reduction in the natural rate increase in Newfoundland can be attributed to a number of factors, including higher education and more industrialization in the province from 1971 to 1981. Table 3-1 indicates that the natural increase rate fell drastically between 1971 and 1981, but those who were born between 1956 and 1960 (with a growth rate of 27.4 per cent) entered the labor market during the period of 1976 to 1981.

According to Matthews (1979, pp. 89-90) one of the underdevelopment problems of Newfoundland was the growth of her population. Our findings indicate that this problem has been losing its significance since the gap between natural growth of population of the nation and Newfoundland has narrowed.

The third obstacle to growth and development in Newfoundland is the dispersion of population (Table 3-2). In 1949 only 40 per cent of the population lived in urban areas and in 1971 the urban population reached 57 per cent.

TABLE 3-1

Canada, Newfoundland Live Birth,
Death, and Natural Increase Rates

per 1000 population

Period	Average Live Birth Rate		Average Death Rate		Average Natural Increase Rate	
	Can.	Nfld.	Can.	Nfld.	Can.	Nfld.
1921-1925		26.7		14		12.7
1926-1930		25.1		13.7		11.4
1931-1935		23.4		12.8		10.6
1936-1940		25.8		12.4		13.4
1941-1945		29.8		11.8		18
1946-1950		36.2		9.3		26.9
1951-1955		34.1		7.6		26.5
1956-1960		34.6		7.2		27.4
1961-1965		31.5		6.6		24.9
1966-1970		25.8		6.2		19.6
1971	16.8	24.5	7.3	6.1	9.5	18.4
1972	15.9	24.2	7.4	6.3	8.5	17.9
1973	15.5	22	7.4	6.3	8.1	15.7
1974	15.6	21.2	7.4	6.1	8.2	15.2
1975	15.8	20.4	7.3	5.9	8.4	14.5
1976	15.7	20	7.3	6	8.4	14
1977	15.5	19.8	7.2	5.6	8.3	14.2
1978	15.3	18.4	7.2	5.5	8.1	12.9
1979	15.5	17.7	7.1	5.5	8.4	12.2
1980	15.5	17.8	7.2	5.8	8.3	12
1981	15.3	17.8	7	5.7	8.3	12.1

Sources: Vital Statistics, Vol. 1, Births 1971-75/76, cat. no. 84-204
Vital Statistics, Vol III, Deaths 1977-81, cat. no. 84-206

TABLE 3-2

Rural and Urban Population of Newfoundland and
Rural and Urban Percentages for Census Years
1901 to 1981 and Rate of Population Growth Between Each Census Year

Census Year	Total Census Population	Rural Pop. (under 1000)	Growth Rate of Rural Pop. (%)	% Rural	Urban Pop. (over 1000)	Growth Rate of Urb. Pop. (%)	% Urb.
1901	220,984	186,458	-	77.5	49,616	-	22.5
1911	242,619	186,485	.01	76.9	56,161	13.1	23.1
1921	263,033	198,555	6.4	75.5	64,478	14.8	24.5
1935	289,588	203,986	2.7	70.4	85,602	32.7	29.6
1945	321,819	218,886	5.6	68	102,933	20.2	32
1951	361,416	206,621	-5.6	57.2	154,795	50.3	42.8
1961	457,853	225,833	9	49.3	232,020	49	50.7
1966	493,396	226,707	0.3	45.9	266,689	14	54.1
1971	522,104	223,304	-1	42.8	298,800	12	57.2
1976	557,725	229,460	2	41.1	328,270	9	58.9
1981	567,680	234,785	2	41.3	332,895	1	58.7

Sources: For 1901 to 1971: Matthews (1979) table 3

For 1976: Canada Year Book 1980-81, Statistics Canada

For 1981: Census of Canada, Population, cat. no. 92-901
vol. 1

Between 1961 and 1971 the urban area population grew at a declining rate, i.e., from 1951 to 1961 a growth rate of 49 per cent, from 1961 to 1966 a growth rate of 14 per cent and from 1966 to 1971 a growth rate of 12 per cent.

During the same periods the rural population growth fell, i.e. from 1951 to 1961 the growth rate was 9 per cent and from 1966 to 1971 this growth fell by 1 per cent. After the establishment of DREE (between 1971 and 1981) opposite results were found. The rural population had a growth of 2 per cent while the urban population had a declining growth rate, i.e. from 9 per cent in 1971-76 to 1 per cent in 1976-81. The dispersion of population fell between 1901 and 1981, but the rural population, in 1981, still represented 41.3 per cent of the population which means the dispersion of population was significant. On the other hand, from 1971 to 1981 the percentage of population in urban and rural areas remained almost constant while the growth of rural population was higher than the growth of urban areas.

These growth rates may be attributed to the following factors:

- 1 - The wide gap between rural and urban property taxes in Newfoundland motivated Newfoundlanders to live in rural areas rather than in urban areas.
- 2 - The impact of transfer payments allowed many individuals to live in rural areas and commute to work in urban centres.
- 3 - The rise in unemployment and its subsequent high unemployment benefits allowed Newfoundlanders to stay away from urban areas. Consequently, industries in urban centres

may have found it increasingly difficult to attract labor.

As Table 3-3 indicates, in 1971 Newfoundland had 878 separate communities while 545 communities had fewer than 300 residents and 226 of them even had less than 100 residents. In 1981 the number of communities fell from 878 to 870 and 465 separate communities had less than 300 residents. The number of communities with less than 100 residents was reduced to 159. From 1971 to 1981 the number of small communities fell, but the number of separate communities in general decreased by only 8.

Because of this dispersion, it was very costly for the province to provide many communities with facilities such as electricity, roads, telephone, hospitals, and modern schools. As Matthews (1979, p. 91) also mentioned, it was often impossible to find qualified doctors, nurses and teachers who were willing to live in comparative isolation. Matthews (1979, p. 91) concluded, according to the information available until 1971, that the reasons for having centralization as a major thrust of Newfoundland's social planning were isolation and dispersion.

TABLE 3-3
Number of Communities in Newfoundland
By Population of Community,
Census Years 1961, 1966, 1971 and 1981

Population of Community	Number of Communities			
	1961	1966	1971	1981
0-49	238	153	113	96
50-99	174	148	113	103
100-199	263	222	196	176
200-299	140	125	123	130
300-399	83	91	82	78
400-499	69	48	44	65
500-999	83	116	126	130
1000-4999	47	60	71	109
5000-9900	5	7	8	7
10,000 + over	2	2	2	16

Sources: 1961-1971, Matthews (1979) Table 4

1981, Census of Canada. Place Name Reference List.
Atlantic Provinces, Statistics Canada, E-482.

Until the 1960's Newfoundland had another restriction in her growth and development. A large segment of Newfoundland's labor force was illiterate. For example, in 1961, 18 per cent of all Newfoundlanders and 26.7 per cent of Newfoundland's rural population were illiterate - twice the national illiteracy rate in that year. The bigger problem was that over 25 per cent of those between ages 25 and 34 were illiterate.¹

1. For more explanations refer to Matthews (1979), p. 92.

However, calculations (Table 3-4) show that the illiteracy rate fell to zero in 1976 in Newfoundland. The growth rate in post-secondary education between 1976 and 1981 was 32.9 per cent while for the nation it reached 51 per cent. During this period the growth of the educated labor force with a university degree in Newfoundland was 36.1 per cent while the nation had a 36.8 per cent rate. The interesting point is that the rate of growth of people who attended university without obtaining a degree in Newfoundland grew by 14.2 per cent between 1976 and 1981 while this number fell by 11.2 per cent for Canada. This result is not surprising when the federal government's contribution in education in Newfoundland increased from \$7,852,000 in 1976 to \$48,079,000 in 1981, i.e. an increase of 512 per cent.

TABLE 3-4

Population 15 Years and Over,
by Sex and Level of Schooling

	Population 15 years and over	Canada		Newfoundland	
		1976	1981	1976	1981
		17,096,430	18,609,285	369,960	396,485
Level of Schooling	Less than Grade 9	4,425,365	3,851,285	137,445	122,230
	Grades 9-10	3,332,400	3,301,810	90,695	96,565
	Grades 11-13	4,156,230	4,820,650	53,860 *	65,165 *
	Post-secondary	2,428,105	3,666,330	48,705	64,710
	University with degree	1,089,030	1,490,180	13,565	18,460
	University without degree	1,665,295	1,479,020	25,705	29,345
	Total	17,096,425	18,609,275	369,975	396,475

Source: Market Research Handbook 1983, Revised edition. Statistics
Canada, cat. no. 63-224. Annual.

* Newfoundland's secondary school ends with grade 11;
had this system been like most of Canada (ending in grade 12)
or Ontario (ending in grade 13), this number would have
been larger.

B) Employment

The Newfoundland labor force has increased from 147,000 to 218,000 during the period of 1971 to 1981, an overall increase of 48.2 per cent. The comparable national increases were 36.3 per cent. It is noted that the labor force, as a percentage of the population, had increased from 28.3 per cent in 1971 to 38.4 per cent in 1981 in Newfoundland while in the nation the increase went from 40 per cent to 48 per cent respectively.

"The unemployment rate in the province has increased from 8.8 per cent in 1971 to 16.4 per cent in 1978, an 86.4 per cent increase. While the province had improved its unemployment position relative to the Canadian rate during the last half of the 1960's, the situation has since deteriorated. A major reason for this is that the province's participation rate has increased from 45 per cent in 1971 to 51.7 per cent in 1978." (DREE, 1979, p. 12) But as it can be seen in Table 3-5 the unemployment rate fell in both Newfoundland and the nation during the period of 1978 to 1981. However, Newfoundland's reduction in unemployment is 14 per cent and the reduction for the nation is 9 per cent. This means that Newfoundland's labor employment has improved faster than the nation's during this period. However, comparing 1971 to 1981, the gap between

the unemployment rate of the nation and of the province had increased.

TABLE 3-5

Selected Values, Labor Force & Employment
Newfoundland and Canada 1971, 1978, 1981
Unadjusted Series

	1971	1978	1981
Labor Force (000)			
Newfoundland	148	198	218
Canada	8,639	10,882	11,830
Unemployment Rate (%)			
Newfoundland	8.8	16.4	14.1
Canada	6.2	8.4	7.6

Source: Statistics Canada, Cat. no. 71-201.

The reason for a higher rate of unemployment relative to the nation may be as follows:

1) Behavior of aggregate demand in Newfoundland: Previous empirical studies showed that aggregate demand has a relatively weak response to any expansionary fiscal policy in Newfoundland. But the change of aggregate demand/is more effective in Newfoundland than in the rest of the nation. In other words: "...expansionary fiscal policy will provide a relatively weak stimulus to aggregate demand in Newfoundland. Nevertheless,

expansion of aggregate demand in Canada sufficient to reduce unemployment in the rest of the country by 1 percentage point would reduce unemployment in Newfoundland by almost 3 percentage points. But there would not be a one-for-one reduction in unemployment for each new job created."

(Economic Council, 1980, p. 58) This may be due to a very elastic aggregate supply in Newfoundland.

ii) Unemployment insurance: High unemployment benefits created a dis-incentive for workers to seek employment and consequently increased the unemployment rate.

iii) Productivity: The low productivity of the labor force relative to the wage rate in Newfoundland made the cost of labor expensive, which led to the substitution of capital for labor. Many studies confirm this low productivity of Newfoundland's labor force.²

iv) Investment: Investments in the province are an important element for the creation of jobs in the area. The high unemployment rate in Newfoundland is associated with low investment. In 1971 when the gap between the unemployment rate in Newfoundland and the rest of the nation was only 2.6 per cent, the per capita investments in Newfoundland in some sectors were more than twice those of the nation. For example, the ratio of

2. For a more detailed analysis of productivity in Newfoundland, refer to Economic Council, 1980, pp. 59-82.

per capita investment in the manufacturing industries in Newfoundland to those in Canada was 1.93 while in the utility sector the ratio was 2. The figure for the primary and construction industries, the most labor intensive industries, was 1.61 (see Table 3-6). In 1977 all these ratios fell drastically and consequently Newfoundland's unemployment rate in 1978 was twice that of the nation (see Table 3-5). The ratio of per capita investment in 1981 compared to 1977 had improved. The unemployment rate in Newfoundland also had improved in 1981.

TABLE 3-6
Selected Ratio of Per Capita Investment
Of Newfoundland to Canada by Sector*
1971-1981

	1971	1977	1981
Primary and construction	1.61	.54	.96
Manufacturing	1.93	.24	.36
Utilities	2	.66	.61
Trade, Finance + Commercial Services	.56	.58	.46
Institution + Government's Departments	1.18	1.51	.85
Housing	.77	.89	.67

* Excludes repair expenditures

Source: 1971: calculated from table 9 of DREE (1979, p. 11)

1977-80: calculated from Private and Public Investments in Canada. Statistics Canada, cat. nos. 61-205, 61-206, 91-201.

Table 3-7 presents the employed labor force by industry for the years 1961, 1971 and 1981. Over the period 1961 to 1971 employment in the primary sector fell by 23 per cent. This employment rose by 96 per cent over the period 1971 to 1981. Manufacturing industries show better improvement in employment. Employment in this sector rose by 40 per cent over the period 1961 to 1971 while from 1971 to 1981 it increased by 151.5 per cent. Employment in all sectors improved over the period 1971 to 1981 except in one unspecified sector. It is useful to note that employment in manufacturing industries had the highest growth rate (178.8 per cent) over the period 1971 to 1981. This may be due to the impact of the federal government expenditures through DREE during this period.

TABLE 3-7

<u>Employed Labor Force, By Industry</u>			
<u>Newfoundland And Labrador, 1961, 1971 and 1981</u>			
	June 1961	June 1971	June 1981
Agriculture	1,580	1,095	-
Forestry	5,217	1,095	2,200
Fishing & Trapping	7,815	6,530	-
Mining	4,021	4,725	6,000
Manufacturing	11,325	15,900	40,000
Construction	7,719	13,170	18,000
Transportation Communications & Utilities	14,193	15,565	21,000
Trade	18,250	21,900	42,000
Finance, Insurance Real Estate	1,408	2,510	7,000
Community Business & Personal Services	17,371	31,005	56,000
Public Administration	12,039	11,265	19,000
Industry Unspecified	3,099	12,065	5,000
All Industries	104,037	137,640	208,028

Sources: Statistics Canada, Census of Canada, cat. no. 71-001
 Statistics Canada (1982). Estimates of Employees by
 Province and Industry. cat. no. 72-008.

C) Income

Over the periods of 1961-1971 and 1971-1981 personal per capita income grew faster in Newfoundland than for the nation. This is seen in Table 3-8.

TABLE 3-8

<u>Personal Income Per Capita</u> <u>Newfoundland and Canada</u>				
	<u>Newfoundland</u>		<u>Canada</u>	
	\$	Growth Rate Percent	\$	Growth Rate Percent
1961	961		1,651	
1971	2,195	128	3,435	108
1981	7,528	242	11,520	235

Source: Statistics Canada. National Income and Expenditure
Account. cat. no. 13-201.

Important factors may be (1) the rise in transfer payments to Newfoundland over these periods, and (2) the growth in average weekly wages and salaries in Newfoundland since 1971. During the period of 1971 to 1978, weekly wages and salaries have increased approximately 100 per cent in the province, compared to approximately 92 per cent for the nation as a whole.

In 1971 the provincial wage was 89.9 per cent of the Canadian wage, in 1976 this grew to 97.1 per cent (see Table 3-9).

TABLE 3-9

Average Weekly Wages and Salaries*
1976, 1980 and 1981

Years	Newfoundland	Canada
	\$	\$
1976	221.63	228.03
1980	288.90	317.39
1981	328.08	355.28

Source: Canadian Statistical Review, cat. no. 11-0038

* The data is based on reports from firms employing 20 persons or more in any month of the year and relate to the last pay periods in the month.

In 1981 the provincial wage totalled 92 per cent of the nation's. The high wage rate relative to productivity created the fourth obstacle to growth and development in Newfoundland. For instance, in 1976 the provincial wage was 97.1 per cent of the nation's and in 1981 it fell to 92 per

cent. The high wage rate in Newfoundland is attributed to imperfections in the labor market. High institutionalized labor market creates lower growth and development in the province.³

D) Migration

Since the mid-50's, Newfoundland has generally experienced net out-migration. The essentially resource-based provincial economy has been unable to absorb the large influx of young people into the labor force. As a result, these people have been seeking employment elsewhere (DREE, 1979, p. 20). Out-migration from Newfoundland was considerably less during the period 1971 to 1976 than that recorded for the period 1966 to 1971. However, this out-migration increased from 753 for the 1971-76 period to 11,312 for the period 1976 to 1981 (see Table 3-10).

The Economic Council (1980) using data prior to 1977 concluded: "The empirical tests we used indicate that growth in relative wages alone accounts for most of the swing in migration flows." (p. 53) A positive relationship

3. Newfoundland's labor market is the second most unionized (after B.C.) labor market in Canada. Wage rates are usually determined by the unions according to the wage rates in Ontario and Alberta, i.e. these rates are exogenous to Newfoundland's economy.

TABLE 3-10

Migration Data
Newfoundland

Year	Total Net Migration	International Migration	Interprovincial Migration
1966-71	-28,923	-9,579	-19,344
1971-72	1,018	108	910
1972-73	- 405	132	- 537
1973-74	- 3,025	291	- 3,316
1974-75	713	218	495
1975-76	946	354	592
1971-76	- 753	1,103	- 1,856
1976-77	- 1,650	- 252	- 1,398
1977-78	- 4,101	-1,491	- 2,610
1978-79	- 2,475	- 603	- 1,872
1979-80	- 1,301	- 363	- 938
1980-81	- 1,785	- 400	- 1,385
1976-81	-11,312	-3,109	- 8,203

Source: Based on international and interprovincial migration in
Canada, Statistics Canada, cat. no. 91-208 (April 1979)

between net migration and the wage gap between the nation and Newfoundland can be shown by using the data for 1976 to 1981. The net out-migration is 11,312 people while the relative provincial wage in terms of the nation fell from 97.1 per cent in 1971 to 92 per cent in 1981 (see Table 3-10).

However, the impact of other factors on migration has probably been important, for instance, the role of government transfers or government job creation programs in the province. Table 3-11 was derived from the data given in the previous chapter.

TABLE 3-11

SHARE OF THE SELECTED FEDERAL
GOVERNMENT GRANTS TO NEWFOUNDLAND (1971-81)
(\$000)

Regional Development Incentives Act (RDIA)

	Nfld.	Canada	Nfld./Canada ^(%)
1971-76	9,053	79,136	11.4
1976-81	16,504	320,049	5.1

Agriculture Rehabilitation Development Act (ARDA)

1971-76	5,056	138,891	3.6
1976-81	4,437	84,538	5.2

Statutory Subsidies

1971-76	58,196	200,691	28.9
1976-81	48,536	203,890	23.8

According to Table 3-11 both statutory subsidies and RDIA fell in Newfoundland relative to the national level during the 1971-76 and 1976-81 periods. However, the ratio of Newfoundland's ARDA to those of the nation increased from 1976 to 1981 compared with the 1971-76 period. In general, comparing the 1976-81 period with the 1971-76, Newfoundland's RDIA and statutory subsidies fell relative to the national level. These changes may have caused out-migration from Newfoundland.

Note that out-migration can be viewed to be harmful to the region if these people are the most productive members of the labor force (i.e. the region is subject to a brain drain). According to the Economic Council (1980, p. 54) there has not been any brain drain for Newfoundland between 1971 and 1976.⁴

It is also worthwhile to mention that one of the reasons for having a relatively unskilled inflow of labor into Newfoundland could be the high unemployment benefits available.

4. The Economic Council (1980, pp. 54-56) studied the following questions: Who leaves Newfoundland, the employed or the unemployed? Do they find work elsewhere? Who comes to Newfoundland, the employed or the unemployed? Do in-migrants find work in Newfoundland? The answer to these questions are important, but this study is mostly concerned with the obstacles as well as the motivations for growth and development.

For example, Newfoundlanders returning home cannot qualify for any unemployment insurance benefits in Ontario or Alberta if they have not completed 14 weeks of work. Even if they had, they can only collect as many weeks of benefits as they have actually worked. On the other hand, the same workers can receive at least 42 weeks of benefits if they return to Newfoundland after having worked no more than 10 weeks in Ontario or Alberta. Once they re-establish their residence in Newfoundland, they can qualify for as many weeks of unemployment insurance benefits as they have worked, plus 32 weeks of regionally extended unemployment insurance benefits. (Economic Council, 1980, p. 56)

Migration can improve productivity and wage rates if and only if markets are efficient. Existing studies have found inefficiency in Newfoundland's labor market. According to the Economic Council (1980, p. 57) out-migration of Newfoundlanders is not so much a solution to the unemployment and income problems as it is a solution to labor market needs of places like Ontario and Alberta. The Economic Council (1980, p. 57) continues: "The time when out-migration from Newfoundland is really feasible and successful is when the Canadian economy is booming; workers are needed to fill jobs elsewhere in Canada, and unemployment falls in Newfoundland in response to that economy buoyancy." Other authors have

also reached the same conclusion. For example, Copithorne (1981) tested the efficiency of the labor market in Newfoundland by using a u-v (unemployment-vacancy rate) relationship and concluded: "... The Newfoundland labor market is perhaps the most inefficient in Canada, followed by Alberta, then Quebec." (p. 88)

III - PRODUCTION SECTOR

Table 3-12 presents the real per capita gross domestic product (GDP) for Newfoundland and for Canada for the years 1961, 1971 and 1981 and permits a comparison of relative changes in this indicator between Newfoundland and Canada over time.

TABLE 3-12

Selected Values,

Real Per Capita Gross Domestic Products

Newfoundland & Canada

1961, 1971, 1981

	1961 \$	1971 \$	1981 \$
Newfoundland	1,388	2,478	2,690
Canada	2,685	4,408	5,569

Sources: Statistics Canada, Census Canada, cat. nos. 13-213, 62-010, 91-201.
Statistics Canada, Provincial Economic Accounts, 1967-82, cat. no. 13-213.
Government of Newfoundland and Labrador, Historical Statistics of Newfoundland and Labrador, 1979.
Economic Review, May 1977.
Bank of Canada Review, April 1982.

Newfoundland's real per capita GDP rose from \$2,478 in 1971 to \$2,690 in 1981, an increase of 8.55 per cent. For Canada this figure grew by 26.3 per cent.

Table 3-13 presents the value of real selected products by industry for the years 1961, 1971 and 1981. According to this estimation the main products in Newfoundland in 1961 were construction, manufacturing and mining with shares of 16, 11.2 and 10.6 per cent, respectively. In 1971, these three industries produced the main products in Newfoundland, with different ranking, i.e. construction 20.1 per cent, mining 12.4 per cent and manufacturing 9.5 per cent of the provincial products. In 1981 the construction industry only produced 7 per cent of the provincial output while the manufacturing industries' contribution in the provincial output increased from 9.5 per cent in 1971 to 11.6 per cent in 1981.

At this point it may be useful to study the two important product sectors of Newfoundland's economy in more detail. As will be seen these sectors, i.e., hydroelectric energy and oil and gas, are the most promising sectors today for Newfoundland's economy.

TABLE 3-13

REAL SELECTED PRODUCT BY INDUSTRY,
NEWFOUNDLAND - 1961, 1971, 1981

Industry	1961		1971		1981	
	\$ million	% of total	\$ million	% of total	\$ million	% of total
Agriculture	-	-	.08	.3	6.3	.3
Fishery	10.2	1.6	25.1	2.1	36.6	2.3
Forestry	17.1	2.7	17.9	1.5	20.4	1.2
Mining	66.5	10.6	145.9	12.4	85.5	5.4
Manufacturing	70.2	11.2	112.1	9.5	183.6	11.6
Construction	99.7	16.0	237.2	20.1	112.16	7

Sources: 1961 and 1971: Estimated by the Conference Board of Canada, January 1979.

1981: Estimated by this study by using the following:
Provincial Gross Domestic Product By Industry, Statistics
Canada, cat. no. 61-202, and Real Domestic Product By
Industry, cat. no. 61-213.

Hydroelectric Energy Sector:

Water power is the main source of energy in Newfoundland. Although the absence of high mountains, large waterfalls, and long rivers has limited the establishment of very large hydroelectric installations on the island, this handicap is offset to some extent by the even and abundant precipitation and the large lake surfaces, which produce a steady runoff in the rivers and brooks. (The Encyclopedia Americana, 1973, p. 275)

The Labrador territory has immense water power potential, notably at Churchill Falls, which has a sheer drop twice the height of Niagara Falls. Hydro resources are one of the promising avenues for the development of Newfoundland's economy. The increasing cost and unstable supply of energy and the abundant undeveloped resources in the province make Newfoundland a good site for an inexpensive source of energy in the future.

The expansion of Newfoundland's electricity ended much of the isolation of the rural areas. Until the 1960's, the hydroelectric potential remained essentially undeveloped in Newfoundland. With the establishment of the Newfoundland

Power Commission in 1954, a rural electrification program was designed and implemented to provide electric power to those isolated areas where it proved economically unattractive for private industry to do so. By 1972 every community with more than 15 subscribers had electricity. (Economic Council, 1980, p. 119)

Offshore Oil and Gas:

The second most important avenue for growth and development is oil and gas resources. However, production is economical only on a large scale, due to high costs of exploration and construction. Exploration for oil on the east coast started in 1959 and on the Grand Bank in 1964. In the 1970's the exploration for gas in the Labrador Sea started; however, in 1977 when Newfoundland brought in its own petroleum industry regulations, this exploration came to a virtual standstill. (Economic Council, 1980, pp. 125-143)

In 1979, the Hibernia field was discovered by Chevron Standard Limited. This field is 312 kilometers southeast of St. John's. The discovery of Hibernia field has moved Newfoundland and Labrador into the forefront of oil and gas exploration and development in North America (Government of Newfoundland and Labrador, 1981a, p. 4).

Hibernia is an area of about 20,000 acres. The production from this field has been delayed because of three kinds of problems. The first problem is due to the existence of iceberg-infested water and harsh weather conditions which delayed the design of a feasible production system. However, a number of design alternatives are being considered. The second problem is tied to the costs associated with offshore oil and gas and the fluctuating world market prices. The third problem arose from the dispute between the federal government and the government of Newfoundland over the management of the resources. The ownership dispute was settled in favor of the federal government in February 1984 by the Supreme Court of Canada.⁵ However, no oil could be brought ashore from Hibernia until a settlement had been reached between the province and the federal government over the management of Newfoundland's offshore oil and natural gas resources. At last, the dispute between the two levels of government was settled on February 11, 1985. The two governments agreed to turn over the management of Newfoundland's offshore oil and natural gas resources to a seven-person board headed by a neutral chairman. The

5. Other reservoirs in the region, i.e. Avalon and Jeanne d'Arc, should also be mentioned. It has not yet been established whether the Jeanne d'Arc reservoir is commercially feasible or not (Eglinton and Uffelmann, 1984, pp. 38-39).

federal government will control the pace of development on the Hibernia field until Canada achieves energy self-sufficiency and security of supply. Newfoundland will control the mode of development, as long as it does not delay the attainment of self-sufficiency.

Despite the capital-intensive character of the industry, the offshore oil and gas resources may bring a good deal of new employment for Newfoundlanders. Policies related to offshore oil and gas are not the subject of this chapter and so are omitted. However, suffice it to say that the province should receive a fair amount of income from these resources. Various studies⁶ done in this regard have forecast differing amounts of this projected income depending on the particular scenario being envisioned.

IV - NEWFOUNDLAND'S MARKET ENVIRONMENT

Newfoundland is a small trading economy, both in its exports and its imports; consequently, it faces given terms of trade. Both of her major exports, fish and iron ore, face high

6. For example see Government of Newfoundland and Labrador (1981a), Wilby (1981) and Eglington and Uffelman. (1984).

tariffs in the receiving countries if shipped in a manufactured or fully processed form.⁷

The province faces uncertain demands with a high variance in its primary products. The minerals and the forest industry are more affected by uncertain demands. Despite its good sea location for its exports to Europe and to South America, the majority of Newfoundland's exports at present tend to be by road and rail to the U.S. markets. This creates extra transportation costs for Newfoundland's goods.

"The major market for Newfoundland fish products is the United States. Over 70 per cent of all fish exports are sold to the United States. The European market buys about 15 per cent of the total exports and the remainder is shipped to South American and Japanese markets. World prices for fish products have increased considerably over the past several years and the demand for these products appear strong. Although global demand for fish products continues to increase, Newfoundland processors must maintain high quality if markets

7. "Two major problems remain: very little of Newfoundland's fresh and frozen cod can penetrate the European Economic Community because of its tariff structure; and no exported fish are cooked in Newfoundland because American tariffs preclude imports of processed fish." (Economic Council, 1980, p. 94)

are to be expanded or developed. The largest market potential for an expanded catch lies in Europe and Japan. However, the existence of extensive processing capacity in Europe and traditional reliance on whole fresh fish in Japan pose difficulties in attempting to export finished consumer packaged seafood products to these countries." (DREE, 1979, pp. 18-19)

The United States are the main purchaser of Newfoundland's mineral products, followed by Europe and Japan. For pulp and paper products, Newfoundland faces strong world demand and the major consumer for these products is the United States. Approximately 70 per cent of the total production is exported to the American market. The Canadian market absorbs only very little of Newfoundland's products. "Newfoundland is a net importer of goods and services. Despite the fact that consumer prices in the province tend to be higher than in the rest of Canada, retail sales per capita are extremely high as is the rate of personal savings. This is, in part, due to the high volume of transfer payments to the province. A domestic market for finished products exists, but provincially based manufacturing has not grown to meet this demand. Consequently, much of the money injected into the provincial economy, in the form of transfer payments, moves

rapidly out, creating relatively few jobs in the process. Similarly, the manufacture of capital stock for primary industry takes place elsewhere and is imported to the province. The domestic market is not large, but it appears that some potential for import substitution does exist. For some of the basic goods consumed in the province, the extra transportation costs which inflate the prices should act as a protective tariff and offset the loss in scale economies, given the smaller market." (DREE, 1979, pp. 19-20)

After 1970 when Canada applied the flexible exchange rate system, Newfoundland faced new instabilities in its export income, since the fluctuation of exchange rate is associated with the fluctuation of foreign prices (domestic price times exchange rate) of Newfoundland's exports.

CONCLUSIONS

This chapter introduced some features of the Newfoundland's economy relevant for this study, some of which were avenues for and others were obstacles to further growth and development of the region. Four obstacles were identified: isolation, climate and soils, both due to its natural environment, and dispersion of population and high wage rates which are man-made. On the other hand, the hydro and offshore oil and gas resources are the most promising avenues for its growth and development.

Newfoundland is small in both its export and import markets. It is a net importer of goods and services. Its exports include fishery products, mineral products as well as pulp and paper. Wage rates are exogenous for its labor market. They are determined by unions according to wage rates in Ontario and Alberta. On the other hand, migration cannot affect the province's wage rates. Combining these two factors, Newfoundland's labor market is one of the most inefficient in Canada.

CHAPTER IV

REGIONAL LONG-RUN SUPPLY GROWTH MODELS

Regional growth models, as discussed in Chapter I, can be divided into long-run supply models, like those of Borts (1960), Borts and Stein (1964), Smith (1974, 1975) and others, and short-run demand models, like those of Bell (1967), Ghali et al. (1981), Glickman (1971, 1977), Hall and Licari (1974) and many others. None of these models consider the impact of government intervention directly on the supply side. On the other hand, demand-determined growth models study the impact of federal government expenditures in an aggregate form on the demand side of the region in the same fashion as export-base models. However, one should be aware that different government policies may have different offsetting or reinforcing effects on both the supply and the demand sides of the region. At the same time, it is possible that aggregate demand in the region shifts to the right as the result of a rise in government expenditures without any impact on employment. This situation occurs when all new income is allocated to imports from other regions or countries. A demand-determined model for a small open region usually assumes that there is enough unemployed resources so that the quantity supplied can increase without pushing up the costs of production. Considering this assumption, and recalling a

given terms of trade for a small open region, the region will have a perfectly elastic aggregate supply curve. In these models, a shift in aggregate demand will only result in higher employment.

Most demand-determined models deal with government expenditure and its impact on employment only through aggregate demand movements. Even some supply models (e.g. Swan and Kovacs (1981)) study the impact of federal government expenditures on the region through the demand side.

On the other hand, one should note that supply-affecting policies may have short-run impacts by reducing marginal costs of production, but the longer term impact may be a distorting one by shifting marginal costs of production to the left and up. It is also possible that two transforming policies, while having a favorable short-run impact on the regional economy, work to offset each other in the long run. To our knowledge, there is no model which considers the impact of federal government policies directly on the supply side in a disaggregated form. The purpose of this chapter is to introduce three such models, i.e. long-run dynamic supply-affecting regional growth models

which include policy instruments.¹ The first model is a full employment model with an aggregate Cobb-Douglas production function. Later the second model will be introduced. It is a long-run, dynamic supply model like the first, but incorporates more realistically unemployment. And finally, the third model, which modifies Model II by considering a constant elasticity of substitution (C.E.S.) production function, will be discussed. A brief conclusion will follow.

Model I

Assume that the output of the region is described by an aggregate Cobb-Douglas production function and capital (K) and labor (L) are fully employed. The region is small and so it faces a given terms of trade. Capital and output are homogeneous, i.e. the income (Y) may be consumed or added to the capital stock of the region. The labor force ($\bar{L}$) is measured in efficiency units, i.e. $\bar{L} = L e^{mt}$, where technical progress is disembodied Harrod-neutral at a given rate m and t is time. The production function is Solow type, continuous, and twice differentiable. At full capacity, the production

1. These models should be viewed as temporal rather than spatial. Consequently, such issues as land use patterns or income gradient distribution cannot be evaluated.

function is $Y = Y(A, K, \bar{L})$. Here A is a variable which is influenced by factors such as infrastructure of the region. Clearly, any policy which affects such factors will influence the value of A . For any given A , capital and labor have some level of productivity. For any given capital and labor in the region, a higher value of A implies a larger quantity of output for the region. For instance, more highways, better water and sewer systems, industrial parks, roads and bridges, port facilities, schools, etc., can increase the region's productive capacity, for given quantities of capital and labor, through increasing the value of A . Let the production function have the following explicit form.

$$(1-1) \quad Y = AK^\alpha \bar{L}^{(1-\alpha)}$$

where $0 < \alpha < 1$ and is the income elasticity with respect to capital and $(1 - \alpha)$ is income elasticity with respect to labor.²

We also have

$$(1-2) \quad \bar{L} = L e^{mt}.$$

2. The functional form of A will be specified later in this section.

Substitute (1-2) in (1-1) to obtain

$$(1-3) \quad Y = AK^{\alpha} L^{(1-\alpha)} e^{(1-\alpha)mt}$$

Define income per worker as $\frac{Y}{L} = y$ and
modify equation (1-3) to read

$$(1-4) \quad y = AK^{\alpha} L^{-\alpha} e^{(1-\alpha)mt}$$

Take the natural logarithm of (1-4) to
get

$$(1-5) \quad \ln y = \ln A + \alpha \ln K - \alpha \ln L + (1 - \alpha)mt$$

Using an asterisk to denote the percentage rate
of change, the rate of growth of income per worker can be
written as:

$$(1-6) \quad \dot{y} = \dot{A} + \alpha \dot{K} - \alpha \dot{L} + (1 - \alpha)m$$

Investment:

The region's investment comes from local savings
as well as other regions and foreign sources. Assume

provincial savings are proportional to provincial income, i.e.

$$(1-7) \quad S = sY \quad 0 < s < 1$$

Whenever the return to capital (r) in the region is below the opportunity cost of capital, some such savings are transferred out of the region. For simplicity assume the relevant transaction costs to be negligible. Hence, net capital movements to the region (NKM) is a function of the local rate of return to capital ($r + \rho_K$) and the national rate of return (r_N):

$$(1-8) \quad NKM = F(r + \rho_K, r_N)$$

$$\text{such that } \frac{\partial NKM}{\partial (r + \rho_K)} > 0 \quad \text{and} \quad \frac{\partial NKM}{\partial r_N} < 0$$

$$\rho_K = \frac{\text{Federal government subsidy on capital} (G_K)}{\text{capital} (K)}$$

Follow Smith's (1975) linear expression for equation (1-8), but modify it to allow for the effect of capital subsidy in the region as follows:

$$(1-9) \quad NKM = v (r + \rho_K - r_N) K \quad v > 0$$

where K , the capital stock, is multiplied by the difference between the effective local rate of return and that prevailing nationally. The change in the region's capital, (ΔK) , is the summation of equations (1-7) and (1-9) minus the depreciation.

$$(1-10) \quad \Delta K = sY + v(r + \rho_K - r_N)K - qK$$

where q is the annual depreciation rate. Assume capital and labor receive their marginal products, then with an appropriate substitution using $r = \frac{\alpha Y}{K} + \rho_K$ equation (1-10) becomes

$$(1-11) \quad \Delta K = sY + v\left(\frac{\alpha Y}{K} + 2\rho_K - r_N\right)K - qK$$

and

$$(1-12) \quad \frac{\Delta K}{K} = (s + v\alpha) \frac{Y}{K} + 2v\rho_K - \left\{ v\alpha \frac{Y_N}{K_N} + q \right\}$$

where Y_N and K_N are the nation's income and capital respectively.

From $Y = AK^\alpha L^{(1-\alpha)} e^{mt(1-\alpha)}$ the following can be written

$$K = \frac{\frac{1}{Y^\alpha}}{\frac{1}{A^\alpha} L^{\frac{1-\alpha}{\alpha}} e^{mt(\frac{1-\alpha}{\alpha})}} = \frac{\frac{1}{Y^\alpha}}{\frac{1}{A^\alpha} L^{\frac{1-\alpha}{\alpha}} e^{mt(\frac{1-\alpha}{\alpha})} \frac{1}{L^\alpha}}$$

$$= \frac{\frac{1}{Y^\alpha}}{\frac{1}{A^\alpha} L^{-1} e^{mt(\frac{1-\alpha}{\alpha})}}, \text{ or}$$

$$(1-13) \quad K = A^{\frac{1}{\alpha}} Y^{\frac{1}{\alpha}} L e^{-mt(\frac{1-\alpha}{\alpha})}.$$

$\frac{Y}{K}$ can be written in the following way

$$\frac{Y}{K} = \frac{Y}{A^{-\frac{1}{\alpha}} Y^{\frac{1}{\alpha}} L e^{-mt(\frac{1-\alpha}{\alpha})}} = \frac{Y}{A^{-\frac{1}{\alpha}} Y^{\frac{1}{\alpha}} e^{-mt(\frac{1-\alpha}{\alpha})}}$$

$$= A^{\frac{1}{\alpha}} Y^{-\frac{1-\alpha}{\alpha}} e^{mt(\frac{1-\alpha}{\alpha})}, \text{ or}$$

$$(1-14) \quad \frac{Y}{K} = Y^{-\frac{1-\alpha}{\alpha}} e^{mt(\frac{1-\alpha}{\alpha})} A^{\frac{1}{\alpha}}.$$

Substitute (1-14) in (1-12) to get

$$(1-15) \quad \frac{\Delta K}{K} = A^{\frac{1}{\alpha}} (s + va) y^{-\frac{1-\alpha}{\alpha}} e^{mt(\frac{1-\alpha}{\alpha})} + 2vp_K - \{A_N^{\frac{1}{\alpha}} v a y_N^{-\frac{1-\alpha}{\alpha}} e^{mt(\frac{1-\alpha}{\alpha})} + q\}.$$

We know that

$$\rho_K = \frac{G_K}{K} = \frac{G_K}{A^{\frac{1}{\alpha}} y^{\frac{1}{\alpha}} L e^{mt(\frac{1-\alpha}{\alpha})}} = A^{\frac{1}{\alpha}} g_K y^{\frac{1}{\alpha}} e^{mt(\frac{1-\alpha}{\alpha})}$$

where G_K is the federal government's assistance to capital, such as expenditures under the Regional Incentives Act, and g_K is per-worker G_K .

Substitute for ρ_K in equation (1-15) to obtain

$$(1-16) \quad \frac{\Delta K}{K} = A^{\frac{1}{\alpha}} \left\{ 2vg_K y^{\frac{1}{\alpha}} e^{mt(\frac{1-\alpha}{\alpha})} + (s+va) y^{-\frac{1-\alpha}{\alpha}} e^{mt(\frac{1-\alpha}{\alpha})} - \{A_N^{\frac{1}{\alpha}} v a y_N^{-\frac{1-\alpha}{\alpha}} e^{mt(\frac{1-\alpha}{\alpha})} + q\} \right\}$$

which shows the dynamic growth path of capital in the region.

The Labor Market:

The natural rate of population growth (n) is assumed to be exponential in the form of $n = n_0 e^{\Delta t}$ where $\Delta > 0$.³ Assume the participation rate ($\frac{L}{P}$) is constant⁴ through time where P stands for the total population in the region. Assume, as Smith (1975, p. 168), that the change in the labor force (ΔL) is equal to the change in employment⁵ and that this equals the participation rate multiplied by the sum of natural increase and net migration (ΔM), i.e.

$$(1-17) \quad \Delta L = \left(\frac{L}{P}\right) (\Delta P + \Delta M)$$

3. The natural rate of population growth in Newfoundland has declined from 24.9 per cent in 1965 to 12 per cent in 1982. See Table 3-1 of Chapter III which also shows that this rate remained roughly constant over the same period for Canada.
4. This assumption will be relaxed in Models II and III.
5. Relaxation of this assumption will make this model relevant only to the short run. However, this dissertation is concerned with the long run. If there is a positive unemployment rate in this long run, neoclassical world, the rate should be considered the unemployment rate associated with full employment, i.e. the natural rate of unemployment. This assumption, while very strong, may be plausible for a region where in the long run the unemployed can move to other regions.

Assume that employment decisions in the region are based on the marginal productivity of labor, and employment continues until the marginal product of labor equals the real wage rate (W) minus real grant on labor per worker (ρ_L). The efficiency condition of the region requires that

$$(1-18) \quad W = \frac{(1 - \alpha)Y}{L} + \rho_L = (1 - \alpha)y + \rho_L.$$

Use equation (1-17) to write

$$\frac{\Delta L}{L} = \frac{\Delta P}{P} + \frac{\Delta M}{P}, \text{ or}$$

$$(1-19) \quad \dot{L} = n + \dot{M} = n_0 e^{\Delta t} + \dot{M}.$$

Follow the neoclassical tradition and assume that migration responds to the difference between the real wage rates in the region and the nation, i.e.

$$(1-20) \quad \frac{\Delta M}{P} = \psi(W, W_N) \text{ such that } \frac{\partial \frac{\Delta M}{P}}{\partial W} > 0, \frac{\partial \frac{\Delta M}{P}}{\partial W_N} < 0$$

where W_N is the national real wage rate.

Follow Smith (1975, p. 169) and assume that equation (1-20) is linear in the following form:

$$(1-21) \quad \frac{\Delta M}{P} = \dot{M} = d(W - W_N), \quad (d > 0).$$

Substitute (1-18) into (1-21) to have

$$(1-22) \quad \dot{M} = d(1 - \alpha)y - d(1 - \alpha)y_N + d\rho_L$$

where $\rho_L = g_L$.

And substituting (1-22) in (1-19) gives

$$(1-23) \quad \dot{L} = n_0 e^{\Delta t} + d(1 - \alpha)y - d(1 - \alpha)y_N + d\rho_L.$$

Substitute (1-23) and (1-16) in (1-6) to get the reduced form of $\dot{y}$:

$$(1-24) \quad \dot{y} = \dot{A} + \alpha A^{\frac{1}{\alpha}} \left\{ 2vg_K y^{-\frac{1}{\alpha}} e^{\frac{m(1-\alpha)}{\alpha} t} + (s + va)y^{-\frac{(1-\alpha)}{\alpha}} e^{\frac{m(1-\alpha)}{\alpha} t} \right. \\ \left. - \alpha \{ A_N^{\frac{1}{\alpha}} v a y_N^{-\frac{(1-\alpha)}{\alpha}} e^{\frac{m(1-\alpha)}{\alpha} t} + q \} - a n_0 e^{\Delta t} - \alpha d(1 - \alpha)y \right. \\ \left. + \alpha d(1 - \alpha)y_N - \alpha d\rho_L + (1 - \alpha)m \right\}$$

Specification of A:

Assume that variable A captures all influences on the production function not included in K or L. For instance, highways, roads, bridges, industrial parks, are an immobile type of capital which does not respond to changes in the rates of return in the region vis-à-vis the national average⁶ while affecting the productivities of factors of production proper. Alternatively, any policy or public expenditure which aims at expanding or improving the region's economic potential with given quantities of K and L must affect this change through changes in A. For instance, a program like the Agricultural Rehabilitation and Development Act or the Agricultural and Rural Development Act (ARDA) which encourages soil, water, and land use conservation,⁷ if successful, will improve the productivities of available factors by changes in the variable A. I is defined as per-worker aggregate of all federal government assistance or expenditures which increase the value of A at time t. A and I are assumed to have a linear relationship as follows:

6. Since decisions to affect such responses is in the public domain, they are subject to other criteria.
7. These programs, as discussed in Chapter II, attempts to encourage small farmers to move to urban areas and induce farming on a larger scale.

$$(1-25) \quad A_t = A_{t-1} + \delta I_t - aA_t,$$

where $\delta > 0$, and $a < 1$ is a constant rate of depreciation.

Equation (1-25) can be written as:

$$A_t = \frac{1}{1+a} A_{t-1} + \frac{\delta}{(1+a)} I_t, \text{ or}$$

$$A_t = \left(\frac{1}{1+a}\right) \left\{ \frac{1}{1+a} A_{t-2} + \frac{\delta}{1+a} I_{t-1} \right\} + \frac{\delta}{1+a} I_t$$

$$A_t = \left\{ \frac{1}{(1+a)^2} \right\} \left\{ \frac{1}{(1+a)} A_{t-3} + \frac{\delta}{1+a} I_{t-2} \right\}$$

$$+ \frac{\delta}{1+a} \left\{ I_t + \frac{1}{1+a} I_{t-1} \right\}$$

$$(1-26) \quad A_t = \frac{1}{(1+a)^N} A_{t-N} + \frac{\delta}{1+a}$$

$$\left\{ I_t + \frac{1}{(1+a)} I_{t-1} + \frac{1}{(1+a)^2} I_{t-2} + \dots + \right.$$

$$\left. \frac{1}{(1+a)^N} I_{t-N} \right\}.$$

$$\text{As } N \rightarrow \infty \text{ implies } \frac{1}{(1+a)^N} A_{t-N} \rightarrow 0.$$

From (1-26), one can see that the impact of current I on A is $\frac{\delta}{1+a} I_t$, where $\frac{\delta}{1+a} > 0$. Furthermore, the impact of previous period's government expenditure ($I_{t-1}, I_{t-2}, \dots$) on A declines with its distance from present. This impact depends on a , the depreciation rate. In the absence of any I , the path of A_t through time is convex to the origin for $A_t > 0$. Since $N = t$, then $A_{t-N} = A_0$

and $A_t = \frac{1}{(1+a)^t} A_0$, where $\frac{\partial A_t}{\partial t} = -\frac{A_0}{(1+a)^t} \ln(1+a) < 0$ and

$$\frac{\partial^2 A_t}{\partial t^2} = \frac{\{\ln(1+a)\}^2 A_0}{(1+a)^t} > 0. \text{ This relationship is shown}$$

in Figure 4-1.

FIGURE 4-1

DYNAMIC PATH OF VARIABLE A

Now assume that at $t = 1$, where $A = A_1$ as shown, we have $I_1 > 0$. This will push A to a new position, such as A_1' or A_1'' or A_1''' depending on the relative magnitudes of depreciation and I for the period. If this expenditure is once and for all then, depending on the value of I , the new path of A may be A_t' , A_t'' or A_t''' . If I is positive for every t , then A_t may have any path like $\bar{A}_t$, $\bar{A}_t'$, $\bar{A}_t''$ or $\bar{A}_t'''$. For large values of N , A_t can be written as

$$(1-26)' \quad A_t = \frac{\delta}{1+a} \left\{ I_t + \frac{1}{1+a} I_{t-1} + \frac{1}{(1+a)^2} I_{t-2} + \dots \right\}.$$

From (1-26)' the expression for the growth rate of A_t , i.e. $\dot{A}_t$ can be

$$(1-27) \quad \dot{A}_t = \frac{A_t - A_{t-1}}{A_{t-1}} = \frac{I_t - a \left\{ \frac{1}{1+a} I_{t-1} + \frac{1}{(1+a)^2} I_{t-2} + \dots \right\}}{I_{t-1} + \frac{1}{1+a} I_{t-2} + \frac{1}{(1+a)^2} I_{t-3} + \dots}$$

Substitute $\dot{A}$ and A from (1-27) and (1-26)' into (1-24) to obtain

$$(1-28) \quad \bar{y}^* = \frac{I_t - \frac{a}{1+a} (I_{t-1} + \frac{1}{1+a} I_{t-2} + \dots)}{I_{t-1} + \frac{1}{1+a} I_{t-2} + \dots} + \left\{ \alpha \left(\frac{\delta}{1+a} \right)^{\frac{1}{\alpha}} \right.$$

$$\left. \left(I_t + \frac{1}{1+a} I_{t-1} + \frac{1}{(1+a)^2} I_{t-2} + \dots \right) (2vg_K y^{-\frac{1}{\alpha}} e^{m(\frac{1-a}{\alpha})t} \right.$$

$$\left. + (s + va) y^{-\left(\frac{1-a}{\alpha}\right)} e^{m(\frac{1-a}{\alpha})t} \right\}$$

$$- \alpha \left(A_N^{\frac{1}{\alpha}} v a y_N^{-\left(\frac{1-a}{\alpha}\right)} e^{m(\frac{1-a}{\alpha})t} + q \right) - a n_0 e^{\Delta t}$$

$$- ad(1-a)y + ad(1-a)y_N - adp_L + (1-a)m.$$

Equation (1-28) is the dynamic growth path of per-worker income for the region and, as it indicates, $\bar{y}^*$ declines with a rise in per-worker income in the region. This can be observed from

$$(1-29) \quad \frac{\partial \bar{y}^*}{\partial y} = - 2A^{\frac{1}{\alpha}} v e^{m(\frac{1-a}{\alpha})t} y^{-\left(\frac{1+a}{\alpha}\right)} - (1-a)A_0$$

$$(s + va) - e^{m(\frac{1-a}{\alpha})t} y^{-\frac{1}{\alpha}} - ad(1-a) < 0.$$

From equation (1-18) $y = \frac{W-p_L}{1-a}$ can be written. Assume

that W_N (the national wage rate) grows at a constant rate g , where $W_N = \bar{W}_N e^{gt}$. Thus,

$$(1-30) \quad \frac{W}{W_N} W_N = \frac{W}{W_N} \bar{W}_N e^{gt}$$

where $\frac{W}{W_N}$ is the wage parity between the region and the rest of the economy. If $\frac{W}{W_N} = 1$, then perfect parity is achieved and $\frac{W}{W_N} < 1$ indicates disparity between wage rates in the region and the rest of the economy. Many authors have shown that W is exogenous for Newfoundland.⁸ To obtain $\bar{y}$ in terms of wage parity ($\frac{W}{W_N}$), substitute for W from equation (1-30) into

$$y = \frac{W - \rho_L}{1 - \alpha} \quad \text{Substitute also the result, } y = \frac{\frac{W}{W_N} \bar{W}_N e^{gt} - \rho_L}{1 - \alpha}$$

into equations (1-16), (1-23) and (1-28) to obtain the following

$$(1-16) \quad \begin{aligned} K = A^{\frac{1}{\alpha}} & \left\{ 2\alpha g_K \left(\frac{\frac{W}{W_N} \bar{W}_N e^{gt} - \rho_L}{1 - \alpha} \right)^{\frac{1}{\alpha}} e^{mt(\frac{1-\alpha}{\alpha})} \right. \\ & + (s + vd) \left(\frac{\frac{W}{W_N} \bar{W}_N e^{gt} - \rho_L}{1 - \alpha} \right)^{-(\frac{1-\alpha}{\alpha})} e^{mt(\frac{1-\alpha}{\alpha})} \\ & \left. - \left(A_N^{\frac{1}{\alpha}} \alpha v y_N^{-(\frac{1-\alpha}{\alpha})} e^{mt(\frac{1-\alpha}{\alpha})} + q \right) \right\} \end{aligned}$$

8. For example, see Swan and Kovacs (1981, p. 14); Copithorne (1981, pp. 83-98); Economic Council (1977, 1980); Auld et al. (1979); Riddell (1980); Thirsk (1973).

$$(1-23)' \quad \dot{L} = n_0 e^{\Delta t} + d(1 - \alpha) \left\{ \frac{\frac{W}{\bar{W}_N} \bar{W}_N e^{gt} - \rho_L}{1 - \alpha} \right\}$$

$$- d(1 - \alpha) y_N + d\rho_L$$

$$(1-28)' \quad \dot{y} = \dot{A} + \alpha A^{\frac{1}{\alpha}} \left\{ 2vg_K \left(\frac{\frac{W}{\bar{W}_N} \bar{W}_N e^{gt} - \rho_L}{1 - \alpha} \right) - \frac{1}{\alpha} e^{m(\frac{1-\alpha}{\alpha})t} \right.$$

$$+ (s + va) \left(\frac{\frac{W}{\bar{W}_N} \bar{W}_N e^{gt} - \rho_L}{1 - \alpha} - \frac{1-\alpha}{\alpha} e^{m(\frac{1-\alpha}{\alpha})t} \right)$$

$$- \alpha \left\{ A_N^{\frac{1}{\alpha}} v a y_N^{-\frac{1-\alpha}{\alpha}} e^{m(\frac{1-\alpha}{\alpha})t} + q \right\} - \alpha n_0 e^{\Delta t}$$

$$- \alpha d(1 - \alpha) \left(\frac{\frac{W}{\bar{W}_N} \bar{W}_N e^{gt} - \rho_L}{1 - \alpha} \right) + \alpha d(1 - \alpha) y_N$$

$$- \alpha d\rho_L + (1 - \alpha)m.$$

According to (1-16)' the growth of capital ($\dot{K}$) falls as $\frac{W}{\bar{W}_N}$ rises, but $\dot{L}$ increases according to (1-23)'. These

two results show that the model is stable. To verify this, consider Figure 4-2.⁹

There is one level of wage parity such that $\dot{y}^*$ is zero; any $\frac{W}{W_N}$ lower than this level (call it $(\frac{W}{W_N})^e$) will be associated with a lower growth rate of the labor force and a higher growth rate of capital. The result will be higher $\dot{y}^*$. As $\frac{W}{W_N}$ rises, the labor force growth rate will increase through in-migration, capital will exit and its growth rate falls and, consequently, $\dot{y}^*$ falls. For levels of $\frac{W}{W_N}$ above $(\frac{W}{W_N})^e$, the opposite direction will be followed.

9. One can easily verify that $\frac{\partial \dot{L}^*}{\partial (\frac{W}{W_N})} > 0$, $\frac{\partial^2 \dot{L}^*}{\partial (\frac{W}{W_N})^2} < 0$;

$\frac{\partial \dot{K}^*}{\partial (\frac{W}{W_N})} < 0$, $\frac{\partial^2 \dot{K}^*}{\partial (\frac{W}{W_N})^2} > 0$. Figure 4-2 is drawn according to

equation (1-6). Plot $\alpha \dot{K}^*$, $\alpha \dot{L}^*$ and $\dot{A} + (1-\alpha)m$, and the vertical summation of these three curves will give $\dot{y}^*$. By substituting for y in terms of $\frac{W}{W_N}$ in equation (1-29) one

can see that $\frac{\partial \dot{y}^*}{\partial (\frac{W}{W_N})} < 0$ and $\frac{\partial^2 \dot{y}^*}{\partial (\frac{W}{W_N})^2} > 0$.

FIGURE 4-2

STABILITY OF REAL PER-WORKER GROWTH OF INCOME

Policy Implications of Model I:

a) Per-worker federal government expenditure on infrastructure, etc., (I):

For a higher I, both $\bar{K}^*$ and $\bar{A} + (1 - \alpha)m$ shift up and so the $\dot{y}^*$ schedule will shift to the right and up, as shown in Figure 4-3.

b) Per-worker subsidy on capital (g_K):

For a higher g_K , $\bar{K}^*$ will shift up and so will the corresponding $\dot{y}^*$ (Figure 4-3).

c) Per-worker subsidy on labor (ρ_L):

For a higher ρ_L , both $\bar{K}^*$ and $\bar{L}^*$ will shift up but the resulting shift in $\dot{y}^*$ is uncertain.¹⁰

10. It should also be noted that a priori the direction of the time paths of $\dot{y}^*$ when all other variables are held constant cannot be determined. This can readily be seen by taking derivative of $\dot{y}^*$ in terms of t.

FIGURE 4-3

GRAPHICAL EXPLANATION
OF POLICY IMPLICATIONS OF MODEL I

This model has some analytical limitations, when applied to the Newfoundland economy, as follows:

- i) The constant participation rate assumption is not appropriate for Newfoundland since, as mentioned in Chapter III, the province's participation rate has not been constant through time.
- ii) Newfoundland has had severe unemployment relative to the rest of Canada, thus the appropriateness of a full-employment model may be questioned.
- iii) There are regional policies aimed at reducing unemployment in depressed regions such as Newfoundland which do not enter into the model.
- iv) There are a number of arguments which question the appropriateness of assuming a constant returns to scale production technology for a region such as the one studied here. They concern the fixity of some input which makes a significant contribution to the region's production process. In their empirical study of the Newfoundland economy, for instance, Swan and Kovacs (1981, pp. 25-26) assume a decreasing returns to scale production technology. This is essentially on the grounds that entrepreneurial talent for each firm is a fixed input, thus causing equiproportional changes in capital and labor to result, in the relevant range, in less than proportional changes in firm output. This fixity is also assumed to apply to the number of entrepreneurs for the region which "is a limiting factor on the number of firms"

(1981, p. 21). In a later study, Norrie and Percy (1983) use a decreasing returns to scale, Cobb-Douglas production function to represent the technologies of both eastern and western regions of Canada. It seems more appropriate that for a region where natural resources are a significant input into the production process, and where some such inputs (e.g. the number of square miles of fishing area permitted by natural and legal conditions, the number and capacity of discovered sources of minerals, etc.) are in fixed supply, the production technology should display decreasing returns to scale. For although the summation of output elasticities of a production function which includes natural resources as an argument may be unity - as is normally assumed - the fixity of the latter implies that output elasticities of capital and labor should sum to less than unity. The point can also be inferred from Marshall's discussion of increasing and diminishing returns (1920, pp. 125-143, 262-268).

These alternative formulations of the region's production technology, together with other modifications, are introduced in the remainder of this chapter to cope with these analytical limitations of Model I. ¶

Model II

Model II (hereafter MII) should be constructed so as to overcome the shortcomings of Model I (hereafter MI). Let us keep the following simplifying assumptions of MI: only one sector; exponential population growth; Harrod-neutral technological change; Cobb-Douglas production functions in the relevant range; two variable factors only (labor and capital). The following assumptions will be added; namely, there is a high unemployment rate, even in the long run; there is no shortage of factors like capital and labor, but a shortage of entrepreneurship¹¹ which is essential to production and cannot be imported. This assumption makes the summation of input elasticities of capital and labor less than one (see the notes on shortcomings of MI).

Let the aggregate production function of the region be approximated by a Cobb-Douglas in the relevant range, with Harrod-neutral technical change at the rate m so that

$$(2-1) \quad Y = AK^\alpha L_D^\beta e^{\beta mt}, \quad \alpha + \beta < 1,$$

where capital (K) and output are homogeneous, i.e. the

11. This assumption is borrowed from Swan and Kovacs (1981).

income (Y) may be consumed or added to the capital stock of the region. L_D is demand for labor; α and β are positive. This production function has the same specifications as equation (1-1) of MI. Here labor employed (L_D) is not the same as labor supplied, and, because of the fixity of some resources and entrepreneurship in the region, the production function exhibits first increasing, then decreasing returns to equiproportional changes in K and L_D . Recall from MI that A is not fixed but is a function of many regional policies as specified in MI.¹² Assume, as in Model I, that labor receives its marginal product. Thus,

$$(2-2) \quad L_D = \frac{\beta Y}{W - p_L}, \quad \text{or} \quad Y = \frac{W - p_L}{\beta} L_D. \quad 13$$

Taking the natural logarithm of (2-2) and then its derivative with respect to time we will have

12. It should be noted that natural resources are omitted from the production function. Swan and Kovacs' (1981, pp. 31-32) model, which does not include regional supply-affecting policies, shows that including natural resources will complicate their model's mathematical operations without affecting their results. For the present model, which explicitly deals with supply-affecting policies, these complications will be exaggerated but our results will remain unaffected.

13. All notations have the same meaning as MI unless otherwise specified.

$$(2-3) \quad \dot{y}^* = (W - p_L)^*,$$

where the asterisk denotes the percentage rate of change. It is plausible to describe the behavior of the percentage change of nominal wage over time ($\frac{\dot{w}}{w}$) in the province in the following way.

$$(2-4) \quad \frac{\dot{w}}{w} = \frac{\dot{p}}{p} + F(u, \frac{w}{w_N}, \mu, UN, FIS)$$

where a dot on top of any variable denotes its change in terms of time (t), i.e. $\frac{dw}{dt} = \dot{w}$ and

$\frac{\dot{p}}{p}$ = price inflation in the province where

$$\frac{dp}{dt} = \dot{p},$$

w_N = average nominal wage rate of the whole economy,

μ = an index of the generosity of unemployment insurance system of the region,

FIS = the expenditure of all levels of government, net of all taxes, per worker,

g_e = federal government expenditure on direct employment creation per worker in the region, e.g. ADA, ADIA, etc.

UN = the percentage of the labor force unionized,

U = unemployment rate in the region.

The positive relationship between $\frac{\dot{w}}{w}$ and $\frac{\dot{p}}{p}$ means that there is no money illusion. It is plausible to assume that higher unemployment in the region will reduce upward pressures on $\frac{\dot{w}}{w}$, i.e. $\frac{\partial F}{\partial u} < 0$. For a given u and $\frac{\dot{p}}{p}$, $\frac{\dot{w}}{w}$ is a function of $\frac{w}{w_N}$ and a target value of this ratio itself is a function of u and UN . Obviously, the closer w is to w_N , the lower pressures are on $\frac{\dot{w}}{w}$. All other things constant, both u and UN positively affect the target level of $\frac{w}{w_N}$, such that we can write

$$\frac{\partial F}{\partial \frac{w}{w_N}} < 0, \quad \frac{\partial F}{\partial u} < 0 \quad \text{and} \quad \frac{\partial F}{\partial UN} < 0.$$

Higher government expenditures (net of taxes) may be associated with a higher proportion of the labor force being civil servants and, at the same time, with higher demands for goods and services in the region. It may be realistic to assume that both put upward pressures on $\frac{\dot{w}}{w}$, i.e.

$\frac{\partial F}{\partial FIS} > 0$. Equation (2-4) shows that real growth of wage rates in the region ($\frac{\dot{w}}{w}$) can be written as

$$(2-5) \quad \frac{\dot{w}}{w} = \frac{\dot{w}}{w} = \frac{\dot{w}}{w} - \frac{\dot{p}}{p} = F(.)$$

By assuming a linear form for the F function, (2-5) may be written as

$$* (2-5) \quad \bar{W} = \zeta_0 + \zeta_1 \text{FIS} - \zeta_2 \frac{W}{W_N} - \zeta_3 \mu - \zeta_4 \text{UN} - \zeta_5 U.$$

It is plausible to assume that $(W - \rho_L)^*$ is a function of $\bar{W}$ and ρ_L , i.e.

$$(2-6) \quad (W - \rho_L)^* = f(\bar{W}, \rho_L) \quad \text{such that}$$

$$\frac{\partial (W - \rho_L)^*}{\partial \bar{W}} > 0 \quad \text{and} \quad \frac{\partial (W - \rho_L)^*}{\partial \rho_L} < 0.$$

It may be assumed that this equation has also a linear form of

$$(2-6)' \quad (W - \rho_L)^* = \bar{W} - \eta \rho_L, \quad \text{where } \eta > 0.$$

At this point we need to derive the functional form of U from this model. The unemployment rate (U) is defined as

$$(2-7) \quad U = 1 - \frac{L_D}{L_S},$$

where L_S is the labor supply in the region. Follow Borts and Stein (1964, p. 79) and define labor supply in the region as

$$(2-8) \quad W = \frac{1}{b} W(L_S)$$

such that $\frac{dW}{dL_S} > 0$ and b is a shift factor. For any given value of b , say b_0 , the region's supply will be as shown in Figure 4-4 below.

FIGURE 4-4

LABOR SUPPLY

For any $b > b_0$, supply will shift to the right and for $b < b_0$, it will shift to the left. The variable b is itself a function

of any variable which affects migration and participation in the region. Equation (2-8) may be defined in the following explicit form.

$$(2-9) \quad L_S = bW^{a_1}, \quad \text{where } a_1 > 0 \quad \text{and}$$

$$(2-10) \quad b = b(M, PA, X) \text{ such that } \frac{\partial b}{\partial M} > 0, \frac{\partial b}{\partial PA} > 0, \frac{\partial b}{\partial X} = ?$$

where M is net in-migration; PA is the participation rate in the region and X is the vector of all variables affecting b which are not included in M or PA. It may be assumed that b has the following linear form.

$$(2-10)' \quad b = \theta_0 + \theta_1 n - \theta_2 g_K + \theta_3 \rho_L + \theta_4 g_e + \theta_5 FIS + \theta_6 \mu + \theta_7 UN + \theta_8 \frac{W}{W_N} + \sum_{i=0} \theta_{9i} I_{t-i}, \text{ where } \theta_s \text{ are positive.}$$

As before (i.e. MI), assume capital receives its marginal product, so the efficiency condition requires

$$(2-11) \quad K = \frac{\alpha(W - \rho_L)}{\beta(r - \rho_K)} L_D.$$

By deriving L_D from the production function (2-1) and substituting K from (2-11) and some rearrangement we obtain

$$(2-12) \quad L_D = y^{\left(\frac{1}{\alpha+\beta-1}\right)} A^{\left(\frac{1}{1-\alpha-\beta}\right)} \left\{ \frac{\alpha(W-\rho_L)}{\beta(r-\rho_K)} \right\}^{\left(\frac{\alpha}{1-\alpha-\beta}\right)} e^{\left(\frac{\beta mt}{1-\alpha-\beta}\right)}$$

Substitute for y from (2-2) to get

$$(2-13) \quad L_D = \alpha^{\left(\frac{\alpha}{1-\alpha-\beta}\right)} \beta^{\left(\frac{1-\alpha}{1-\alpha-\beta}\right)} \left\{ \frac{1}{r-\rho_K} \right\}^{\left(\frac{\alpha}{1-\alpha-\beta}\right)} A^{\left(\frac{1}{1-\alpha-\beta}\right)} \\ (W-\rho_L)^{\left(\frac{\alpha-1}{1-\alpha-\beta}\right)} e^{\left(\frac{\beta mt}{1-\alpha-\beta}\right)}$$

It is important and realistic to assume that in the long run r will be a fraction of r_N , that is parametric for the model, say $r = r_0 r_N$ where $r_0 > 0$. Equation (2-13) is the dynamic path of labor demand for the region; it falls with W and increases with A and ρ_L and ρ_K . We know that

$$\rho_K = \frac{G_K}{K} = \frac{G_K}{A^{-\left(\frac{1}{\alpha}\right)} y^{\left(\frac{1}{\alpha}\right)} L_D^{\left(\frac{1-\beta}{\alpha}\right)} e^{-mt\left(\frac{\beta}{\alpha}\right)}} \quad \text{or}$$

$$\begin{aligned}
 (2-14) \quad \rho_K &= \frac{G_K}{A^{-\left(\frac{1}{\alpha}\right) \left(\frac{W-\rho_L}{\beta}\right)^{\frac{1}{\alpha}} L_D^{\left(\frac{1-\beta}{\alpha}\right)} e^{-mt\left(\frac{\beta}{\alpha}\right)}} \\
 &= A^{\frac{1}{\alpha}} \left(\frac{W-\rho_L}{\beta}\right)^{-\frac{1}{\alpha}} g_K e^{\left(\frac{\beta mt}{\alpha}\right)} L_D^{\left(\frac{\alpha+\beta-1}{\alpha}\right)}
 \end{aligned}$$

using (2-1) and (2-2), where g_K is per-worker federal government subsidy on capital in the region. Substitute (2-14) and r in terms of r_N into (2-13) to obtain

$$(2-15) \quad L_D = \frac{\left\{ \Omega^{\left(\frac{1-\alpha-\beta}{\alpha}\right)} A^{\frac{1}{\alpha}} (W-\rho_L)^{\left(\frac{\alpha-1}{\alpha}\right)} e^{\left(\frac{\beta mt}{\alpha}\right)} + A^{\frac{1}{\alpha}} g_K \left(\frac{W-\rho_L}{\beta}\right)^{-\frac{1}{\alpha}} e^{\left(\frac{\beta mt}{\alpha}\right)} \right\} \left(\frac{\alpha}{1-\alpha-\beta}\right)}{(r_O r_N)^{\left(\frac{\alpha}{1-\alpha-\beta}\right)}}$$

$$\text{where } \Omega = \alpha^{\left(\frac{\alpha}{1-\alpha-\beta}\right)} \beta^{\left(\frac{1-\alpha}{1-\alpha-\beta}\right)}$$

Substitute (2-10)' in (2-9) to obtain

$$(2-16) \quad L_S = (\theta_0 + \theta_1 n - \theta_2 g_K + \theta_3 \rho_L + \theta_4 g_e + \theta_5 FIS +$$

$$\theta_6 \mu + \theta_7 UN + \theta_8 \frac{W}{W_N} + \sum_{i=0} \theta_{9i} I_{t-i}) W^{a_1}.$$

For simplicity define

$$\Xi = \frac{\beta mt}{1-\alpha-\beta}$$

$$\tau = \frac{1}{\alpha}$$

$$\Omega = \alpha^{\left(\frac{\alpha}{1-\alpha-\beta}\right)} \beta^{\left(\frac{1-\alpha}{1-\alpha-\beta}\right)}$$

$$\Lambda = \frac{\beta mt}{\alpha}$$

$$\nabla = 1-\alpha-\beta$$

$$\omega = \frac{W}{W_N} \bar{W}_N e^{gt} - \rho_L$$

$$L = \left(\frac{W}{W_N}\right)^{a_1} \bar{W}_N^{a_1} e^{a_1 gt}$$

Now, substitute for L_D and L_S in the unemployment equation (2-7) to obtain

$$(2-17) \quad U = 1 - \frac{(\Omega^{\frac{V}{\alpha}})^T A^T (W-\rho_L)^{(\alpha-1)T} e^{\Lambda} + A^T g_K \left(\frac{W-\rho_L}{\beta}\right)^{-T} e^{\Lambda} \left(\frac{\alpha}{V}\right)}{(r_O r_N)^{\left(\frac{\alpha}{V}\right)} b W^{a_1}}$$

By substituting (2-17) in (2-5)' and the result into (2-6)', we will get $(W-\rho_L)^*$ which, according to equation (2-3), is equal to $\bar{y}$. The final result of these operations is

$$(2-18) \quad \bar{y} = (W-\rho_L)^* = \zeta_0 + \zeta_1 FIS - \zeta_2 \frac{W}{W_N} - \zeta_3 \mu - \zeta_4 UN - \zeta_5 - \eta \rho_L$$

$$+ \zeta_5 \frac{(\Omega^{\frac{V}{\alpha}})^T A^T (W-\rho_L)^{(\alpha-1)T} e^{\Lambda} + A^T g_K \left(\frac{W-\rho_L}{\beta}\right)^{-T} e^{\Lambda} \left(\frac{\alpha}{V}\right)}{b(r_O r_N)^{\left(\frac{\alpha}{V}\right)} W^{a_1}}$$

Equation $\dot{y}^*$ is a long-run, dynamic growth path of per-worker real income for a small, open region with unemployment.

Stability of the Model:

The model is stable: to verify this note that $\dot{y}^*$ can be written in terms of the following components

$$(2-18) \quad \dot{y}^* = C - B + \zeta_5 EM, \text{ where}$$

$$C = \zeta_0 - \zeta_5 + \zeta_1 FIS - \zeta_3 \mu - \zeta_4 UN - \eta \rho_L, \quad B = \zeta_2 \frac{W}{W_N},$$

and EM is the employment rate equation which, using (2-17), is

$$(2-19) \quad EM = 1 - U = \frac{(\Omega^{\frac{\gamma}{\alpha}} A^T (W - \rho_L)^{(\alpha-1)T} e^{\Lambda} + A^T g_K \frac{(W - \rho_L)^{\alpha}}{\beta} e^{\Lambda})^{\frac{\alpha}{\gamma}}}{b (r_O r_N)^{\frac{\alpha}{\gamma}} W^{\alpha_1}}$$

By substituting $W = \frac{W}{W_N} \bar{W}_N e^{gt}$ in (2-18) and (2-19), while recalling $\alpha < 1$, a negative relationship between EM and $\frac{W}{W_N}$ is readily observed.

FIGURE 4-5

STABILITY OF MODEL II

Here, for any level of FIS, μ , ρ_L and UN, C is constant and invariant with respect to $\frac{W}{W_N}$. It is also clear that B is a

positive linear function of $\frac{W}{W_N}$. By adding these three curves vertically, we will get $\bar{y}$, as shown in Figure 4-6 below.

FIGURE 4-6

Figure 4-6 shows that there is one level of $\frac{W}{W_N}$ at which $\bar{y}$ is zero, call this level $(\frac{W}{W_N})^e$. If $\frac{W}{W_N} > (\frac{W}{W_N})^e$, then the employment rate will be very low, workers will out-migrate, capital inflow and $\bar{y}$ will increase; the opposite is true for $\frac{W}{W_N} < (\frac{W}{W_N})^e$. Given these tendencies, the stability of the model is evident.

Policy Implications of Model II:

1) Per-worker real income growth:

a) The impact of compensating policies (FIS):

$$\frac{\partial \bar{y}}{\partial FIS} = \zeta_1 - \theta_5 \phi = ? \quad \text{where}$$

$$\phi = (\Omega \left(\frac{\gamma}{\alpha}\right) A^T u^{(\alpha-1)T} e^{\Lambda} \cdot$$

$$+ A^T g_K \left(\frac{w}{b}\right)^{-T} e^{\Lambda} \left(\frac{\alpha}{\gamma}\right) \zeta_5 b^{-2} (r_O r_N)^{-\left(\frac{\alpha}{\gamma}\right)} w^{-a_1} > 0$$

The sign of the derivative cannot be determined a priori.

b) Generosity of unemployment insurance (μ):

$$\frac{\partial \bar{y}}{\partial \mu} = \zeta_3 - \theta_6 \phi < 0$$

The impact of μ on $\bar{y}$ is negative.

c) The degree of unionization of the labor force (UN):

$$\frac{\partial \bar{y}}{\partial UN} = -\zeta_4 - \theta_7 \phi < 0$$

The impact is negative.

3 3

OF / DE

d) Per-worker federal government expenditure on infrastructure (I), etc.,:

$$\frac{\partial y^*}{\partial I} = \left\{ \left(\frac{1}{V} \right) \left(\frac{\delta}{1+a} \right) \left(\Omega^{\left(\frac{V}{\alpha} \right)} A^T (\omega)^{(\alpha-1)T} e^{\Lambda} + A^T g_K \left(\frac{\omega}{\beta} \right)^{-T} e^{\Lambda} \right)^{\left(\frac{\alpha}{V} \right)} A^{\left(\frac{\alpha+\beta}{V} \right)} b \right. \\ \left. - A^{\left(\frac{1}{V} \right)} \left(\Omega^{\left(\frac{V}{\alpha} \right)} A^T (\omega)^{(\alpha-1)T} e^{\Lambda} + A^T g_K \left(\frac{\omega}{\beta} \right)^{-T} e^{\Lambda} \right)^{\left(\frac{\alpha}{V} \right)} \right\} \\ \theta_{90} \frac{\zeta_5}{b^2 (r_O r_N)^{\frac{\alpha}{V}} w a_1} = ?$$

The sign of the derivative cannot be determined unambiguously.

e) Per-worker subsidy on capital (g_K):

$$\frac{\partial y^*}{\partial g_K} = \frac{\zeta_5}{b^2 (r_O r_N)^{\left(\frac{\alpha}{V} \right)} w a_1} \left\{ \frac{\alpha e^{\Lambda} b A^T}{V} \left(\frac{\omega}{\beta} \right)^{-T} \left(\Omega^{\left(\frac{V}{\alpha} \right)} A^T \omega^{(\alpha-1)T} e^{\Lambda} \right)^{\left(\frac{\alpha}{V} \right)} \right. \\ \left. + A^T g_K \left(\frac{\omega}{\beta} \right)^{-T} e^{\Lambda} \right)^{\left(\frac{\alpha}{V} \right) - 1} + \theta_2 \left(\Omega^{\left(\frac{V}{\alpha} \right)} A^T \omega^{(\alpha-1)T} e^{\Lambda} \right)^{\left(\frac{\alpha}{V} \right)} \\ \left. + A^T g_K \left(\frac{\omega}{\beta} \right)^{-T} e^{\Lambda} \right)^{\left(\frac{\alpha}{V} \right)} \right\} > 0$$

The impact of g_K on y^* is positive.

f) Per-worker subsidy on labor (ρ_L):

$$\frac{\partial \bar{y}}{\partial \rho_L} = -\eta + \frac{\zeta_5}{b^2(r_O r_N) \left(\frac{\alpha}{\bar{v}}\right) w^{\alpha_1}} \left\{ \left(\frac{\alpha b}{\bar{v}}\right) \right.$$

$$\left[(1-\alpha) T e^{\Lambda} \Omega^{\frac{\bar{v}}{\alpha}} A^T w^{(\alpha-1)T-1} + \frac{T}{\beta} \left(\frac{w}{\beta}\right)^{-T-1} A^T g_K e^{\Lambda} \right]$$

$$\left(\Omega^{\left(\frac{\bar{v}}{\alpha}\right)} A^T (W-\rho_L)^{(\alpha-1)T} e^{\Lambda} + A^T g_K \left(\frac{w}{\beta}\right)^{-T} e^{\Lambda} \right) \left(\frac{\alpha}{\bar{v}} - 1\right)$$

$$- \theta_3 \left(\Omega^{\left(\frac{\bar{v}}{\alpha}\right)} A^T (W-\rho_L)^{(\alpha-1)T} e^{\Lambda} + A^T g_K \left(\frac{w}{\beta}\right)^{-T} e^{\Lambda} \right) \left(\frac{\alpha}{\bar{v}}\right) \} - ?$$

The impact of ρ_L on $\bar{y}^*$ cannot be determined unambiguously.

g) Per-worker subsidy on direct job creation (g_e):

$$\frac{\partial \bar{y}}{\partial g_e} = -\theta_4 \phi < 0$$

The impact of g_e on $\bar{y}^*$ is negative.

2) Employment rate:

One of the goals of most regional policies is to reduce the high unemployment rate of depressed regions.

Model II attempts to evaluate these policies.

a) Compensating policies (FIS):

$$\frac{\partial EM}{\partial FIS} = - \frac{\theta_5^\phi}{\zeta_5} < 0$$

The impact of FIS on EM is unambiguously negative.

b) Generosity of unemployment insurance (μ):

$$\frac{\partial EM}{\partial \mu} = - \frac{\theta_6^\phi}{\zeta_5} < 0$$

The generosity of unemployment insurance reduces EM.

c) The degree of unionization of the labor force (UN):

$$\frac{\partial EM}{\partial UN} = - \frac{\theta_7^\phi}{\zeta_5} < 0$$

The impact of UN on EM is unambiguously negative.

d) Per-worker federal government expenditure on infrastructure, etc. (I):

$$\frac{\partial EM}{\partial I} = \frac{1}{\zeta_5} \frac{\partial y^*}{\partial I} = ?$$

The impact of I on EM cannot be determined a priori.

e) Per-worker subsidy on capital (g_K):

$$\frac{\partial EM}{\partial g_K} = \frac{1}{\zeta_5} \frac{\partial \bar{y}}{\partial g_K} > 0$$

The impact of g_K on EM is positive.

f) Per-worker subsidy on labor (ρ_L):

$$\frac{\partial EM}{\partial \rho_L} = \frac{1}{\zeta_5} \frac{\partial \bar{y}}{\partial \rho_L} + \frac{\eta}{\zeta_5} = ?$$

The impact of ρ_L on EM cannot be determined unambiguously.

g) Per-worker subsidy on direct job creation (g_e):

$$\frac{\partial EM}{\partial g_e} = \frac{1}{\zeta_5} \frac{\partial \bar{y}}{\partial g_e} < 0$$

The impact of g_e on EM is unambiguously negative.

It is also interesting to question at this point what the time path of $\bar{y}$ and EM, for a given $\frac{W}{W_N}$ and UN, would be if we were to freeze all government policies. This can be observed from the following two equations.

$$\frac{\partial \bar{y}}{\partial t} = \zeta_S \frac{\partial EM}{\partial t} = ? , \text{ since}$$

$$\frac{\partial EM}{\partial t} = \frac{\frac{\partial L_D}{\partial t} \cdot L_S - \frac{\partial L_S}{\partial t} \cdot L_D}{L_S^2} = ? , \text{ where}$$

$$\frac{\partial L_D}{\partial t} = \frac{\alpha A^T}{\nabla(r_O r_N)^{(\frac{\alpha}{\nabla})}} \{ -T t \Omega^{(\frac{\nabla}{\alpha})} \omega^{(1-T)} e^\Lambda +$$

$$\Omega^{(\frac{\nabla}{\alpha})} (1-T) \frac{W}{W_N} g \bar{W}_N e^{gt} \omega^{-T} +$$

$$\Omega^{(\frac{\nabla}{\alpha})} \omega^{(1-T)} \frac{\Lambda}{t} e^\Lambda - g_K t^T \left(\frac{\omega}{\beta}\right)^{-T} e^\Lambda - g_K \frac{T}{\beta} \left(\frac{\omega}{\beta}\right)^{-T-1} e^\Lambda +$$

$$g_K \left(\frac{\omega}{\beta}\right)^{-T} \frac{\Lambda}{t} e^\Lambda \}$$

$$(\Omega^{(\frac{\nabla}{\alpha})} A^T \omega^{(1-T)} e^\Lambda + A^T g_K \left(\frac{\omega}{\beta}\right)^{-T} e^\Lambda)^{(\frac{\alpha}{\nabla} - 1)} = ? \text{ and}$$

$$\frac{\partial L_S}{\partial t} = b a_1 g W^{a_1} > 0$$

As above derivatives show, the direction of the time paths of $\bar{y}$ and EM when all policy instruments as well as $\frac{W}{W_N}$ and UN are held constant cannot be determined a priori.

Model III

It is useful to construct a model which, in addition to facilitating the study of the impact of supply-affecting regional policies, has the feature of an elasticity of substitution which is constant but not necessarily unity. At the same time, such a model should be capable of integrating the demand as well as the supply side of the region. Let the aggregate production function be¹⁴

$$(3-1) \quad Y = A \{ \beta K^{-\pi} + (1 - \beta) L_D^{-\pi} e^{-\pi \pi t} \}^{-\frac{1}{\pi}}$$

where $0 < \beta < 1$ and $\pi > -1$.

The elasticity of substitution (σ) of (3-1) is constant and the production function is homogeneous of degree one. It should also be noted that β is the distribution parameter.

14. All notations used in this section have identical meanings to those introduced in MI and MII. For specifications of variable A, see Model I infra.

The production function (3-1) can be written in terms of per-worker income, y , where

$$(3-2) \quad y = A \left\{ \beta \left(\frac{K}{L_D} \right)^{-\pi} + (1 - \beta) e^{-m\pi t} \right\}^{-\frac{1}{\pi}}$$

Define $\frac{K}{L_D} = k$ and write the definition of σ as

$$(3-3) \quad \sigma = - \frac{\frac{dy}{dk} (y - k \frac{dy}{dk})}{k y \frac{d^2 y}{dk^2}}$$

The equilibrium condition requires that

$$W - p_L = y - k \frac{dy}{dk}, \text{ or}$$

$$(3-4) \quad W = y - k \frac{dy}{dk} + p_L. \quad \text{Thus,}$$

$$(3-5) \quad \frac{dW}{dk} = -k \frac{d^2 y}{dk^2}.$$

From equation (3-2) we can write

$$\frac{dy}{dW} = \frac{dy}{dk} \frac{dk}{dW}, \text{ or}$$

$$(3-6) \quad \frac{dy}{dW} = - \frac{\frac{dy}{dk}}{k} / \frac{d^2y}{dk^2} \text{ using (3-5).}$$

Equation (3-6) can be written as

$$\frac{dy}{dW} \cdot \frac{W}{y} = \left\{ - \frac{\frac{dy}{dk}}{k} / \frac{d^2y}{dk^2} \right\} \left\{ \frac{y - k \frac{dy}{dk} + \rho_L}{y} \right\} \text{ using (3-4),}$$

$$\text{or} \quad \frac{dy}{dW} \cdot \frac{W}{y} = - \frac{\frac{dy}{dk} (y - k \frac{dy}{dk}) + \rho_L \frac{dy}{dk}}{ky \frac{d^2y}{dk^2}}, \quad \text{or}$$

$$\frac{dy}{dW} \cdot \frac{W}{y} = \sigma - \frac{\rho_L \frac{dy}{dk}}{ky \frac{d^2y}{dk^2}} \text{ using (3-3). We can write}$$

$$\frac{\frac{dy}{y}}{\frac{dW}{W}} = \frac{d \ln y}{d \ln W} = \frac{y^*}{W^*} = \sigma - \frac{\rho_L}{ky} \frac{\frac{dy}{dk}}{\frac{d^2y}{dk^2}}, \text{ or}$$

$$(3-7) \quad y^* = \sigma W^* - \frac{\rho_L}{ky} \frac{\frac{dy}{dk}}{\frac{d^2y}{dk^2}} W^*.$$

From equation (3-2) we can find $\frac{dy}{dk} / \frac{d^2y}{dk^2}$:

$$(3-8) \quad \frac{dy}{dk} / \frac{d^2y}{dk^2} = \frac{A^\pi}{-(\pi+1)k^{-1} A^\pi + k^{-\pi-1} (\pi+1) y^\pi \beta}$$

Substitute (3-8) in (3-7) and rearrange the equation to get

$$(3-9) \quad \dot{y}^* = \sigma \dot{W}^* - \frac{\rho_L}{(\pi+1)y} \left(\frac{A^\pi}{-A^\pi + k^{-\pi} y^\pi \beta} \right) \dot{W}^*$$

$k^{-\pi}$ can be derived from equation (3-2) as

$$k^{-\pi} = \frac{1 - (1-\beta)e^{-m\pi t} \left(\frac{y}{A}\right)^\pi}{\beta \left(\frac{y}{A}\right)^\pi}$$

Substitute for $k^{-\pi}$ in (3-9) and rearrange the equation to obtain

$$(3-10) \quad \dot{y}^* = \sigma \dot{W}^* + \left(\frac{\rho_L \dot{W}^*}{(\pi+1)y} \right) \left(\frac{1}{(1-\beta)} \right) A^\pi e^{m\pi t}$$

Reproduce the specification of $\dot{W}^*$ from equation

(2-5)' of MII which is applicable here:

$$(2-5) \quad \dot{W}^* = \zeta_0 + \zeta_1 \text{FIS} - \zeta_2 \frac{W}{W_N} - \zeta_3 \mu - \zeta_4 \text{UN} - \zeta_5 U.$$

However, in MIII, the functional form of U is different. The specification for the supply of labor derived in Model II can also be used. It was

$$(2-16) \quad L_S = (\theta_0 + \theta_1 n - \theta_2 g_k + \theta_3 \rho_L + \theta_4 g_e + \theta_5 \text{FIS} + \theta_6 \mu + \theta_7 \text{UN} + \theta_8 \frac{W}{W_N} + \sum_{i=0} \theta_{gi} I_{t-i}) W^{a_1}.$$

The next step is to derive the labor demand function for MIII in order to obtain U. Assume, as before, that labor is used until its marginal product equals its unit cost minus its unit subsidy, i.e.

$$(3-11) \quad A(1-\beta)L_D^{-\pi-1} e^{-m\pi t} \{ \beta K^{-\pi} + (1-\beta) L_D^{-\pi} e^{-m\pi t} \}^{-\frac{1}{\pi} - 1} = W - \rho_L.$$

By finding $\beta K^{-\pi}$ from the production function (3-1) and substituting it in (3-11) we get

$$(3-12) \quad L_D = \frac{(1-\beta)^\pi}{(\omega)^\pi e^{m\pi t} A^{\pi\pi}} Y,$$

$$\text{where } \pi = \frac{1}{\pi+1} \quad \text{and}$$

$$\omega = W - \rho_L$$

The region's income, Y , can also be written in the following form:

$$(3-13) \quad Y = E + X - IM + G - T, \text{ where}$$

E = the summation of the region's private spending, investment, and tax revenues of all levels of government and is a function of Y ,

X = the region's exports, which are exogenous,

IM = the region's imports, which are a function of Y ,

$G - T$ = the expenditure of all levels of government minus tax collections by all levels of government.

Assume

$$(3-14) \quad E = \delta Y, \quad \delta > 0$$

$$(3-15) \quad IM = \epsilon Y, \quad \epsilon > 0, \text{ and}$$

$$(3-16) \quad X = \bar{X}.$$

From MII we have $FIS = \frac{G - T}{L_D}$, or

$$(3-17) \quad G - T = L_D FIS.$$

Substituting (3-14) through (3-17) into (3-13) yields an expression for the region's income

$$(3-17)' \quad Y = \frac{\bar{X} + L_D FIS}{1 - \hat{e} + \epsilon} = \frac{\bar{X} + L_D FIS}{\Gamma}, \text{ where } \Gamma = 1 - \hat{e} + \epsilon$$

By substituting (3-17)' into (3-12) we can solve for

$$(3-18) \quad L_D = \frac{(1-\beta)^{\pi} \bar{X}}{\Gamma (\omega)^{\pi} e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^{\pi} FIS}.$$

Equation (3-18) is the dynamic path of demand for labor in the region. The equation shows that the demand for labor rises with the region's exports and with per-worker government expenditure net of taxes, as well as with the subsidy on labor. However, L_D falls with the region's wage rate. In the same fashion as before, the region's unemployment rate may be written, using equations (2-16) and (3-18) as

$$(3-19) \quad U = 1 - \frac{L_D}{L_S} = 1 - \frac{(1-\beta)^{\pi} \bar{X} b^{-1} W^{-a_1}}{\Gamma(\omega)^{\pi} e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^{\pi} FIS}$$

From equation (3-12) we can find

$$(3-20) \quad y = \frac{(\omega)^{\pi} e^{m\pi\pi t} A^{\pi\pi}}{(1-\beta)^{\pi}}$$

using as before $W_N = \bar{W}_N e^{gt}$. Substitute U from (3-19) in $\bar{W}$ of (2-5)' and both the result and (3-20) into (3-10). To get the reduced form of $\bar{y}$, substitute (3-19) into (2-5)' and the resulting equation, together with (3-20), into (3-10) using also the exogenous path of W_N . Hence,

$$(3-21) \quad \bar{y} = \left(\sigma + \frac{\rho_L}{(\pi+1)\omega} \right) \{ \zeta_0 - \zeta_5 + \zeta_1 FIS - \zeta_2 \frac{W}{W_N} - \zeta_3 \mu - \zeta_4 \frac{\zeta_5 (1-\beta)^{\pi} \bar{X}}{(\frac{W}{W_N})^{a_1} \bar{W}_N^{a_1} e^{a_1 g t}} (\theta_0 + \theta_1 n - \theta_2 g_K + \theta_3 \rho_L + \theta_4 g_e) + \theta_5 FIS + \theta_6 \mu + \theta_7 UN + \theta_8 \frac{W}{W_N} + \sum_{i=0}^{\infty} \theta_{9i} I_{t-i} \}$$

$$\left(\frac{1}{\Gamma(\omega)^{\pi} e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^{\pi} FIS} \right)$$

g) Per-worker subsidy on direct job creation (g_e):

$$\frac{\partial y^*}{\partial g_e} = - \left(\sigma + \frac{\rho_L}{(\pi+1)\omega} \right) \left(\frac{1}{\Gamma(\omega)^\pi e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^\pi \text{FIS}} \right)$$

$$\left(\frac{\theta_4 \zeta_5 (1-\beta)^\pi \bar{X}}{\omega b^2} \right) < 0 .$$

The impact is unambiguously negative.

2) Employment rate:

a) Per-worker compensating policies (FIS):

$$\frac{\partial EM}{\partial \text{FIS}} = \frac{(1-\beta)^{2\pi} \bar{X}}{\{ \Gamma(\omega)^\pi e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^\pi \text{FIS} \}^2} \cdot \frac{1}{\omega b^2} > 0 .$$

The impact is unambiguously positive.

b) The generosity of unemployment insurance (μ):

$$\frac{\partial EM}{\partial \mu} = - \left(\frac{(1-\beta)^\pi \bar{X}}{\{ \Gamma(\omega)^\pi e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^\pi \text{FIS} \}} \right) \left(\frac{\theta_6}{\omega b^2} \right) < 0 .$$

The impact is unambiguously negative.

- c) The degree of unionization of the labor force (UN):

$$\frac{\partial EM}{\partial UN} = - \left(\frac{(1-\beta)^{\Pi} \bar{X}}{\{ \Gamma(\omega)^{\Pi} e^{m\pi\Pi t} A^{\pi\Pi} - (1-\beta)^{\Pi} FIS \}} \right) \left(\frac{\theta_7}{\epsilon b^2} \right) < 0$$

The impact is unambiguously negative.

- d) Per-worker federal government expenditure on infrastructure, etc. (I):

$$\begin{aligned} \frac{\partial EM}{\partial I} = & - \left(\frac{(1-\beta)^{\Pi} \bar{X} \Gamma(\omega)^{\Pi} e^{m\pi\Pi t} \pi\Pi - \left(\frac{\sigma}{1+a}\right) A^{-\Pi}}{\{ \Gamma(\omega)^{\Pi} e^{m\pi\Pi t} A^{\pi\Pi} - (1-\beta)^{\Pi} FIS \}^2} \right) \left(\frac{1}{\epsilon b} \right) \\ & - \left(\frac{(1-\beta)^{\Pi} \bar{X}}{\Gamma(\omega)^{\Pi} e^{m\pi\Pi t} A^{\pi\Pi} - (1-\beta)^{\Pi} FIS} \right) \left(\frac{\theta_{9i}}{\epsilon b^2} \right) < 0. \end{aligned}$$

The impact is unambiguously negative.

- e) Per-worker subsidy on capital (g_K):

$$\frac{\partial EM}{\partial g_K} = \left(\frac{(1-\beta)^{\Pi} \bar{X}}{\Gamma(\omega)^{\Pi} e^{m\pi\Pi t} A^{\pi\Pi} - (1-\beta)^{\Pi} FIS} \right) \left(\frac{\theta_2}{\epsilon b^2} \right) > 0.$$

The sign is unambiguously positive.

b) Generosity of unemployment insurance (μ):

$$\frac{\partial y^*}{\partial \mu} = - \left(\sigma + \frac{\rho_L}{(\pi+1)\omega} \right) \left\{ \zeta_3 + \frac{\theta_6 \zeta_5 (1-\beta)^\pi \bar{X}_L}{L^2 b^2} \right\}$$

$$\frac{1}{\left\{ \Gamma(\omega)^\pi e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^\pi FIS \right\}} < 0.$$

The impact of μ on y^* is negative.

c) The degree of unionization of the labor force (UN):

$$\frac{\partial y^*}{\partial UN} = - \left(\sigma + \frac{\rho_L}{\omega(\pi+1)} \right) + \left(\zeta_4 + \frac{\theta_7 \zeta_5 (1-\beta)^\pi \bar{X}}{L b^2} \right)$$

$$\left(\frac{1}{\Gamma(\omega)^\pi e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^\pi FIS} \right) < 0.$$

The impact is negative.

d) Per-worker federal government expenditure on infrastructure, etc. (I):

$$\frac{\partial y^*}{\partial I} = \left(\sigma + \frac{\rho_L}{\omega(\pi+1)} \right) \left\{ - \left(\frac{\theta_{91} \zeta_5 (1-\beta)^\pi \bar{X}}{L b^2} \right) \right.$$

$$\left(\frac{1}{\Gamma(\omega)^\pi e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^\pi FIS} \right) - \left(\frac{\zeta_5 (1-\beta)^\pi \bar{X}}{L b} \right)$$

$$\left. \left(\frac{\Gamma(\omega)^\pi e^{m\pi\pi t} \pi\pi \frac{\sigma}{1+a} A^{\pi\pi}}{(\Gamma(\omega)^\pi e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^\pi FIS)^2} \right) \right\} < 0.$$

The impact is negative.

e) Per-worker subsidy on capital (g_K):

$$\frac{\partial y^*}{\partial g_K} = \left(\sigma + \frac{\rho_L}{\omega(\pi+1)} \right) \left(\frac{1}{\Gamma(\omega)^\pi e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^\pi FIS} \right)$$

$$\left(\frac{\theta_2 \zeta_5 (1-\beta)^\pi \bar{X}}{L b^2} \right) > 0$$

The impact is positive.

f) Per-worker subsidy on labor (ρ_L):

$$\frac{\partial y^*}{\partial \rho_L} = \frac{W}{(\pi+1)\omega^2} \bar{W} + \left(\sigma + \frac{\rho_L}{\omega(\pi+1)} \right)$$

$$\left\{ - \left(\frac{1}{\Gamma(\omega)^\pi e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^\pi FIS} \right) \left(\frac{\theta_3 \zeta_5 (1-\beta)^\pi \bar{X}}{L b^2} \right) \right.$$

$$\left. + \left(\frac{\zeta_5 (1-\beta)^\pi \bar{X}}{L b} \right) \left(\frac{\pi\Gamma(\omega)^{-\pi\pi} e^{m\pi\pi t} A^{\pi\pi}}{(\Gamma(\omega)^\pi e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^\pi FIS)^2} \right) \right\} = ?$$

The sign of the derivative cannot be determined unambiguously.

g) Per-worker subsidy on direct job creation (g_e):

$$\frac{\partial y^*}{\partial g_e} = - \left(\sigma + \frac{\rho_L}{(\pi+1)\omega} \right) \left(\frac{1}{\Gamma(\omega)^\pi e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^\pi \text{FIS}} \right)$$

$$\left(\frac{\theta_4 \zeta_5 (1-\beta)^\pi \bar{X}}{\zeta b^2} \right) < 0 .$$

The impact is unambiguously negative.

2) Employment rate:

a) Per-worker compensating policies (FIS):

$$\frac{\partial EM}{\partial \text{FIS}} = \frac{(1-\beta)^{2\pi} \bar{X}}{\{ \Gamma(\omega)^\pi e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^\pi \text{FIS} \}^2} \cdot \frac{1}{\zeta b^2} > 0 .$$

The impact is unambiguously positive.

b) The generosity of unemployment insurance (μ):

$$\frac{\partial EM}{\partial \mu} = - \left(\frac{(1-\beta)^\pi \bar{X}}{\{ \Gamma(\omega)^\pi e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^\pi \text{FIS} \}} \right) \left(\frac{\theta_6}{\zeta b^2} \right) < 0 .$$

The impact is unambiguously negative.

c) The degree of unionization of the labor force (UN):

$$\frac{\partial EM}{\partial UN} = - \left(\frac{(1-\beta)^{\pi} \bar{X}}{\{ \Gamma(\omega)^{\pi} e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^{\pi} FIS \}} \right) \left(\frac{\theta_7}{\epsilon b^2} \right) < 0$$

The impact is unambiguously negative.

d) Per-worker federal government expenditure on infrastructure, etc. (I):

$$\begin{aligned} \frac{\partial EM}{\partial I} = & - \left(\frac{(1-\beta)^{\pi} \bar{X} \Gamma(\omega)^{\pi} e^{m\pi\pi t} \pi\pi \left(\frac{\sigma}{1+a} \right) A^{-\pi}}{\{ \Gamma(\omega)^{\pi} e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^{\pi} FIS \}^2} \right) \left(\frac{1}{\epsilon b} \right) \\ & - \left(\frac{(1-\beta)^{\pi} \bar{X}}{\Gamma(\omega)^{\pi} e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^{\pi} FIS} \right) \left(\frac{\theta_{9i}}{\epsilon b^2} \right) < 0 . \end{aligned}$$

The impact is unambiguously negative.

e) Per-worker subsidy on capital (g_K):

$$\frac{\partial EM}{\partial g_K} = \left(\frac{(1-\beta)^{\pi} \bar{X}}{\Gamma(\omega)^{\pi} e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^{\pi} FIS} \right) \left(\frac{\theta_2}{\epsilon b^2} \right) > 0 .$$

The sign is unambiguously positive.

f) Per-worker subsidy on labor (ρ_L):

$$\frac{\partial EM}{\partial \rho_L} = \left(\frac{(1-\beta)^{\pi} \bar{X} \Gamma e^{m\pi\pi t} A^{\pi\pi}}{\{\Gamma(\omega)^{\pi} e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^{\pi} FIS\}^2} \right) \left(\frac{1}{Lb} \right)$$

$$- \left(\frac{(1-\beta)^{\pi} \bar{X}}{\{\Gamma(\omega)^{\pi} e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^{\pi} FIS\}} \right) \left(\frac{\theta_3}{Lb^2} \right) = ?$$

The sign cannot be determined unambiguously.

g) Per-worker subsidy on direct job creation (g_e):

$$\frac{\partial EM}{\partial g_e} = - \left(\frac{(1-\beta)^{\pi} \bar{X}}{\Gamma(\omega)^{\pi} e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^{\pi} FIS} \right) \left(\frac{\theta_4}{Lb^2} \right) < 0.$$

The sign is unambiguously negative.

Finally, the time path of $\dot{y}^*$ and EM, ceteris paribus, will be examined. They are observed from the following derivatives.

$$\frac{\partial y^*}{\partial t} = \frac{-Wg}{(\pi+1)^2 \omega^2} \{ \zeta_0 - \zeta_5 + \zeta_1 \text{ FIS} - \zeta_2 \frac{W}{W_N} - \zeta_3 u - \zeta_4 UN +$$

$$\left(\frac{\zeta_5 (1-\beta)^\pi \bar{X}}{L_S} \right) \left(\frac{1}{\Gamma(\omega)^\pi e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^\pi \text{ FIS}} \right) \}$$

$$+ \left(\sigma + \frac{\rho_L}{(\pi+1)\omega} \right) \left(\frac{-\zeta_5 (1-\beta)^\pi \bar{X} a_1 g}{bW} \right)$$

$$\left(\frac{1}{\Gamma(\omega)^\pi e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^\pi \text{ FIS}} \right) - \left(\frac{\zeta_5 (1-\beta)^\pi \bar{X}}{bW} \right)$$

$$\left(\frac{\Gamma \Pi (Wg)^{-\pi\pi} e^{m\pi\pi t} A^{\pi\pi}}{1} \right) \left(\frac{\Gamma(\omega)^\pi A^{\pi\pi} (m\pi\pi) e^{m\pi\pi t}}{\Gamma(\omega)^\pi e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^\pi \text{ FIS}} \right)^2 = ?$$

$$\frac{\partial EM}{\partial t} = \frac{(1-\beta)^\pi \bar{X}}{1} \left\{ \left(\frac{g \Gamma \Pi Wg (\omega)^{-\pi\pi} e^{m\pi\pi t} A^{\pi\pi}}{1} \right) \right.$$

$$\left. \left(\frac{a_1 g \cdot b \Gamma(\omega)^\pi A^{\pi\pi} m\pi\pi e^{m\pi\pi t}}{\{\Gamma(\omega)^\pi e^{m\pi\pi t} A^{\pi\pi} - (1-\beta)^\pi \text{ FIS}\}^2} \right) \right\} = ?$$

As seen from above derivatives, the dynamic path of both y^* and EM, when everything else is held constant, depends on the relative magnitudes of the region's marginal propensity to import and the weighted average of the rates of taxation chosen by various levels of government.

Summary and Conclusions

In this chapter three models were introduced to analyze the operation of regional economic policies. The first model, which assumed full employment, studied the impact of some supply-affecting regional policies on variables of interest. However, it was found that the model's advantageous feature - that of technical simplicity - was offset by inherent limitations of this advantage, viz, the absence of unemployment as an explained variable, and the fixity of the participation rate of the region's labor force.

In order to extend the scope of the analysis to other policy instruments and not overlook the historical fact of persistent, high unemployment, Model II was constructed. It incorporated the latter as an explained variable and included seven policy instruments, also taking

into account the consequences of the fixity of some of the region's natural resources for the region's production technology. The latter was assumed to be Cobb-Douglas (as in MI), but displayed decreasing returns to scale. Once again, the advantage of technical simplicity of Cobb-Douglas production technology brought with it a limiting feature, viz, a unitary elasticity of substitution.

Finally, Model III which employs a C.E.S. production function was constructed, thus allowing the elasticity of substitution to be other than unity. Having also incorporated the expenditure (demand) side of the region, it was found that these changes made stronger, a priori, results attainable. As it can be observed from the following summary, the direction of impact of all but two policy instruments on the dynamic path of per-worker income growth, and all but one of such instruments on employment rate is unambiguously determined.

The results of the impact of policy instruments on per-worker income growth and employment rate for each of the three models are summarized in the following table.

TABLE 4-1
SUMMARY OF POLICY CONCLUSIONS

Explained Variable	Model	Compensating Policies (FIS)	Transforming Policies				
			ρ_L	g_K	I	μ	g_g
Y (real per-worker income growth rate)	I	N/A	(?)	(+)	(+)	N/A	N/A
	II	(?)	(?)	(+)	(?)	(-)	(-)
	III	(?)	(?)	(+)	(-)	(-)	(-)

EM (employment rate)	I	N/A	N/A	N/A	N/A	N/A	N/A
	II	(-)	(?)	(+)	(?)	(-)	(-)
	III	(+)	(?)	(+)	(-)	(-)	(-)

ρ_L = real per-worker federal government subsidy on labor; g_K = real per-worker federal government subsidy on capital; I = real per-worker federal government expenditure on infrastructure; μ = an index for generosity of unemployment insurance; UN = the percentage of the labor force unionized; g_g = real per-worker direct federal government job creation expenditure.

CHAPTER V

EMPIRICAL RESULTS: TESTING THE MODELS

ON NEWFOUNDLAND DATA

In this chapter Model II and Model III of Chapter IV will be tested on Newfoundland data. Section I will specify the appropriate lags for each variable and present the models in their testable forms. Section II will introduce the data and specify their sources. In section III, empirical results are reported and discussed. Section IV is devoted to model simulation where accuracy measures are reported and evaluated. Finally, section V presents a summary of the empirical results.

I

Models II and III have different functional forms. However, both growth rate equations as well as employment rate equations for each model contain the same variables. Using this information, we can write the growth rate equation from these models in the following implicit form:

$$(1) \quad \dot{y} = \dot{y} (W, FIS, L, I, g_e, \mu, UN, t)$$

The directions of impact, together with definitions of the variables, are summarized in the following table.

TABLE 5-1

REAL PER-WORKER INCOME GROWTH ($\dot{y}$)

	Model II	Model III
W = (wage parity = the ratio of the wage rate in Newfoundland to the national average)	(-)	(-)
FIS = (real net government (all levels) expenditure divided by employment)	(?)	(?)
g_K = (real per-worker federal government subsidy on capital)	(+)	(+)
g_L = (real per-worker federal government subsidy on labor)	(?)	(?)
I = (real per-worker federal government expenditure on infrastructure)	(?)	(-)
g_e = (real per-worker direct federal government job creation expenditure)	(-)	(-)
u = (an index for generosity of unemployment insurance)	(-)	(-)
UN = (the percentage of the labor force unionized)	(-)	(-)
t = (time)	(?)	(?)

Both models resulted in a non-linear equation for real per-worker income growth rate. Consequently, a linear approximation was made using Taylor's series.¹

1. The linearization process is available upon request.

Employment rate equations derived from each model have different functional forms, but include the same variables. These equations are also non-linear. Linear approximations were made using Taylor's series.² We can write

$$(2) \quad EM = EM(W, FIS, g_K, \rho_L, I, g_e, \mu, UN, t),$$

where EM is the employment rate. The directions of impact of the variables, according to MII and MIII, are given in the following table.

TABLE 5-2
EMPLOYMENT RATE (EM)

Variables	Model II	Model III
W	(-)	(-)
FIS	(-)	(+)
g_K	(+)	(+)
ρ_L	(?)	(?)
I	(?)	(-)
g_e	(-)	(-)
μ	(-)	(-)
UN	(-)	(-)
t	(?)	(?)

2. The linearization process is available upon request.

Before equations (1) and (2) are written in their explicit linear forms, it is convenient to introduce the computer mnemonics for the variables. Using these mnemonics the variables are:

GY = Real per-worker growth rate of gross provincial product in Newfoundland

EM = Employment rate in Newfoundland

W = $\frac{\text{Average weekly wage rate in Newfoundland}}{\text{Average weekly wage rate in Canada}}$

FIS = Government spending by all levels on goods and services in the Newfoundland region, less all taxes on, plus all transfers to, the private sector, all divided by Newfoundland's average annual employment

RGK = Real per-worker federal government subsidy on capital in Newfoundland

RGL = Real per-worker federal government subsidy on labor in Newfoundland

RI = The sum of real per-worker federal government expenditure on infrastructure in Newfoundland and any other federal expenditure which attempts to increase the productivity of both capital and labor in Newfoundland

RGE = Real per-worker federal government expenditure on direct job creation in Newfoundland

RMU = A proxy for the generosity of unemployment insurance in Newfoundland: real maximum per week payment multiplied by the maximum number of weeks payments continue

UN = The percentage of labor force unionized

T = Time.

Recall from the last chapter that the influence of the explanatory variable (RI) on both $\bar{y}^*$ and EM is distributed over a number of past values of this variable. However, the impact of past values declines geometrically with time, approaching but never becoming zero. This implies that the more recent values of RI exert a greater influence on $\bar{y}^*$ and EM than more remote values and lag coefficients decline in the form of a geometric progression. It should also be noted that the impact of some of the other variables in equations 1 and 2 are subject to lags. But specification of appropriate lags is difficult. Theory offers little guide. A mixture of theory and common sense will be used to specify these lags.

A. Specification of lags in the employment equation:

a) All variables (except RI)

Nearly all exogenous variables would be expected to operate with some lag, varying from a few months to perhaps three years or more. The fiscal variable, FIS, is known from numerous econometric models to take from one to three years for all of its effects to work their way through (Swan and Kovacs, 1981, p. 35). To avoid losing too many observations, this study considers only two lag periods for the fiscal variable in the

employment rate equation. Wage parity (W) would be expected to affect the employment rate after one period, since most of the labor force in Newfoundland works under contract.

A lag for the influence of the generosity of unemployment insurance and the degree of unionization of the labor force on the employment rate is indicated from previous work on data for other provinces and on Newfoundland (refer to Swan and Kovacs, 1981, p. 36). However, the employment rate was estimated by using a one-period as well as a two-period lag for the effect of the generosity of unemployment insurance (RMU) and the degree of unionization of the labor force (UN). A two-period lag led to better statistical results.

Per-worker subsidy on labor (RGL) should affect employment within two to three months and, consequently, no lag for its impact is expected since annual data were used. Per-worker subsidy on capital (RGK), on the other hand, would be expected to affect the employment rate with a one-year lag because the plan implementation would be expected to take at least one year. Per-worker federal government expenditure on direct job creation (RGE) affects the employment rate by a lag when annual data are used.

b) Identification of the distributed lag for RI

As mentioned above, one cannot expect any precise or firm indications as to the appropriate length of the lag from the relevant theoretical considerations. Statistical inference is a useful means of specifying these lags. T-statistic as well as R^2 were used for this purpose. The model was regressed by using, first, the current value of RI and, then, the current as well as the lagged values and so on. This process was continued until the value of the t-statistic showed significant results for the estimated coefficient. If, at the same time, the value of R^2 did not increase significantly, we could conclude that the influence is no longer operating. Using the above method, we discovered that the influence of RI on the employment rate is distributed over a two-year period. This operation is reported in Appendix D to this chapter. Using sections (a) and (b), equation (2) may be written in the following way.

$$(3) \quad EM_t = EM_t(W_{t-1}, FIS_{t-2}, RGK_{t-1}, RGL_t, \sum_{i=0}^2 RI_{t-i}, RGE_t, RMU_{t-2}, UN_{t-2})$$

B. Specification of lags in per-worker real income growth equation

The fiscal variable, FIS, as in the case of the employment rate, would be expected to affect the growth rate

within two years. The wage parity (W) would affect the real income with a two-year lag, because we would expect a one-year lag for its impact on the employment rate (discussed in part A) and a further one year for it to affect income.³ The generosity of unemployment insurance (RMU) and the degree of labor force unionization (UN) would be expected to affect the per-worker growth rate with a two-year lag. Per-worker subsidy on labor (RGL) and on capital (RGK) - if not offsetting each other's impact - would be expected to affect $\dot{y}$ with the same lag as their impact on the employment rate; that is, a one-year lag for (RGL) and a two-year lag for (RGK). Per-worker federal government expenditures on direct job creation (RGE) would be expected to affect the growth rate (if at all) by a lag of one year.

The influence of per-worker federal expenditure on items such as infrastructure (RI) would be expected to be distributed over two periods beyond the current one.⁴ Now equation (1) can be written in the following form.

-
3. Equations (2-18)' and (3-21) of Chapter IV mathematically elaborate the employment-income relationship.
 4. This result was obtained using the same procedure as that used to discover the appropriate lag for the RI-employment relationship. See Appendix A to this chapter.

$$(4) \quad GY_t = GY_t (W_{t-2}, FIS_{t-2}, RGK_{t-1}, RGL_t, \sum_{i=0}^2 RI_{t-i}, RGE_{t-1}, \\ RMU_{t-2}, UN_{t-2})$$

II

Data

The study employs annual data for the 1954-1982 period, as quarterly data are not available. Newfoundland data for earlier periods are incomplete. Our search for Newfoundland data found many shortcomings with data publication; these will be explained, in each case, as data sources are cited.

Gross provincial product at market price (GPP) for 1954 to 1979 is derived from Government of Newfoundland and Labrador, Historical Statistics of Newfoundland and Labrador, 1981 and 1970. Data for 1980-1982 were taken from Statistics Canada, Provincial Accounts, catalogue number 13-213.

Data for 1961 to 1979 are also published by Statistics Canada, catalogue number 13-213, but differ greatly from those published by the Government of

Newfoundland. For example, 1961 data from Statistics Canada sources indicate a GPP of \$297 million, while in the Government of Newfoundland sources, it amounts to \$503.7 million. The problem persists for all other years. Out of curiosity, the data from the original sources were calculated. The results were different from both sources. For the empirical study in this dissertation the published sources were used, but one should keep in mind for later reference that some measurement problems exist.

Employment data (annual average) for 1954 to 1969 are derived from Government of Newfoundland and Labrador, Historical Statistics of Newfoundland and Labrador. Again, out of curiosity, these data were calculated from the unemployment rate data taken from Statistics Canada, Historical Statistics of Canada, second edition, 1983, using the following formula:

$$\text{Employment} = \frac{\text{unemployment}}{\text{unemployment rate}} - \text{unemployment}$$

and substantially different results were found. For example, our calculation for 1958, 1959 and 1960 give 88, 89 and 91 thousand respectively, while the published data are 108, 111 and 111 thousand. These problems (over and underreporting) also exist for other years.

The employment data for 1970 to 1975 are derived from the Canada Year Book, 1975, 1978-79 and 1980-81. The data for 1975 to 1983 are derived from Statistics Canada, Labor Force Annual Average, 75-83, catalogue number 71-529. The data for average weekly wages and salaries for Canada, and for Newfoundland are derived from Statistics Canada, Historical Summary, 1970, catalogue number 11-505 and 1954-82, catalogue number 11-003. The data for inflation for 1954 to 1978 are derived from Government of Newfoundland and Labrador 1979, Historical Statistics of Newfoundland and Labrador, August 1979 and for 1980-1982 from Statistics Canada, catalogue number 62-010. The St. John's index is used as a proxy measure for Newfoundland.

The sources of data on federal government expenditures which together make up RI (infrastructure and other items) are the following: for Trans-Canada highways, Railway Grade Crossing Fund, roads leading to resources, air, Agricultural Rehabilitation and Development (ARDA), forests, trunk highway programs, land protection and reclamation, and the relocation of families from isolated fishing areas, the source is Statistics Canada, Financial Statistics of the Government of Canada, 1951-82, catalogue number 68-211. For capital assistance towards the development and operation of activities under the Technical and Vocational Training

Assistance Act, the sources are Government of Canada, Public Accounts, annual (1961-65) and Government of Canada, Manpower and Immigration, annual (1966-72). For federal expenditures through the Atlantic Development Board (ADB), the data were obtained from Statistics Canada, Financial Statistics of the Government of Canada, 1951-82, catalogue number 68-211; the data on Mineral Development Programs, and Housing and General Development Act (GDA) were obtained from the same sources. Recall that these expenditures attempt to increase the productivities of both capital and labor.

The data on compensating expenditures (fiscal variable FIS) were obtained from Statistics Canada, Provincial Economic Accounts, 1961-82, catalogue number 13-213 for 1961 and 1982, and for 1954 to 1960, the data were calculated from the original sources of this publication, i.e. Department of National Revenue, Taxation Statistics, 1953 to 1962.

The federal government subsidy on capital (RGK) is the summation of ADA (Area Development Agency Program), the construction of vessels, and RDIA (Regional Development Incentives Act subsidy on capital) expenditures. ADA figures are not published anywhere. They were, therefore, calculated

from correspondence reports of DREE and the Parliament of Canada from the National Library Archives Sessional Paper 97C dated April 28, 1969 and Sessional Paper 97D dated October 22, 1969. These data are taken according to the date of approval. The actual subsidy may be spent in the region sometime after or even before that date since firms, in many cases, moved to the province and asked for a revision of their grant which brought later the approval of a different amount. A careful study of these reports substantiates our point.

The data on federal government subsidies for the construction of vessels for 1954-69 were obtained from C. L. Mitchell and H. C. Fruk, Government Programs of Assistance For Fishing Craft Construction in Canada: An Economic Appraisal, Department of Fisheries and Forestry, Ottawa, June 1970. The data for 1970-73 were obtained from Financial Statistics of Government of Canada, Statistics Canada, 1951, 1982, catalogue number 68-211. Finally, the data on this item for 1974-82 were extracted from Department of Fisheries and Oceans, Annual Reports. The data on RDIA (capital subsidy part) were obtained from the Department of Regional Economic Expansion, Report on Regional Development Incentives monthly publication, October 1969 to December 1982.

It should be noted that these grants were often approved and later (one year to two years) were revised or cancelled. It is not clear as to when the money was actually spent in the province.

Data on DREE grants on labor (RGL) were obtained from the Department of Regional Economic Expansion, Report on Regional Development Incentives monthly publications, October 1969 to December 1982. It must be noted that expenditure data showed large fluctuations; cancellations and revisions occurred even more often. These grants present more problems since firms received them based on the estimated number of jobs they would create, but these jobs may have actually been created much later than estimated (if created at all).

The data on the unemployment rate for 1957 to 1966 were obtained from Statistics Canada, Historical Statistics of Canada, second edition, 1982 and for 1966 to 1983 from Statistics Canada, Unemployment Rate, catalogue number 71-201. It should also be mentioned that there are many inconsistencies in figures published by different sources. The employment rate was calculated by subtracting the unemployment rate from one.

As a proxy for the generosity of unemployment insurance in Newfoundland the following was used:

$$\text{RMU} = \frac{\text{Maximum dollar received each week times the number of weeks received}}{\text{St. John's price index}}$$

The information for the calculation of the above proxy is taken from Employment and Immigration Canada (1981), A Chronology of Response, The Evolution of Unemployment Insurance from 1940 to 1980.

The federal government expenditure on direct job creation (RGE) is the summation of the expenditure on Winter Work Projects, Youth Canada Work Plan, Local Employment Assistance Program (LEAP), Local Initiatives Programs (LIP) and Canada Works Programs. Winter Work Projects data were obtained from Statistics Canada Federal Government Finance, annual, catalogue number 68-211; Youth Canada Work Plan data were taken from (1975-80) Government of Canada Manpower and Immigration, annual, and (1981-82) Government of Canada Federal-Provincial Programs and Activities, 1981-82; Local Employment Assistance Program data were taken from Government of Canada Federal-Provincial Programs and Activities, 1976, and 1981-82; Local Initiatives Program (LIP) data were obtained from Government of Canada

Federal-Provincial Programs and Activities, 1977; finally, Canada Works Programs data were obtained, for 1978-80, from Government of Canada Employment and Immigration, annual and for 1981-82 from Government of Canada Federal-Provincial Programs and Activities, 1981-82.

The degree of labor force unionization (UN) is the percentage of the labor force unionized in Newfoundland. Data on union membership⁵ in Newfoundland, for 1954-57, were obtained from Union Growth in Canada 1921-1967, Economics and Research Branch Canada, Department of Labor, 1970. This data, for 1968-70, were obtained from J.K. Eaton, Union Growth in Canada in the Sixties, Labor Canada, 1976. Finally, data for 1971-82 were obtained from Corporations and Labor Union Returns Act - With Supplements, Statistics Canada, annual publication.

In Appendix A, the evolution of all (dependent and independent) variables used in this study have been diagrammed (with time on the horizontal axis) for visual comparison and study. The irregular movements in the data are due to problems with the data mentioned earlier in this

5. The union membership is based on all reporting labor organizations. The membership count is based on the province in which the members are actually employed.

section and, in some cases, may be due to sporadic motions of time series produced by many short-run regional policy changes in Newfoundland. This fact can be observed from Figures A-1 to A-10. These movements lead to an autocorrelation problem and violation of the white noise property of the error term.⁶ To cope with these problems, the appropriate lags - as explained in the previous section - and the Cochrane-Orcutt two-stage iterative method of estimation will be used.

III

Equations (3) and (4) in their linearized forms can be written in the following way:

$$(5) \quad EM_t = a_0 + a_1 W_{t-1} + a_2 FIS_{t-2} + a_3 RGK_{t-1} + a_4 RGL_t + a_5 RI_t + a_{51} RI_{t-1} + a_{52} RI_{t-2} + a_6 RGE_t + a_7 RMU_{t-2} + a_8 UN_{t-2} + u_t$$

-
6. Serial correlation will not affect the unbiasedness or consistency of OLSQ, but their efficiency. In the case of positive serial correlation, this loss of efficiency will be masked by the fact that the estimates of the standard errors obtained from the least-squares regressions will be smaller than the true standard errors. In other words, the regression estimators will be unbiased, but the standard error of regression will be biased downward. This will lead to the conclusion that the parameter estimates are more precise than they actually are to reject the null hypothesis when, in fact, it should not be rejected.

$$(6) \quad GY_t = b_0 + b_1 W_{t-2} + b_2 FIS_{t-2} + b_3 RGK_{t-1} + b_4 RGL_t + b_5 RI_t +$$

$$b_{51} RI_{t-1} + b_{52} RI_{t-2} + b_6 RGE_t + b_7 RMU_{t-2} + b_8 UN_{t-2} + \epsilon_t$$

where a_i and b_i (for all $i = 0, \dots, 8$) are constant and u_t and ϵ_t are the error terms, which are assumed to have the following properties.

- i) u_t and ϵ_t are normally distributed,
- ii) means of u_t and ϵ_t are zero for all $t = 1, \dots, 29$,
- iii) the variances of u_t and ϵ_t are constant for all $t = 1, \dots, 29$.

However, we know that autoregression exists. This problem will be solved with the technique of estimation mentioned earlier and elaborated later. As mentioned above, another characteristic of both equations (5) and (6) is that the effect of the variable (RI) is distributed over three periods. Fortunately, correlation coefficients between RI_t , RI_{t-1} and RI_{t-2} are low enough to assume that there is no serious multicollinearity problem.⁷

7. Refer to correlation matrix given in Appendix B.

Therefore, Ordinary Least-Squares will give best linear unbiased estimate, using assumptions (i), (ii) and (iii) above. In such a case, there are other techniques of estimation, especially when we know from specification of A (in Chapter IV) that the influence of RI on GY and EM declines geometrically over time. One of the best techniques in such a case is "Koyck's transformation technique". However, this technique will not be used because it requires the lag dependent variable to appear on the right hand side of the equation. In such a case, the Durbin-Watson test is biased towards 2. For a large sample (number of observations more than 30), we can use the h test, instead of the Durbin-Watson test for serial correlation (Johnston, 1972, pp. 307-313). Since the sample contains only 27 observations, both the employment and growth rate equations were estimated according to simple distributed lag models. However, for curiosity's sake, these equations were also estimated by the Almon scheme of Polynomial Lags.

Equations (5) and (6), derived from Models II and III of Chapter IV, were estimated by using Newfoundland's data from 1954 to 1982. To avoid zero values for variables with lags, two years of observations had to be lost; consequently, the sample size became 27. All variables are in real terms. The correlation matrices of the variables are given in Appendix B of this chapter.

A - Empirical results on the employment rate (EM):

The variable FIS is highly correlated with the variables T , RI_{t-1} and RI_{t-2} . To avoid a multicollinearity problem, EM was regressed on all variables except FIS and then EM on all variables except T , RI_{t-1} and RI_{t-2} .⁸ The empirical results are given in Tables 5-3 and 5-4.⁹ Table 5-5 contains the estimated elasticities of the variables.

TABLE 5-3
DEPENDENT VARIABLE EM
(without FIS)

Independent Variable	Estimated Coefficient	t-statistic
C	655.6	1.37 ^(c)
W_{t-1}	-10.17	-2.36 ^(a)
RGX_{t-1}	1.59	0.16 ^(c)
RGL_t	3.18	0.34 ^(c)
RGE_{t-1}	-5.96	-1.65 ^(b)
RMU_{t-2}	-0.05	-1.18 ^(c)
UN_{t-2}	-0.59	-5.67 ^(a)
RI_t	0.67	0.37 ^(c)
RI_{t-1}	0.95	0.51 ^(c)
RI_{t-2}	-1.51	-0.79 ^(c)
T	-0.277	-1.14 ^(c)

$R^2 = 0.90$ F-statistic = 13.6^(a) D.W. = 1.98

Sample Size = 26

Note: (a) 99% level of significance; (b) 90% level of significance;
(c) insignificant

8. The seriousness of the multicollinearity problem and the justification for the measures taken to deal with it is discussed in Appendix C.
9. The estimation method of the results reported in these two tables is OLSQ.

TABLE 5-4

DEPENDENT VARIABLE EM
(without RI_{t-1} , RI_{t-2} and T)

Independent Variables	Estimated Coefficients	t-statistic
C	112.2	24.08 ^(a)
W_{t-1}	-10.90	-2.71 ^(a)
RGK_{t-1}	1.98	0.24 ^(c)
RGL_t	1.42	0.166 ^(c)
RGE_{t-1}	-6.51	-1.99 ^(a)
FIS_{t-2}	-223816	-2.01 ^(a)
RMU_{t-2}	-0.06	-1.29 ^(c)
UN_{t-2}	-0.60	-6.10 ^(a)
RI_t	1.59	1.03 ^(c)
$R^2 = 0.89$	F-statistic = 18.63 ^(a)	D.W. = 2.004
Sample size = 26		

Note: (a) 95% level of significance; (b) 90% level of significance and (c) insignificant.

TABLE 5-5

ESTIMATED ELASTICITIES FOR THE EMPLOYMENT RATE¹⁰

$$\frac{\partial EM}{\partial \bar{W}} \cdot \frac{\bar{W}}{EM} = -0.11$$

$$\frac{\partial EM}{\partial \overline{RGK}} \cdot \frac{\overline{RGK}}{EM} = 0.002$$

$$\frac{\partial EM}{\partial \overline{RGL}} \cdot \frac{\overline{RGL}}{EM} = 0.003$$

$$\frac{\partial EM}{\partial \overline{RGE}} \cdot \frac{\overline{RGE}}{EM} = -0.02$$

$$\frac{\partial EM}{\partial \overline{FIS}} \cdot \frac{\overline{FIS}}{EM} = -0.002$$

$$\frac{\partial EM}{\partial \overline{UN}} \cdot \frac{\overline{UN}}{EM} = -0.18$$

$$\frac{\partial EM}{\partial \overline{RMU}} \cdot \frac{\overline{RMU}}{EM} = -0.025$$

$$\frac{\partial EM}{\partial \overline{RI}_t} \cdot \frac{\overline{RI}}{EM} = 0.013^*$$

$$\frac{\partial EM}{\partial \overline{RI}} \cdot \frac{\overline{RI}}{EM} = 0.0009^{**}$$

* This is the short-run response of EM to RI or its immediate impact, where $\frac{\partial EM}{\partial \overline{RI}_t}$ is equal to the estimated coefficient of $\overline{RI}_t$ in Table 5-4.

** This is the long-run response of EM to RI; namely, a measure of the percentage change in EM associated with a one per cent change in RI which stays in effect for all time. Here

$\frac{\partial EM}{\partial \overline{RI}}$ is equal to the sum of lag coefficients of RI in Table 5-3.¹¹

10. Variables superscripted by a bar are arithmetic means of a variable.

11. See Pindyck and Rubinfeld (1976), p. 213.

The impact of higher wage rates in Newfoundland, for a given wage rate in the rest of the country, is statistically significant and negative - as both theoretical models predicted. A 10% rise in W will lower the employment rate by 1.1% (see Table 5-5). The estimated coefficients of both subsidies on capital and labor are statistically insignificant. One may thus argue that these policies have worked to offset each other's impact, specially since their sample means ($\overline{RGK} = 0.09$, $\overline{RGL} = 0.08$) have almost the same magnitude. An alternative explanation for the result obtained for RGL is that the policy has affected both the demand and the supply of labor in such a way that the employment rate has remained unaffected.

The estimated coefficients of per-worker federal direct job creation expenditure (RGE) reported in both Tables 5-3 and 5-4 are statistically significant and the estimated sign is, as Models II and III predicted, negative. For a one per cent increase in this expenditure, the employment rate will fall by 0.02 per cent. One possible explanation of this result is that such expenditures, if effective, may call forth an increase in the supply of labor through in-migration such that the employment rate actually falls. Alternatively, these expenditures may work to crowd

out private investment in other segments of the regional economy so as to reduce overall demand for labor. Finally, both effects may occur simultaneously.

The estimated coefficient of the fiscal variable FIS (per-worker government expenditure net of all taxes for all levels), as Table 5-4 shows, is statistically significant and negative. This confirms the theoretical result of Model II which predicted a negative impact for FIS on EM. Furthermore, the elasticity of EM with respect to FIS is estimated to be -0.002; namely, for a one per cent increase in per-worker government expenditure (net of taxes), the employment rate is expected to fall by 0.002 per cent.

The estimated coefficient for the generosity of unemployment insurance (RMU) is statistically insignificant. However, the estimated sign is negative, as Models II and III predicted.

The estimated coefficient of the region's degree of labor force unionization (UN) is statistically significant and its estimated sign is negative, as predicted in Models II and III. From Table 5-5, we can see that for a one per cent increase in UN, the employment rate (EM) will fall by 0.18 per cent.

The estimated coefficients of federal expenditure on infrastructure and other items (the collectivity of which forms the variable RI) are statistically insignificant for the current as well as the two-lagged periods. However, the estimated sign of the two-period lag of RI is negative, as predicted in Model III. Again, the insignificance of its impact may be attributed to the expenditures affecting both the demand and the supply of labor (refer to equations 2-15, 2-16 of Model II and equation 3-18 of Model III).

The estimated coefficient of the variable T (time) is statistically insignificant. It may be concluded from this result that the dynamic trend of EM is, ceteris paribus, constant.

As mentioned before, the employment rate equation was also tested using the Polynomial Distributed Lag. Because of the high value of the correlation coefficient between FIS, the RI variables, and T, FIS was deleted from the regression. The employment equation was estimated using a three-period second degree Polynomial with no-end-point restrictions. These results are given in Table 5-6. Comparing these

results with those reported in Table 5-3, it is evident that the two techniques of estimation have produced identical results, both in the magnitude of the estimated coefficients and their significance.

TABLE 5-6

DEPENDENT VARIABLE EM

Independent Variable	Estimated Coefficient	t-statistic
C	705.68	1.55 ^(c)
W_{t-1}	-10.18	-2.42 ^(a)
RGE_{t-1}	-6.01	-1.71 ^(b)
T	-0.30	-1.31 ^(c)
RGK_{t-1}	2.03	0.21 ^(c)
RGL_t	3.33	0.37 ^(c)
UN_{t-2}	-0.59	-6.01 ^(a)
RMU_{t-2}	-0.06	-1.29 ^(c)
RI_t	1.27	1.01 ^(c)
RI_{t-1}	0.18	0.22 ^(c)
RI_{t-2}	-0.90	-0.67 ^(c)
Sum of lag coefficients	0.54	0.22 ^(c)
$R^2 = 0.9006$ F-statistic (9, 16) = 16.1055 ^(a)		
D.W. = 2.0453 Sample size = 26 Mean lag = -3.01		

B - Empirical Results on Real Per-Worker Income Growth (GY):

As mentioned in section A, the variables FIS, T , RI_{t-1} and RI_{t-2} are highly correlated. To avoid a multicollinearity problem in regressing equation (6), GY was once regressed on all variables except FIS and, then, GY on all variables except T , RI_{t-1} and RI_{t-2} . These results are presented in Tables 5-7 and 5-8 respectively. As expected from the data (section II), a high autocorrelation problem exists. The Cochrane-Orcutt two-stage iterative technique of estimation was used to correct the problem.

TABLE 5-7

DEPENDENT VARIABLE GY
(without FIS)

Independent Variable	Estimated Coefficient	t-statistic
C	-950.09	-1.70 (a)
W_{t-2}	-2.73	-0.68 (c)
RGE_{t-1}	3.23	0.64 (c)
T	0.49	1.72 (a)
RGK_{t-1}	-10.68	-0.71 (c)
RGL_t	-45.32	-3.93 (a)
UN_{t-2}	-0.33	-3.11 (a)
RMU_{t-2}	0.14	2.42 (a)
RI_t	-7.91	-2.54 (a)
RI_{t-1}	4.19	1.23 (c)
RI_{t-2}	-7.37	-2.26 (a)

$R^2 = 0.6979$ F-statistic (10, 15) = 3.465 (a) D.W. = 2.7752

Sample size = 26 Mean lag = 0.95

Sum of lag coefficients = -11.1

Note: The estimation technique used here is Cochrane-Orcutt two-stage iterative technique and the final rho is -0.71.
Here (a) denotes 95% level of significance; (b) 90% level of significance and (c) is insignificant.

TABLE 5-8

DEPENDENT VARIABLE GY
(without RI_{t-1} , RI_{t-2} and T)

Independent Variable	Estimated Coefficient	t-statistic
C	12.10	2.26 ^(a)
W_{t-2}	-1.47	-0.34 ^(c)
RGE_{t-1}	-3.27	-0.73 ^(c)
FIS_{t-2}	37073.9	0.25 ^(c)
RGR_{t-1}	6.84	0.53 ^(c)
RGL_t	-47.33	-3.78 ^(a)
UN_{t-2}	-0.33	-2.84 ^(a)
RMU_{t-2}	0.14	2.29 ^(a)
RI_t	-4.25	-1.92 ^(a)

$R^2 = 0.5831$ F-statistic (8, 17) = 2.97^(a)

D.W. = 2.67 Sample size = 26

Note: The estimation technique used here is Cochrane-Orcutt two-stage iterative technique and the final rho is -0.68. Here (a) denotes 95% level of significance; (b) 90% level of significance; and (c) is insignificant.

The following table presents the elasticities of GY with respect to the exogenous variables derived from Tables 5-7 and 5-8.

TABLE 5-9

ESTIMATED ELASTICITIES FOR GY

$\frac{\partial GY}{\partial \bar{W}} \cdot \frac{\bar{W}}{GY} = -0.81$	$\frac{\partial GY}{\partial \overline{RGK}} \cdot \frac{\overline{RGK}}{GY} = 0.20$
$\frac{\partial GY}{\partial \overline{RGL}} \cdot \frac{\overline{RGL}}{GY} = -1.2087$	$\frac{\partial GY}{\partial \overline{RGE}} \cdot \frac{\overline{RGE}}{GY} = -0.30$
$\frac{\partial GY}{\partial \overline{UN}} \cdot \frac{\overline{UN}}{GY} = -2.7918$	$\frac{\partial GY}{\partial \overline{FIS}} \cdot \frac{\overline{FIS}}{GY} = \text{zero}$
$\frac{\partial GY}{\partial \overline{RMU}} \cdot \frac{\overline{RMU}}{GY} = 1.6689$	$\frac{\partial GY}{\partial \overline{RI}_t} \cdot \frac{\overline{RI}}{GY} = -1.7936^*$
	$\frac{\partial GY}{\partial \overline{RI}} \cdot \frac{\overline{RI}}{GY} = -2.5164^{**}$

* This is the short-run response of GY to RI or its immediate impact, where $\frac{\partial GY}{\partial \overline{RI}_t}$ is equal to the estimated coefficient of $\overline{RI}_t$ in Table 5-7.

** This is the long-run response of GY to RI: namely, a measure of the percentage change in GY associated with a one per cent change in RI which stays in effect for all time. Here $\frac{\partial GY}{\partial \overline{RI}}$ is equal to the sum of lag coefficients of RI which appears in Table 5-7.

Note: Variables superscripted by a bar are arithmetic means of the variables.

As the above tables indicate, the wage-parity variable (W) is inversely related to GY as both Models II and III predicted, but the coefficient is not statistically significant.

The estimated impact of per-worker federal expenditure on direct job creation (RGE) is not statistically significant while the estimated sign of the coefficient (refer to Table 5-8) confirms the theoretical predictions of Models II and III.

The estimated coefficient of time (T) is statistically significant and its relationship with GY is positive; that is, ceteris paribus, the growth of per-worker income will rise through time (though the estimated coefficient is only 0.491). This is not inconsistent with theoretical predictions of MII and MIII, which attribute this sign to the various parameters of each model.

The estimated coefficient of per-worker subsidy on capital (RGK) is not statistically significant; however, the estimated sign is positive (see Table 5-8). This does not contradict the theoretical results of Models II and III

and those of traditional theory. Recall that the sample means of subsidies on capital and labor reported above have nearly the same magnitude ($\overline{RGK} = 0.09$, $\overline{RGL} = 0.08$). Given a homogeneous production function for the region, as assumed in all models of Chapter IV, this leads to a parallel outward shift of the region's isocost line, leaving the output per worker unaffected by the subsidies. This accords with our empirical results just reported.

The estimated coefficient of per-worker subsidy on labor (RGL) is statistically significant and, according to the empirical results, RGL is inversely related to GY. For a one per cent increase in this expenditure, GY will fall by 1.2 per cent (Table 5-9). The estimated results are, again, not inconsistent with the theoretical findings, which show the direction of this impact to depend on the parameters of each model. Recall from equations (2-15) of Model II and (3-18) of Model III that the demand for labor in the region is positively related to the value of RGL. Thus, one may argue that the empirical results imply that the increment of real income - consequent on a change in RGL - did not match the magnitude by which the demand for labor was thus augmented.

The estimated coefficient of the degree of labor force unionization (UN) is statistically significant, and its sign, as Models II and III predicted, is negative. A one per cent increase in the degree of labor force unionization will reduce real per-worker income growth rate by 2.79 per cent.

The generosity of unemployment insurance (RMU) has a statistically significant estimated coefficient. For a one per cent increase in this variable, real per-worker income growth rate increases by 1.6 per cent. Models II and III results, however, are not confirmed by the empirical finding. A possible explanation is that the demand for labor (equation 2-15 of Model II and 3-18 of Model III, Chapter IV) is invariant to changes in the generosity of unemployment insurance. On the other hand, these federal expenditures do augment the region's income through the benefits received by the unemployed. Consequently, per-worker income growth may be expected to respond positively to generosity of such benefits in Newfoundland.

The estimated coefficient of federal expenditure on infrastructure and other items (the collectivity of which forms the variable RI) is statistically significant

And its sign is negative, as Model III predicted. However, this variable has a short-run as well as a long-run impact on GY. For the short-run, a one per cent increase in RI results in an immediate fall of 1.79 per cent of GY (see short-run elasticity of this variable in Table 5-9); in the long-run, GY will fall by 2.5 per cent for the same rise in RI.

Finally, note that the estimated coefficient of per-worker government expenditures net of taxes (FIS) (Table 5-8) is not statistically significant. A possible explanation is that these expenditures will affect both income and employment in such a way that per-worker real income remains unaffected (see equations 3-13 and 3-18). The estimated result is not inconsistent with the theoretical findings, which show the direction of this impact to depend on the parameter of each model.

IV

Evaluating The Models' Accuracy
And Forecasting Ability (Simulation)

A- The Employment Equation

An estimate of the models' accuracy over the sample period for the employment equation was obtained by computing the root-mean-square simulation error, the root-mean-square percent error, the mean simulation error and the mean percent error. These results, including the mean of the employment rate, are given in Table 5-10. Unfortunately, to our knowledge no authors have published their sample period statistics studies in Canada - thus making a comparison of these results with others' impossible. As Glickman (1977, p. 68) points out, only few authors have published their sample period error statistics for their U.S. regional studies; and such reporting has been limited to only Mean Simulation Percentage Error Statistics. However, this study's results compare favorably with what little (MSPE) has been reported by Glickman (1977, p. 69). It may be possible to judge some of the above empirical results on their own merits: comparing the RMS simulation errors (= 2.7) with the

mean of EM (= 81.5) the errors are small indeed.¹² Other results are equally favorable.

TABLE 5-10

RESULTS OF HISTORICAL SIMULATION OF EM

Mean = 81.5

Mean Simulation Error = 0.42

RMS = 2.7

Mean Simulation
Percent Error 0.005

RMS Percent Error = 0.019

Note:

$$\text{RMS} = \text{Root-Mean-Square} = \sqrt{\frac{1}{N} \sum_{t=1}^N (EM_t^s - EM_t^a)^2}$$

$$\text{RMS Percent Error} = \sqrt{\frac{1}{N} \sum_{t=1}^N \left(\frac{EM_t^s - EM_t^a}{EM_t^a} \right)^2}$$

$$\text{Mean Simulation Error} = \frac{1}{N} \sum_{t=1}^N (EM_t^s - EM_t^a)$$

$$\text{Mean Simulation Percent Error} = \frac{1}{N} \sum_{t=1}^N \left(\frac{EM_t^s - EM_t^a}{EM_t^a} \right)$$

EM_t^s = Simulated value of employment rate

EM_t^a = Actual value of employment rate

N = Number of observations.

12. "The magnitude of this error can be evaluated only by comparing it with the average size of the variable in question." (Pindyck and Rubinfeld, 1976, p. 316).

It should be noted, however, that a low RMS simulation error is only one desirable measure of simulation fit. Another important criterion is how well the model simulates turning points in the historical data. Figure 5-1 shows turning points with reasonable accuracy. As this figure shows, the simulated series do seem to reproduce the general long-run behavior of the actual series, although short-run fluctuations in the actual series are not reproduced well, and some turning points are missed altogether. It can be concluded from these results that the models have good forecasting ability for Newfoundland's employment rate in response to the policy instruments.

FIGURE 5-1

FORECASTING ACCURACY TEST
(EMPLOYMENT RATE)

B - The Per-Worker Income Growth Rate:

Table 5-11 presents the results of the accuracy measures. Keeping in mind that the small mean of the growth rate is due to the growth rate for some years being positive and for other years negative and the resulting cancellation reducing the value of the mean, the results are quite reasonable. The above discussion on the results for the employment rate (section A above) also applies to these results with equal force. Looking at Figure 5-2, the simulated series have reproduced closely the general long-run behavior of the actual series.

TABLE 5-11

RESULTS OF HISTORICAL SIMULATION OF GY

Mean = 3

RMS = 7.2

RMS (percent error)* = 3.8

Mean Simulation Error* = -3.5

Mean Simulation Percent Error* = -0.04 .

* For the formulas used, refer to Table 5-10.

7

FIGURE 5-2
FORECASTING ACCURACY TEST
(REAL PER-WORKER INCOME GROWTH)

SUMMARY

Theoretical results of Chapter IV were tested on Newfoundland data in this chapter and, as the simulation and accuracy measures indicate, a good deal of confidence can be placed in these results and their forecasting abilities. The effectiveness of regional policies in Newfoundland with respect to employment rate and per-worker real income growth rate can be summarized as follows:

- (i) Policies of Regional Development Incentives Act (RDIA) of DREE (now DRIE) were not successful in increasing the employment rate in Newfoundland. The program's subsidies on labor reduced the region's real per-worker income growth rate and this rate did not respond to subsidies on capital.
- (ii) Direct job creation programs were found to reduce the region's rate of employment. Real per-worker income growth rate did not respond to job creation programs.
- (iii) All compensating policies were found to reduce the region's employment rate, but left the per-worker real income growth rate unaffected.
- (iv) Federal expenditures on items like infrastructure have no impact on the employment rate but a negative impact on the region's per-worker real income growth rate.

(v) The generosity of unemployment insurance benefits was found to have no impact on the employment rate. It did, however, increase per-worker real income growth.

(vi) The rate of labor force unionization was found to reduce both the employment rate and the rate of growth of income per-worker in the region.

APPENDIX A

FIGURE A-1

EVOLUTION OF GY THROUGH TIME

FIGURE A-2

EVOLUTION OF EM THROUGH TIME

FIGURE A-3

EVOLUTION OF W THROUGH TIME

FIGURE A-4

EVOLUTION OF RGK THROUGH TIME

FIGURE A-5

EVOLUTION OF RGE THROUGH TIME

FIGURE A-6

EVOLUTION OF UN THROUGH TIME

FIGURE A-7

EVOLUTION OF RGL THROUGH TIME

FIGURE A-8

EVOLUTION OF RI THROUGH TIME

APPENDIX B

TABLE B-1

CORRELATION MATRICES

	W_{t-2}	W_{t-1}	RGE_{t-1}	T	RGK_{t-1}	RGL_t
UN_{t-2}						
RI_{t-3}						
W_{t-2}	1.0000 -.32277 .28013	.71530 .50043	.27168 .43727	.52051 .35329	.29111 .34349	.13655 .31097
W_{t-1}	.71530 -.24190 .20632	1.0000 .41256	.23510 .35788	.42236 .31435	.23309 .28057	.10087 .24785
RGE_{t-1}	.27168 .31354 .79015	.23510 .51216	1.0000 .77945	.74418 .70529	.43298 .74681	-.10278 .73740
T	.52051 -.17627E-01 .74348	.42236 .64808	.74418 .97961	1.0000 .71104	.67244 .74894	.24462 .76998
RGK_{t-1}	.29111 -.67523E-01 .34061	.23309 .36305	.43298 .61311	.67244 .43454	1.0000 .36893	.34496 .30432
RGL_t	.13655 -.24573 -.98633E-02	.10087 .31965	-.10278 .16510	.24462 .45111E-01	.34496 .29775E-01	1.0000 .43548E-01
UN_{t-2}	-.32277 1.0000 .17927	-.24190 -.93086E-01	.31354 .51681E-01	-.17627E-01 .21391	-.67523E-01 .16251	-.24573 .17122
RMU_{t-2}	.50043 -.93086E-01 .27179	.41256 1.0000	.51216 .64407	.64808 .66123	.36305 .60213	.31965 .53244
FIS_{t-2}	.43727 .51681E-01 .73648	.35788 .64407	.77945 1.0000	.97961 .75302	.61311 .80983	.16510 .81015
RI_t	.35329 .21391 .46926	.31435 .66123	.70529 .75302	.71104 1.0000	.43454 .76890	.45111E-01 .56170
RI_{t-1}	.34349 .16251 .59524	.28057 .60213	.74681 .80983	.74894 .76890	.36893 1.0000	.29775E-01 .77585
RI_{t-2}	.31097 .17122 .80095	.24785 .53244	.73740 .81015	.76998 .56170	.30432 .77585	.43548E-01 1.0000
RI_{t-3}	.28013 .17927 1.0000	.20632 .27179	.79015 .73648	.74348 .46926	.34061 .59524	-.98633E-03 .80095

APPENDIX C

It should be noted that OLSQ, in the presence of multicollinearity, remains unbiased. In fact, all desirable properties of OLSQ, and the R^2 statistic, are unaffected by multicollinearity. The major undesirable consequence of multicollinearity is that the variances of OLSQ estimates of the parameters of the collinear variables are quite large. Having high variance means that the parameter estimates are not precise, and hence unreliable. A second consequence is that it can easily lead to specification errors. This problem arises because the researcher cannot determine which independent variable is relevant. Though one may know that at least one is relevant, it is very difficult to identify which one. The existence of multicollinearity will not always lead to a serious problem (inefficiency and misspecification). Whether such multicollinearity is serious must then be identified first. Unfortunately, no successful formal tests exist to date. Among existing tests the correlation coefficient was chosen for purposes of this study. A correlation coefficient of 0.8 or more is conventionally regarded as serious (Kennedy, 1979, p. 131). There are several options in correcting the multicollinearity problem. The "dropping the collinear variable(s)" technique

was chosen since this is a correct move if the true coefficient of the variable(s) in the equation being estimated is (are) zero. As Table 5-3 indicates, the estimated coefficients of variables RI_{t-1} , RI_{t-2} and T are insignificant. In Table 5-4, all these variables (collinear with FIS_{t-2}) are dropped in order to estimate the coefficient of FIS . EM was also regressed on all variables. The results are given in Table C-1. As the table shows, the estimated coefficients of all variables T , RI_{t-1} , RI_{t-2} and FIS_{t-2} are statistically insignificant. Dropping the variable FIS_{t-2} is, therefore, an appropriate method.

With respect to the variable GY , Table C-2 shows the estimated coefficients of all variables on GY . The dropping procedure is also supported by the results of Tables 5-8 and C-2 - that the impact of FIS on GY is insignificant.

TABLE C-1

DEPENDENT VARIABLE EM

Independent Variable	Estimated Coefficient	t-statistic
C	281.54	0.22 ^(c)
W_{t-1}	-10.63	-2.28 ^(a)
RGK_{t-1}	1.05	0.103 ^(c)
RGL_t	2.24	0.22 ^(c)
RGE_{t-1}	-6.07	-1.62 ^(b)
UN_{t-2}	-0.59	-5.49 ^(a)
RMU_{t-2}	-0.057	-1.14 ^(c)
RI_t	0.80	0.42 ^(c)
RI_{t-1}	1.16	0.57 ^(c)
RI_{t-2}	-1.42	-0.71 ^(c)
FIS_{t-2}	-132795	-0.32 ^(c)
T	-0.086	-0.13 ^(c)

$R^2 = 0.90$ F-statistic = 11.81^(a) D.W. = 1.93

Sample size = 26

Note: The estimation technique used here is OLSQ.
Here (a) denotes 95% level of significance; (b) 90% level of significance and (c) is insignificant.

TABLE C-2

DEPENDENT VARIABLE GY

Independent Variable	Estimated Coefficient	t-statistic
C	-1006.97	-0.59 ^(c)
W_{t-2}	-3.91	-0.78 ^(c)
RGE_{t-1}	3.19	0.59 ^(c)
T	0.52	0.60 ^(c)
RGK_{t-1}	-11.13	-0.67 ^(c)
RGL_t	-45.37	-3.24 ^(a)
UN_{t-2}	-0.34	-2.74 ^(a)
RMU_{t-2}	0.14	2.20 ^(a)
RI_t	-7.78	-2.31 ^(a)
RI_{t-1}	4.16	1.04 ^(c)
RI_{t-2}	-7.35	-2.10 ^(a)
FIS_{t-2}	-11270.4	-0.01 ^(c)

$R^2 = 0.6956$ F-statistic (11, 13) = 2.70014^(a)

D.W. = 2.7757 Sample size = 25

Note: The estimation technique used here is Cochrane-Orcutt two-stage iterative technique and the final rho is -0.70873. Here (a) denotes 95% level of significance; (b) 90% level of significance and (c) is insignificant.

APPENDIX D

IDENTIFICATION OF THE DISTRIBUTED LAG OF THE IMPACT OF RI ON EM AND GY

Since there is a high correlation between the variable T and FIS, to avoid a multicollinearity problem, FIS was deleted from the identification procedure. Table D-1 contains the current values of RI, Table D-2 contains the current as well as the lagged values of RI. As it can be seen, both estimations show the impact of RI variables is statistically insignificant, but the value of R^2 is larger in Table D-2. Consequently, the two-period lag of RI was included; the estimated results are reported in Table D-3. According to this table, the estimated coefficients of all RI variables are statistically insignificant, but the value of R^2 is larger. This leads to repeat the process by using a three-period lagged RI as an additional variable. The estimated results are still insignificant and the value of R^2 did not increase notably. It is thus concluded that the appropriate length of the distributed lag to capture the influence of RI on the employment rate is two (lagged) periods.

The above procedure was repeated to find the appropriate length of the distributed lag for the effect of RI on GY. The procedure is detailed in Tables D-5 through D-8. Table D-5 shows the regression using the current value

of RI. The estimated coefficient of RI is statistically significant. In Table D-6, a one-period lag of RI is included; the estimated coefficients of both RI_t and RI_{t-1} are statistically insignificant, but the value of R^2 is larger. Table D-7 shows the estimated results with an additional explanatory variable; the two-period lagged value of RI. The estimated coefficients of RI_t and RI_{t-2} are statistically significant, but that of RI_{t-1} is not. However, the value of R^2 has increased markedly. Finally, a three-period lagged value of RI was included, as Table D-8 shows. The estimated coefficient of this variable is statistically insignificant and the value of R^2 has fallen. This led to conclude that the appropriate length of the distributed lag to capture the effect of RI on GY is two (lagged) periods. In the estimation of GY, the existence of high autocorrelation was noted and was corrected using the Cochrane-Orcutt two-stage iterative technique.

Note: In the following tables, the notations (a), (b) and (c) refer to 95% and 90% levels of significance and insignificance respectively.

TABLE D-1

DEPENDENT VARIABLE EM*

(with RI_t , without FIS)

Independent Variable	Estimated Coefficient	T-Statistic
C	918.56	2.09 (a)
U_{t-1}	17.07	0.91 (a)
RSX_{t-1}	-5.91	-1.60 (b)
T	-0.42	-1.92 (a)
RSX_{t-1}	4.14	0.47 (a)
REL_t	5.36	0.53 (a)
RSW_{t-2}	-0.08	-1.54 (a)
UN_{t-2}	-0.51	-4.39 (a)
RI_t	0.52	0.31 (a)

$R^2 = 0.8802$

F-Statistic (8,17) = 15.61 (a)

D.W. = 2.01

Sample Size: 26

The Cochrane-Orcutt iterative technique was used to correct the existing autocorrelation. (Final rho: 0.22185)

TABLE D-2

DEPENDENT VARIABLE EM*

(with RI_t , RI_{t-1} , without FIS)

Independent Variable	Estimated Coefficient	T-Statistic
C	980.42	2.06 (a)
U_{t-1}	15.03	0.83 (a)
RSX_{t-1}	-6.24	-1.61 (b)
T	-0.45	-1.90 (a)
RSX_{t-1}	4.61	0.50 (a)
REL_t	5.67	0.55 (a)
RSW_{t-2}	-0.08	-1.52 (a)
UN_{t-2}	-0.50	-4.17 (a)
RI_t	0.34	0.19 (a)
RI_{t-1}	0.78	0.44 (a)

$R^2 = 0.8817$

F-Statistic (9,16) = 15.2457 (a)

D.W. = 1.9722

Sample Size: 26

The Cochrane-Orcutt iterative technique was used to correct the existing autocorrelation. (Final rho: 0.23823)

TABLE D-3

DEPENDENT VARIABLE -EM*

(with RI_t , RI_{t-1} , RI_{t-2} , without FIS)

Independent Variable	Estimated Coefficient	T-Statistic
C	655.66	1.37 (c)
W_{t-1}	-10.17	-2.36 (a)
RGE_{t-1}	-5.96	-1.65 (b)
T	-0.27	-1.14 (c)
RGX_{t-1}	1.59	0.16 (c)
RGL_t	3.18	0.34 (c)
UM_{t-2}	-0.59	-5.67 (a)
RWU_{t-2}	-0.05	-1.18 (c)
RI_t	0.67	0.37 (c)
RI_{t-1}	0.95	0.51 (c)
RI_{t-2}	-1.51	-0.79 (c)

$R^2 = 0.9020$

F-Statistic (10,15) = 13.8080 (a)

D.W. = 1.9836

Sample Size: 26

* The technique of estimation used here is Ordinary-Least-Squares.

TABLE D-4

DEPENDENT VARIABLE EM*

(with RI_t , RI_{t-1} , RI_{t-2} , RI_{t-3} , without FIS)

Independent Variable	Estimated Coefficient	T-Statistic
C	892.61	1.63 (a)
W_{t-1}	-10.20	-2.35 (a)
RGE_{t-1}	-8.58	-1.85 (a)
T	-0.39	-1.43 (b)
RGX_{t-1}	4.83	0.46 (c)
RGL_t	1.52	0.16 (c)
UM_{t-2}	-0.57	-5.44 (a)
RWU_{t-2}	-0.02	-0.42 (c)
RI_t	0.71	0.39 (c)
RI_{t-1}	1.51	0.77 (c)
RI_{t-2}	-2.48	-1.13 (c)
RI_{t-3}	2.34	0.90 (c)

$R^2 = 0.9075$

F-Statistic (11, 14) = 12.4801 (a)

D.W. = 2.0169

Sample Size: 26

* The technique of estimation used here is Ordinary-Least-Squares.

TABLE D-5
DEPENDENT VARIABLE GY
(with RI_{t-1} , without FIS)

Independent Variable	Estimated Coefficient	T-Statistic
C	-174.75	-0.37 (e)
W_{t-1}	-1.87	-0.42 (e)
REX_{t-1}	-3.68	-0.81 (e)
T	0.09	0.40 (e)
REX_{t-1}	5.42	0.40 (e)
REX_{t-1}	-47.67	-3.80 (e)
VR_{t-2}	-0.32	-2.78 (a)
RW_{t-2}	0.14	2.29 (a)
RI_{t-1}	-4.23	-1.95 (a)

$R^2 = 0.3855$

F-Statistic (8, 17) = 3.00154 (a)

D.W. = 2.69

Sample Size: 26

Final value of rho = -0.68

TABLE D-6
DEPENDENT VARIABLE GY
(with RI_t , RI_{t-1} , without FIS)

Independent Variable	Estimated Coefficient	T-Statistic
C	-354.38	-0.63 (e)
W_{t-1}	-2.14	-0.47 (e)
REX_{t-1}	-3.37	-0.72 (e)
T	0.18	0.66 (e)
REX_{t-1}	0.42	0.02 (e)
REX_t	-45.98	-3.32 (a)
VR_{t-2}	-0.32	-2.68 (a)
RW_{t-2}	0.14	2.16 (a)
RI_t	-3.29	-1.22 (e)
RI_{t-1}	-1.55	-0.61 (e)

$R^2 = 0.3749$

F-Statistic (9, 16) = 2.61115 (a)

D.W. = 2.7368

Sample Size: 26

Final value of rho = -0.68

TABLE D-7

DEPENDENT VARIABLE GY

(with RI_t , RI_{t-1} , RI_{t-2} , without FIS)

Independent Variable	Estimated Coefficient	T-Statistic
C	-950.09	-1.70 (a)
U_{t-1}	-2.73	-0.68 (a)
RE_{t-1}	3.23	0.64 (c)
T	0.49	1.72 (b)
RE_{t-1}	-10.68	-0.71 (c)
RE_t	-45.32	-3.93 (a)
U_{t-2}	-0.33	-3.11 (a)
RE_{t-2}	0.14	2.42 (a)
RI_t	-7.91	-2.34 (a)
RI_{t-1}	4.19	1.23 (c)
RI_{t-2}	-7.37	-2.26 (a)
$R^2 = 0.6979$		
F-Statistic (10, 15) = 3.46565 (a)		
D.W. = 2.7752		
Sample Size: 26		
Final value of rho = -0.71355		

TABLE D-8

DEPENDENT VARIABLE GY

(with RI_t , RI_{t-1} , RI_{t-2} , RI_{t-3} , without FIS)

Independent Variable	Estimated Coefficient	T-Statistic
C	-964.78	-1.23 (c)
U_{t-1}	-3.90	-0.83 (c)
RE_{t-1}	3.08	0.45 (c)
T	0.49	1.25 (c)
RE_{t-1}	-10.97	-0.58 (c)
RE_t	-45.38	-3.30 (a)
U_{t-2}	-0.34	-2.71 (a)
RE_{t-2}	0.14	1.40 (c)
RI_t	-7.80	-2.22 (a)
RI_{t-1}	4.19	0.94 (c)
RI_{t-2}	-7.45	-1.53 (b)
RI_{t-3}	0.12	0.02 (c)
$R^2 = 0.6996$		
F-Statistic (11, 13) = 2.70088 (a)		
D.W. = 2.7697		
Sample size: 25		
Final value of rho = -0.70846		

CHAPTER VI

SUMMARY AND CONCLUDING REMARKS

In this study federal regional policies were divided into those affecting the supply side (transforming policies) and those aimed at stimulating regional demand (compensating policies). Each has been employed by various governments to reduce disparities among regions of Canada.

The focus of the present work has been to evaluate the effectiveness of regional policies. In particular, the success of such policies in affecting the employment rate and the per-worker real income growth rate in the Newfoundland region was examined. The region was believed particularly appropriate for this purpose since its economic development potential was severely obstructed by both natural and man-made factors. The harshness of its climate and soils, coupled with geographic isolation and sparse population, have been formidable obstacles. Furthermore, its labor market is among the most heavily unionized in Canada and is known to be amongst the most inefficient. At the same time its natural resources, particularly hydro-electric capacity and offshore oil and gas, are among the most promising in Canada today. The region thus incorporates features of a most challenging regional policy testing ground.

The effectiveness of federal regional policies using Newfoundland data was evaluated by devising models considered to be appropriate to the region's peculiar characteristics. First, a basic model of the regional economy (Model I), a long-run dynamic growth model with constant returns to scale Cobb-Douglas production technology was introduced. With the model's features only three policy instruments under assumptions of full employment and constant participation rate can be incorporated. To extend the scope of the evaluation to more policies and incorporate the region's persistent, high unemployment rate, Model II was constructed. The model comprises seven policy instruments, the unemployment rate as an explained variable, and the consequences of the fixity of some of the region's natural resources for its production technology. The latter is assumed to be Cobb-Douglas, but displays decreasing returns to scale. The third model was constructed according to a C.E.S. production technology and incorporated the demand side of the regional economy, producing stronger theoretical and empirical results.

Models II and III were successfully tested on Newfoundland data and, as the estimation and accuracy measures reported in Chapter V indicate, a good deal of

confidence can be placed on the empirical results and their forecasting abilities. At the outset, it should be noted that to qualify the resulting evaluation knowledge of true policy goals of the federal government is required for a fair evaluation of the efficacy of such policies. The theoretical and empirical results of this study, however, have necessarily adopted a narrower scope, focussing on indicators of particular economic significance. It is only from this perspective that the following evaluations are made.

Policies of Regional Development Incentives Act (RDIA) of DREE (now DRIE) were not successful in increasing the employment rate in Newfoundland. The program's subsidies on labor, it was found, reduced the region's per-worker income growth rate and this rate did not respond to subsidies on capital.

Direct job creation programs - Winter Works Projects, Youth Canada Work Plan, Local Employment Assistance, Local Initiatives Program, and Canada Works Programs, etc. were found to reduce the region's rate of employment. It was also found that the per-worker income growth rate did not respond to job creation programs. All compensating policies, such as equalization payments and statutory subsidies, were found to reduce the region's employment rate, but left the rate of growth of income per worker unaffected.

It was also found that federal expenditures on infrastructure and other items - such as relocating small farmers, relocation of families from isolated fishing areas, Agricultural Rehabilitation and Development, Land Protection and Reclamation - to have no impact on the employment rate but a negative impact on the region's per-worker real income growth rate.

The generosity of unemployment insurance benefits was found to have no impact on the employment rate. It did, however, increase the per-worker real income growth.

An important problem of the region under study is its high rate of labor force unionization. This rate was found to reduce both the region's employment rate and the rate of growth of income per worker.

The empirical results also revealed that in the absence of all regional policies, real per-worker income growth rate rises through time, provided wage parity forces as well as the rate of labor force unionization are also kept constant.

7 A summary of the impact of policy instruments and other explanatory variables on the model's explained variables (the rate of employment and per-worker real income growth rate), contrasting the theoretical and empirical results, are presented in the following table.

TABLE 6-1

SUMMARY OF POLICY CONCLUSIONS AND OTHER EXPLANATORY VARIABLES

Policies and Other Explanatory Variables	Dependent Variables	Theoretical Predictions			Empirical Results
		Model I	Model II	Model III	
Compensating Policies FIS = real per-worker net (of taxes) government (all levels) expenditures	$\dot{y}$ = per-worker real income growth	N/A	(?)	(?)	Insignificant
	EM = employment rate	N/A	(-)	(+)	(-)
Transforming Policies a_1 = real per-worker federal government subsidy on labor a_2 = real per-worker federal government subsidy on capital a_3 = real per-worker federal government expenditure on direct job creation I = real per-worker federal government expenditure on items like infrastructure μ = an index for the generosity of unemployment insurance	$\dot{y}$ = per-worker real income growth	(?)	(?)	(?)	(-)
	EM = employment rate	N/A	(?)	(?)	Insignificant
	$\dot{y}$ = per-worker real income growth	(+)	(+)	(+)	Insignificant
	EM = employment rate	N/A	(+)	(+)	Insignificant
	$\dot{y}$ = per-worker real income growth	N/A	(-)	(-)	Insignificant
	EM = employment rate	N/A	(-)	(-)	(-)
	$\dot{y}$ = per-worker real income growth	(+)	(?)	(-)	(-)
	EM = employment rate	N/A	(?)	(-)	Insignificant
	$\dot{y}$ = per-worker real income growth	N/A	(-)	(-)	(+)
	EM = employment rate	N/A	(-)	(-)	Insignificant
Other Explanatory Variables UN = the percentage of labor force unionized W = the ratio of the wage rate in Newfoundland to the national average t = time	$\dot{y}$ = per-worker real income growth	N/A	(-)	(-)	(-)
	EM = employment rate	N/A	(-)	(-)	(-)
	$\dot{y}$ = per-worker real income growth	(-)	(-)	(-)	Insignificant
	EM = employment rate	N/A	(-)	(-)	(-)
	$\dot{y}$ = per-worker real income growth	(?)	(?)	(?)	(+)
	EM = employment rate	N/A	(?)	(?)	Insignificant

BIBLIOGRAPHY

- Anderson, F. J. (1976), "Demand Conditions and Supply Constraints in Regional Economic Growth", Journal of Regional Science, 16(2), pp. 213-224.
- Auld, D. A. L., L. Christofides, R. Swidinsky and D. A. Wilton (1979), "The Impact of the Anti-Inflation Board on Negotiated Wage Settlements", Canadian Journal of Economics, XII, No. 2 (May).
- Beckman, M. J. (1973), "The Isolated Region, A Model of Regional Growth", Regional and Urban Economics, 3(3), pp. 223-232.
- Bell, F. W. (1967), "An Econometric Forecasting Model For a Region", Journal of Regional Science, 7(2).
- Borts, G. H. (1960), "The Equalization of Returns and Regional Economic Growth", American Economic Review, L, pp. 317-347.
- Borts, G. H. and J. L. Stein (1964), Economic Growth in a Free Market (New York, Columbia University Press).
- Böventer, E. V. (1975), "Regional Growth Theory", Urban Studies, 12, pp. 1-29.
- Buckley, Helen and Eva Tihanyi (1967), "Canadian Policies for Rural Adjustment: A Study of the Economic Impact of ARDA, PFRA, and MMRA", Special Study No. 7, Ottawa, Economic Council of Canada.
- Careless, Anthony G. S. (1977), Initiative and Response (Montreal, McGill-Queen's University Press).
- Chamber's Encyclopaedia (1964), London, George Newnes Ltd.
- Collier's Encyclopedia (1970), New York, Crowell-Collier Educational Corp.
- Copithorne, L. W. (1981), Economic Theories for Small Marine Economics: An Interpretation for Newfoundland, Economic Council, Discussion Paper No. 196.
- Cox, Joseph C. and J. A. Johnson (1983), "The Impact of Federal Grants to Provincial Governments on Regional Incomes", Working Paper No. 83-15, McMaster University, (June).
- Courchene, Thomas J. (1978a), "The Transfer System and Regional Disparities: A Critique of Status Quo", Department of Economics, University of Western Ontario (mimeo).

- (1978b), "Avenues of Adjustment: The Transfer System and Regional Disparities", Canadian Confederation at the Crossroads: The Search for a Federal Provincial Balance, edited by Michael Walker, (Vancouver, The Fraser Institute).
- (1981), "A Market Perspective on Regional Disparities", Canadian Public Policy, 4, pp. 506-518.
- Daniels, Mark (1981), "The Birth and Shaping of Regional Policies", Policy Options, Vol. 2, No. 2 (May/June).
- Department of Regional Economic Expansion (DREE) Annual Publication (1969-1982).
- Department of Regional Economic Expansion (1979), Economic Development Prospects in Newfoundland, Government of Canada.
- Dixon, R. and A. P. Thirlwall (1975), "A Model of Regional Growth-Rate Differences on Kaldorian Lines", Oxford Economic Papers, Vol. 27, pp. 201-214.
- Economic Council of Canada (1976), Living Together.
- (1980), Newfoundland From Dependency to Self-Reliance, Hull, Supply and Services.
- (1982), Financing Confederation Today and Tomorrow.
- Eglington, Peter and Maris Uffelman (1984), An Economic Analysis of the Venture Development Project and Hibernia, Economic Council of Canada, Discussion Paper No. 261.
- Encyclopedia International (1964), New York, Grolier.
- Everyman's Encyclopedia (1967), New York, Encyclopedia Enterprises.
- Flatters, Frank R. (1981), "Productivity, Transfers and Employment: Government Policies and the Newfoundland Economy", Economic Council of Canada, Discussion Paper No. 191.
- Foster, M. (1977), "An Econometric Model of Nova Scotia" Canadian Journal of Regional Science, I.

Ghali, M. A., M. Akyama and J. Fujiwara (1978), "Factor Mobility and Regional Growth", The Review of Economics and Statistics, 60 (February), pp. 78-84.

----- (1981), "Models of Regional Growth, An Empirical Evaluation", Regional Science and Urban Economics, (11), pp. 175-190.

Glickman, N. J. (1971), "An Econometric Forecasting Model for the Philadelphia Region", Journal of Regional Science, 11, pp. 15-32.

----- (1977), Econometric Analysis of Regional Systems (New York, Academic Press).

Government of Canada, Federal-Provincial Programs and Activities, 1975-1981.

Government of Newfoundland and Labrador (1981a), Economic Impact of Future Offshore Petroleum Exploration, Joint report, Department of Development and Petroleum Directorate.

----- (1981b), Effects of the Federal Energy Policy on Offshore Newfoundland and Labrador, Petroleum Directorate, Special Report.

Gunderson, M. (1980), Labor Market Economics (Toronto, McGraw-Hill Ryerson Ltd.).

Hall, O. P. and J. A. Licari (1974), "Building Small Region Econometric Models: Extension of Glickman's Structure to Los Angeles", Journal of Regional Science, 14(3).

Hirschman, A. A. (1958), The Strategy of Economic Development (New Haven).

Johnston, J. (1972), Econometrics Methods, Second edition (New York, McGraw-Hill Kogakusha Ltd.).

Kaldor, N. (1970), "The Case for Regional Policies", Scottish Journal of Political Economy, 17, pp. 337-347.

Kmenta, J. (1971), Elements of Econometrics (New York, MacMillan Co.).

Kennedy, P. (1979), A Guide to Econometrics (Oxford, Martin Robertson).

- Keynes, J. M. (1936), The General Theory of Employment, Interest and Money (London, The MacMillan Press Ltd.).
- Kia, A. (1983), "Positive Rate of Return, Stationary Economy and Efficiency", Research Paper presented at the 1983 Meetings of the Canadian Economics Association held in Vancouver.
- Kia, A. (1985), "A Brief Review of the Development and Structure of the Equalization Program", Bank of Canada (mimeo).
- Klein, L. R. (1953), Textbook of Econometrics (Evanston, Row Peterson Co.).
- (1969), "The Specification of Regional Econometric Models", Papers, Regional Science Association, 23, pp. 105-115.
- Klein, L. R. and N. J. Glickman (1977), "Econometric Model-Building at the Regional Level", Regional Science and Urban Economics, 7. pp. 3-23.
- Koutsoyiannis, A. (1979), Theory of Econometrics, Second Edition (London, The MacMillan Press Ltd.).
- Kuch, P. J. and S. Sharis (1978), "Added- and Discouraged-Worker Effects in Canada, 1953-74", Canadian Journal of Economics, XI, No. 1 (February).
- Lande, P. S. and P. Gordon (1977), "Regional Growth in the United States: A Reexamination of the Neoclassical Model", Journal of Regional Science, 17(1), pp. 61-69.
- Lithwick, N. H. (1981), "Regional Policy: The Embodiment of Contradictions", How Ottawa Spends Your Tax Dollars: Federal Priorities, edited by G. Bruce Doren, (Toronto).
- (1982), "Canadian Regional Policy: Undisciplined Experimentation", The Canadian Journal of Regional Science, 2.
- Long, C. D. (1958), The Labor Force Under Changing Income and Employment. A Study By the National Bureau of Economic Research (Princeton, Princeton University Press).
- Marshall, Alfred (1920), Principles of Economics, Eighth Edition, (London, Lewis Reprint Ltd.).
- Matthews, R. (1977), "Canadian Regional Development Strategy: A Dependency Theory Perspective", Plan Canada, 17.

- (1979), "The Smallwood Legacy: The Development of Underdevelopment in Newfoundland 1949-1972", Journal of Canadian Studies, pp. 89-108.
- (1981), "Two Alternatives Explanations of the Problem of Regional Dependency in Canada", Canadian Public Policy, 2, pp. 268-283.
- McAllister, I. (1966), Newfoundland and Labrador, the First Fifteen Years of Confederation, Edited by R. I. McAllister, Dicks and Co. Ltd.
- (1982), "Review Article: Newfoundland: From Dependency to Self-Reliance", Canadian Public Policy - Analyse de politiques, winter.
- Miernyk, W. H. (1979), "A Note on Recent Regional Growth Theories", Journal of Regional Science, 19(3).
- Mitchell, C. L. and H. C. Fruk (1970), Government Programs of Assistance for Fishing, Craft Construction in Canada: An Economic Appraisal, Department of Fisheries and Forestry, Ottawa (June).
- Myrdal, G. (1957) (Economic Theory and Underdeveloped Regions (Duckworth)).
- Norrie, K. H. and M. B. Percy. (1981), "The Economics of a Separate West" in Pratt, L. and G. Stevenson (ed.), Western Separatism: The Myths, Realities and Dangers (Edmonton, Hurtig Publishers).
- (1982a), "Freight Rate Reform and Regional Burden: A General Equilibrium Analysis of Western Freight Proposals", University of Alberta (mimeo).
- (1982b), "Energy Price Increases, Economic Rents, and Industrial Structure in a Small Regional Economy", Economic Council, Discussion Paper No. 220.
- (1983), "Economic Rents, Province-Building and Interregional Adjustment: A Two-Region General Equilibrium Analysis", Economic Council, Discussion Paper No. 230.
- Olfart, M. R. (1977), "A Dynamic Regional Development Model Using A Simulation Approach", Canadian Journal of Regional Science, 1.

Ostry, S. and M. A. Zaidi (1979), Labor Economics in Canada, Third Edition, (Toronto, MacMillan of Canada).

Parliamentary Task Force on Federal-Provincial Fiscal Arrangements (1981), Fiscal Federalism in Canada, Canada, House of Commons.

Perroux, F. (1953), "Note sur la notion de pôle de croissance", Revue d'économie appliquée, pp. 306-320.

Pindyck, R. S. and D. L. Rubinfeld (1976), Econometric Models and Economic Forecasts, (Toronto, McGraw-Hill Book Company).

Pred, A. (1966), The Spatial Dynamics of U.S. Urban Industrial Growth, 1800-1914, (Cambridge, Mass., MIT Press).

Richardson, H. W. (1973), Regional Growth Theory, (London, The MacMillan Press Ltd.).

----- (1975), "Regional Growth Theory: A Reply to von Böventer", Urban Studies, 12, pp. 33-35.

Riddell, W. Craig (1980), "Unanticipated Inflation and Unemployment in Canada, Ontario and Newfoundland, Economic Council of Canada, Discussion Paper No. 182.

Savoie, Donald J. (1984), "The Toppling of DREE and Prospects For Regional Economic Development", Canadian Public Policy - Analyse de politiques, X, 3, pp. 328-337.

Smith, D. M. (1974), "Regional Growth: Interstate and Intersectoral Factor Reallocations", Review of Economics and Statistics, Vol. 56.

----- (1975), "Neoclassical Growth Models and Regional Growth in the U.S.", Journal of Regional Science.

Solow, R. M. (1956), "A Contribution to the Theory of Economic Growth", Quarterly Journal of Economics, 70, pp. 65-94.

Springate, David J. V. (1972), Regional Development Incentive Grants and Private Investment in Canada. A Ph.D. Dissertation. Harvard Graduate School of Business Administration.

Standing Senate Committee (1982), National Finance Report on Government Policy and Regional Development, Ottawa, (September).

Statistics Canada, Financial Statistics of the Government of Canada, Catalogue no. 68-211 (1954-1960).

-----, Federal Government Finance, Statistics of Canada, Catalogue no. 68-211 (1960-1982).

Swan, N. M. and P. J. E. Kovacs (1981), Empirical Testing on Newfoundland Data of a Theory of Regional Disparities, Economic Council of Canada, Ottawa, Supplies and Services.

Swan, T. (1956), "Economic Growth and Capital Accumulation", Economic Record, 35, pp. 334-361.

The Encyclopedia Americana (1973), (New York, American Corp.).

The New Encyclopaedia Britannica (1974), (Chicago, Encyclopaedia Britannica).

Thirsk, Wayne (1973), Regional Dimensions of Inflation and Unemployment, Prices and Incomes Commission, Information Canada, Ottawa.

Usher, Dan (1975), "Some Questions About the Regional Development Incentives Act", Canadian Public Policy, pp. 557-574.

Verdoorn, P. J. (1949), "Fattari Che Regolano Lo Sviluppo Della Produttivita Del Lavoro", L'Industria.

Wilby, Jonathan (1981), Revenue Implications of Offshore Oil Under Different Taxation and Profit-Sharing Regimes: The Case of Hibernia, Economic Council of Canada, Discussion Paper No. 197.

Woodfine, William J. (1983), "Regional Disparities - Once Again", Canadian Public Policy - Analyse de politiques, IX, 4, pp. 499-503.

Woodward, Robert S. (1974), "The Capital Bias of DREE Incentives", Canadian Journal of Economics.

Zusman, P. (1982), "Group Choice in an Agricultural Marketing Co-operative", Canadian Journal of Economics, No. 2 (May), pp. 220-234.

END

2 5 0 2 8 6

FIN

fin

o

o