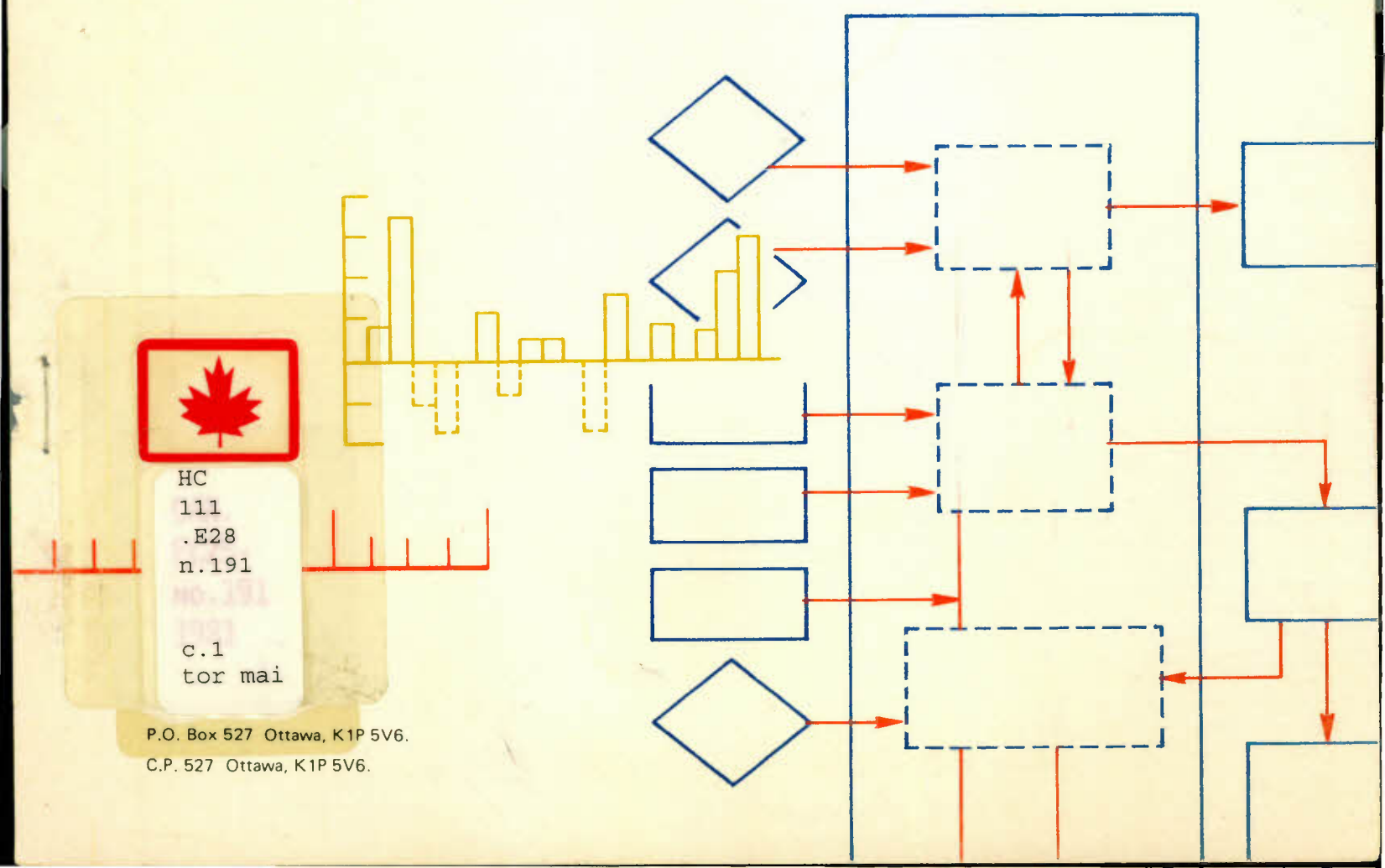
A paper prepared for the

Economic Council of Canada

[redacted]

Un document préparé pour le

Conseil économique du Canada



P.O. Box 527 Ottawa, K1P 5V6.
C.P. 527 Ottawa, K1P 5V6.

DISCUSSION PAPER NO. 191

Productivity, Transfers and Employment; Government Policies and the Newfoundland Economy

by Frank R. Flatters

in collaboration with Robin Boadway, Russell Krelove and Patricia Smith

The findings of this Discussion Paper are the personal responsibility of the author and, as such, have not been endorsed by Members of the Economic Council of Canada.

Discussion Papers are working documents made available by the Economic Council of Canada, in limited number and in the language of preparation, to interested individuals for the benefit of their professional comments.

ISSN 0225-8013

March 1981

Acknowledgement

Research for this study began in June 1979 and the major part of the work was completed between that date and August 1980, while I was in residence at the Economic Council of Canada. The work was completed over the subsequent 16 months in a variety of locations including the University of Essex, the London School of Economics and Queen's University. While at the Economic Council I benefited from stimulating interactions with virtually all members of the staff of the Newfoundland Reference in both Ottawa and St. John's as well as other members of the Council's staff, and several officials in the Newfoundland government. I refrain from naming names for fearing of slighting someone who is overlooked.

The original draft of this study was much larger and was co-authored with Russell Krelove, now a Ph.D. candidate at Princeton University, and Patricia Smith, now at the Department of Fisheries in Ottawa. In addition, Chapter 3 is based on work done jointly with Robin Boadway of Queen's University. To make the manuscript more manageable, it was separated into several reports and what remains in this piece is the work for which I was primarily responsible in the original draft. Although I accept responsibility for all that is wrong with this study, I could not exclude Robin, Russell or Patricia, with whom I collaborated in this research, from a share of any credit the study might deserve.

Kingston, January 1981

Contents

Résumé

Limitée, mais très ouverte, l'économie terre-neuvienne a, avec les autres régions du pays, des liens importants qui touchent, entre autres, les marchés de biens (particulièrement celui des importations), les divers marchés du travail (par le biais des migrations et de la détermination des salaires), les marchés de capitaux (soit les investissements et les tranferts technologiques) et les gouvernements (un fort degré de transferts nets venant du gouvernement fédéral). L'économie de Terre-Neuve est aussi beaucoup plus "instable" que celle de plusieurs autres régions canadiennes. La plus importante manifestation des disparités régionales est le taux de chômage très élevé dans cette province.

Dans la présente étude, l'auteur décrit plusieurs modèles simples de mécanismes d'ajustement interrégional, fondés sur les caractéristiques générales de l'économie terre-neuvienne, et les utilise pour examiner la nature de l'environnement économique ainsi que l'efficacité de diverses politiques économiques qui pourraient être, ou qui ont déjà été, utilisées par les gouvernements afin de réduire les disparités entre la province de Terre-Neuve et les autres. Le premier de ces modèles (voir le chapitre 2) décrit comment les transferts et la croissance de la productivité influent de diverses façons sur l'emploi. La principale conclusion qui se dégage de cette analyse est qu'il ne faut pas compter sur les augmentations de productivité pour accroître l'emploi. Premièrement, le coût des gains de productivité (par le biais des immobilisations, d'une adoption accélérée de la technologie, des investissements dans la découverte de nouvelles méthodes de production) peut être très élevé et doit être comparé aux avantages éventuels. Deuxièmement, il n'est pas du tout évident que la croissance de la productivité aura l'effet voulu sur l'emploi. Si les nouvelles techniques ont tendance à faire économiser de la main-d'oeuvre (par exemple, les tronçonneuses dans le domaine de l'exploitation forestière ou les chalutiers de haute mer dans celui de la pêche), ou bien si elles sont appliquées dans le secteur des biens qui ne font pas l'objet d'échanges interrégionaux (par exemple, dans l'industrie de la construction ou la vente au détail), elles peuvent fort bien avoir pour effet de réduire l'emploi global. De plus, la technologie nouvelle peut contribuer à accroître les salaires de ceux qui ont déjà un emploi au moment de son adoption, ou, pire encore pour les Terre-Neuviens, accroître les profits des propriétaires étrangers de ressources de leur province. Troisièmement, même si l'emploi augmente, le chômage n'en baissera pas pour autant (il peut même s'accroître) si la création de nouveaux emplois contribue à réduire le taux d'émigration, à accroître l'immigration ou à

faire grimper les taux d'activité (voir le chapitre 3). Bien sûr, la croissance de la productivité peut constituer un avantage dans un sens plus général, mais il y a plusieurs raisons de croire qu'elle ne se manifestera pas, à Terre-Neuve, sous la forme d'une réduction du chômage.

L'auteur développe davantage, au chapitre 3, son argumentation sur le taux de chômage comme phénomène d'équilibre, en relation avec la rigidité ou la parité des salaires et les flux de transferts publics, afin de pouvoir évaluer le coût d'option social du travail à Terre-Neuve. Contrairement à certaines opinions courantes, l'existence de niveaux de chômage élevés à Terre-Neuve n'est pas interprétée comme pouvant prouver que le coût d'option social du travail y est moindre que le taux de salaire courant, et que l'emploi devrait être subventionné. Le coût d'option social du travail dépend non seulement des taux de chômage et de salaire dans la province, mais aussi de la façon dont réagissent les taux d'émigration face à la création de nouveaux emplois sur place, ainsi que des taux de salaire dans les régions de destination (et d'origine) des migrants terre-neuviens. Si la baisse de l'émigration ou la hausse de l'immigration, à Terre-Neuve, est suffisamment importante, comme elle pourrait l'être d'ailleurs, à cause surtout de l'existence actuelle d'importants transferts interrégionaux, le coût d'option du travail dépassera en fait le taux de salaire courant à Terre-Neuve. Par conséquent, à en juger par l'information disponible, l'argument en faveur du subventionnement des salaires à Terre-Neuve, fondé sur l'efficacité et appliqué particulièrement aux segments les plus mobiles de la population active, est véritablement très faible.

S'il était décidé, cependant, pour des raisons d'efficacité ou d'équité, de recourir à des politiques de déplacement de dépenses afin d'accroître l'emploi à Terre-Neuve, alors l'auteur soutient que la politique la meilleure ou la plus efficace sera une certaine forme de subventionnement des salaires ou de l'emploi. Dans la dernière partie du chapitre 3, il est question de certains aspects pratiques de la conception d'un tel programme, et, au chapitre 4, de diverses politiques de déplacement des dépenses. Certaines de ces politiques, déjà en vigueur à Terre-Neuve, ou devant l'être, sont analysées dans le but d'en dégager les effets. Ensuite, il est fait mention de toute l'étendue du gaspillage qui peut résulter de politiques inappropriées; il existe, d'après l'auteur, de grandes possibilités d'améliorer la performance économique de Terre-Neuve simplement grâce à certaines politiques importantes de réorientation des subventions (accompagnées de politiques fiscales). Il illustre ces points en donnant comme exemple les subventions au transport, les "taxes" sur l'exportation de l'énergie hydro-électrique, les subsides à l'industrie de la pêche et autres programmes de subventionnement d'industries particulières.

Abstract

Newfoundland has a small and very open economy with many important links with other regions of Canada. These links include goods markets (especially imports), labour markets (migration and wage rate determination), capital markets (investment and technology transfer) and governments (a high level of net transfers from the federal government). Her economy is also much more troubled than those of many other regions. The most important manifestation of regional disparities is the very high rate of unemployment in Newfoundland.

We construct several simple models of interregional adjustment mechanisms based on the general characteristics of the Newfoundland economy and use these to examine the nature of the economic environment and the effectiveness of various economic policies which might be or have been used by governments in order to reduce disparities between Newfoundland and other regions. The first of these models (Chapter 2) outlines some of the processes whereby transfers and productivity growth affect the level of employment. The major conclusion is that productivity improvements cannot be relied upon to raise employment levels. First, the cost of productivity improvements (through capital investment, speeding up adoption of technology, investment in the discovery of new production techniques) might be very high and must be weighed against any possible benefits. Second, it is not at all clear that productivity growth will have the desired effect on the level of employment. If the new technology has a labour-saving bias (e.g. chain saws in lumbering or deep-sea trawlers in the fishery) or if it is introduced in the non-traded goods sector (e.g. construction or retailing), it may well have the effect of reduding overall employment. Furthermore it may also have the effect of increasing the wages of those who are currently employed or, worse still from the viewpoint of Newfoundlanders, increasing the outflow of profits to foreign owners of Newfoundland's resources. Third, even if employment is increased this will not reduce unemployment (it might well increase it!) if the creation of new jobs reduces the rate of outmigration, leads to new inmigration or induces increases in labour force participation (see Chapter 3). While there is no doubt that productivity growth can be beneficial in a more general sense, there are many reasons to believe that it will not manifest itself in a reduction in Newfoundland's unemployment problem.

The view of the unemployment rate as an equilibrium phenomenon in conjunction with wage rigidity (or wage parity) and in flows of government transfers is developed further in Chapter 3 in order to explore the evaluation of the social opportunity cost

of labour in Newfoundland. Contrary to some popular views we argue that the existence of high levels of unemployment in Newfoundland is not sufficient to prove that the social opportunity cost of labour there is less than the market wage rate and that employment in Newfoundland should be subsidized. The social opportunity cost of labour depends not only on Newfoundland's unemployment and wage rates but also on the responsiveness of migration to new job creation in the province and on the wage rates in regions of destination (and source) of Newfoundland's migrants. If the decrease in migration from (or increase in immigration to) Newfoundland is sufficiently large, as it might well be especially in the presence of current high levels of interregional transfers, the opportunity cost of labour will actually exceed the market wage rate in Newfoundland. On the basis of available evidence the efficiency argument for wage subsidies in Newfoundland, especially for the more mobile segments of the labour force is very weak indeed.

If, however, it is decided on either efficiency or equity grounds to make use of expenditure switching policies to increase employment in Newfoundland, we argue that the first best or most efficient policy is some form of wage or employment subsidy. In the latter part of Chapter 3 we discuss some practical aspects related to the design of such a program, and in Chapter 4 we deal with other forms of expenditure switching policies and analyse the effects of some such policies which have been or are in effect in Newfoundland, or which have been proposed for the future. We illustrate the extent of waste that can be generated by inappropriate policies and argue that there is great scope for improvement in Newfoundland's economic performance simply through some major redirection of subsidy (and tax) policies. These points are illustrated with reference to transportation subsidies, "taxes" on exports of hydro electric energy, fisheries subsidies and other industry-specific subsidy programs.

CHAPTER 1

Introduction: The Newfoundland Economy

This study examines the role of governments in the economic environment of Newfoundland. In particular, we focus on policies aimed at the province's most serious economic problem, that of high unemployment. In this chapter we set the background for this analysis by providing a brief discussion of some salient features of the Newfoundland economy. Chapter 2 deals with the processes whereby transfers and productivity affect the level of employment in an economy such as Newfoundland's. Chapter 3 discusses the relationship between job creation, transfers and migration in order to provide guidelines for evaluating the social opportunity cost of labour and hence for implementing wage or employment subsidy programs. In Chapter 4 we discuss other types of expenditure switching measures in the context of the interregional adjustment mechanism and make some observations about several particular fiscal measures employed in Newfoundland. The final chapter draws some conclusions.

Newfoundland is a small open economy with very close links with the Canadian and the international economy. Although detailed trade data are not collected for provincial economies, we can present a fairly clear picture of the structure of the province's trade and production. Newfoundland is heavily dependent on extra-provincial markets for the purchase of goods and services

for use in the province and for the sales of locally produced goods and services. Only 22 per cent of shipments of manufactured goods from Newfoundland establishments were destined for use within the province in 1974.[2] (The average figure for all Canadian provinces was 52 per cent.)[3] Roughly 45 per cent of provincial GDP over the period 1972-76 was exported.[4] Over the same time period about 84 per cent of exports from Newfoundland's major industries came from fishing products (about 16 per cent), metallic and non-metallic minerals (about 50 per cent), and pulp and paper (about 18 per cent). More than one-third of the remaining 16 per cent of exports can be accounted for by electrical energy.[5] While exports are about 45 per cent of provincial GDP in value, the major exporting industries (fisheries, forestry, mining, hydro) directly account for only 16 per cent of total employment.[6] Since the value of exports includes the value of imported intermediate inputs used in their production, it might not be strictly appropriate to compare them with GDP. Rather, we should be looking at value added in exports. It is estimated[7] that the major exporting industries' (defined as above) value added in 1976 was about 30 per cent of provincial GDP.[8] This still indicates that the export industries are much less labour intensive than is provincial production as a whole. The most labour intensive of the export sectors is fishing (including processing) whose value added was five per cent of GDP and which accounted for eight per cent of total employment. The next most labour intensive was the forestry sector (including processing) which accounted for

five per cent of GDP and three per cent of employment.[9] Almost the entire amount -- 78 per cent -- of Newfoundland's exports is shipped to markets outside of Canada, with over 60 per cent of exports of paper, non-ferrous minerals and fish products going to the U.S., U.K. and West Germany alone (83 per cent in the case of fish products).[10] Iron ore, representing 85 per cent of mineral production in Newfoundland,[11] is exported almost entirely to the U.S.

With a massive inflow of transfers from the rest of Canada, Newfoundland runs a substantial merchandise account deficit with the outside world. In addition, an inflow of capital allows the province to run a deficit on the entire capital account. In 1976, for instance, with a provincial GDP of $2,513 million, Newfoundland had a net export deficit estimated to be in the order of $1,001 million.[12] Over the period 1975-76 Newfoundland's net export deficit averaged 46 per cent of her GDP.[13]

Newfoundland's production structure is divided largely into two types of goods: those destined primarily for markets outside of the province and those destined almost entirely for intra-provincial markets. Very few goods in the latter category are imported as well. Some examples of goods which are both imported and produced locally are a small amount of bakery products, some lumber products, and some agricultural products. The list of goods which are produced locally on the island and simultaneously imported from elsewhere to Labrador would be longer, and so this

discussion must be thought of as applying primarily to the island. The distinction between importables and non-tradeable goods is somewhat arbitrary since whether a good is actually imported or produced locally depends on the scale of the local market, transportation costs, etc. (as the Labrador example illustrates). However, given current cost structures, even with some allowance for possible future changes, it would appear that the import-competing sector is of rather minor importance in Newfoundland. Almost all resources which are not employed in the production of export goods are used in the production of non-tradeable (certainly non-traded) goods and services. These non-exporting construction, services and government sectors are more labour intensive than the export goods sector. While they account for at most 70 per cent of provincial GDP, they are responsible for at least 80 per cent of total employment.[14] Construction appears to be an exception to this factor intensity story -- it accounts for 14 per cent of GDP but only for seven per cent of employment.[15] Newfoundland's relative dependence on Canadian and foreign markets for imports is almost exactly the opposite of the case for exports -- 80 per cent of her imports come from other provinces in Canada and the remainder comes from foreign countries.[16] By this measure Newfoundland's reliance on other provinces for imports is greater than that of any other province. Her ratio of imports from other provinces to provincial GDP is second only to P.E.I.'s, and measured as the portion of total provincial imports which come from abroad, Newfoundland is first.[17] In 1974 Newfoundland's three main

Canadian sources of manufactured imports were Ontario, Quebec and New Brunswick, supplying 36, 26 and 10 per cent of such imports respectively.[18] The major supplying industries of manufactured imports from the rest of Canada are food and beverages, petroleum and coal products, metal fabricating, and transportation equipment. About 40 per cent of Newfoundland's foreign imports (1977) are crude materials, mostly crude petroleum for electricity generating, and end products make up about 29 per cent of direct foreign imports.[19]

Newfoundland's trade and production structure can be summarized rather briefly. Production is almost entirely in the form of export goods and non-tradeables; the export sector produces mostly crude and semi-processed natural-resource based products, and with the exception of fish products, is less labour intensive than the rest of the economy. Most of these export goods are shipped outside of Canada and virtually none are destined for use in Newfoundland. Almost all absorption of goods and services in the province is in the form of either locally produced non-traded goods and services or externally produced importables. The distribution of imports, especially in the retail sector, is an important component of activity in the non-tradeable sector. Due to large fiscal transfers from the rest of Canada and also to increasing net indebtedness of Newfoundlanders to the outside world, the value of imports exceeds the value of exports by a significant amount. Since the prices of most of Newfoundland's imports and exports are determined in markets outside of Canada

and since the province is integrated with the Canadian financial system, the local prices it faces for tradeable goods are dependent on the foreign exchange value of the Canadian dollar.

It is not only through goods markets that Newfoundland's economy is closely tied with Canada and the outside world. The labour markets in particular are also linked in several ways with those outside. One channel is through migration. Newfoundland receives very few migrants from other countries; but each year the province gains many migrants from other parts of Canada and loses a large number of residents either temporarily or permanently through migration. Newfoundland traditionally has had the highest rate of natural increase of population of all Canadian provinces, but at the same time has had large per capita inflows of migrants from other provinces and outflows of emigrants to other provinces and countries.[20] To give some idea of the order of magnitude of the migration flows, since the mid-1960s the gross inflows and outflows of migrants have, on average, exceeded the net natural population increase.[21] In all years for which we have records total net migration has been negative -- Newfoundland has been a net loser of population through migration. In the 1970s, however, this net flow has reduced to a small trickle. The net effect of migration plus natural increase has been to leave Newfoundland with a rather high rate of population growth -- exceeded since 1961 only by Quebec, Ontario, Alberta and British Columbia, and since 1966 only by the latter three.[22] This in turn has been reflected

in labour force and employment growth. Due to rising participation rates and to net international immigration, employment in Canada has generally tended to grow more rapidly than population. This has been partially offset in Newfoundland by the fact that the province has had a net population loss through migration[23] and her rate of employment growth has been fifth among Canadian provinces since 1961[24] (as compared with her ranking of fourth in population growth).

The large size of the gross flows into and out of Newfoundland indicates that interprovincial migration cannot be ignored as a major source of labour market adjustment in the province. The Newfoundland labour force is highly mobile and, to the extent that migration decisions are sensitive to economic factors such as wage levels, job opportunities and interprovincial fiscal differences, migration will ensure that some relationship between these variables will be maintained between provinces. Migration is not the only link between the labour markets of Newfoundland and other provinces. Other links include membership in national (and international) unions, federal government employment, provincial minimum wages and national labour market programs (unemployment insurance, manpower training, etc.), all of which might tend to exert influences on local labour markets which are independent of local conditions. National unions often bargain for wage increases and fringe benefits which contain at least some elements of uniformity across regions, and even local unions will often base wage demands on comparable national wage levels.

The federal government, which had 8,618 civilian employees in Newfoundland in 1976,[25] pays uniform national wages for all but about seventeen per cent of its employees (Crown Corporations excluded)[26], and local labour market conditions are only one (and possibly a minor one) of many factors determining provincial minimum wage levels. All of these forces produce a significant amount of rigidity of provincial wage rates in response to local labour market conditions. In fact, over the period 1961-73, while Newfoundland had the highest of all provincial unemployment rates, she had the second highest rate of increase of wage rates (adjusted for provincial variations in employment structure).[27] Comparisons of average weekly earnings either in aggregate or in particular industries also show Newfoundland not to be obviously below the Canadian average.[28] In fact, in the metal mining and the pulp and paper industries, average weekly earnings seem to be higher in Newfoundland than in any other province.[29] What seems to be the case is that high levels of unemployment have not generated effective pressures on the supply side of the labour market to lower wages relative to the rest of Canada. Evidence from the Labour Market Comparison Study confirms that unemployed Newfoundlanders are no more willing to take a wage cut to secure employment than are Ontarians.[30] This means that the major part of the burden of adjustment of labour markets in Newfoundland must be borne by unemployment and by labour supply, especially in the form of migration and labour force participation.

A description of the structure of Newfoundland's small open economy would be incomplete without some reference to capital markets and the public sector. Very little information is available concerning private capital flows between Newfoundland and other parts of Canada and the rest of the world; but there can be little doubt that Newfoundland is very small and very open in this regard. In the public sector, there are substantial financial flows between Newfoundland and the rest of Canada. These flows are largely in the form of taxes and transfers, to both governments and individuals, and to a smaller extent in the form of government expenditures on goods and services. In addition, the government of Newfoundland has built up a sizeable public debt,[31] a large part of which is almost certainly held outside of the province.

As is the case with most other low income provinces, the relative size of the public sector in Newfoundland is larger than the national average. In 1976, for instance, the ratio of government (excluding proprietary Crown Corporations) current expenditures plus capital formation and change in inventories to GPE was 31.4 per cent about 8 percentage points above the national average for all provinces. When the definition of government spending is broadened by the inclusion of transfers to persons, subsidies and interest on the public debt, this proportion (in

1977) becomes 74.9 per cent of Newfoundland's GPE as compared with a national average of 40.2 per cent. As Table 1 indicates, the importance of governments has grown considerably in recent years.

The federal government has run a large and rapidly growing net deficit with respect to its activities in Newfoundland. (See Table 2). The deficit in 1977 was almost one billion dollars -- a transfer of about $1,770 per resident of Newfoundland, or 36 per cent of GPE. This transfer finances a large portion of Newfoundland's net trade deficit (about 80 per cent of it in 1976). The province's relatively large dependence on transfers is manifested in transfers both to persons and to governments. Almost one-half ($461 million) of net federal transfers to Newfoundland in 1977 were to persons. While payments under the family allowance program were the most important single component of personal transfers in early "post-Confederation" years, unemployment insurance payments ($219 million in 1977) are now the largest. Direct federal transfers to persons accounted for 16.2 per cent of personal income in Newfoundland in 1977, an increase of 5.3 percentage points since 1962. On a per capita basis these transfers were about 1.5 times the Canadian average in 1977.

In a similar fashion, Table 3 shows that the Newfoundland government is about twice as dependent on federal transfers (measured as a proportion of provincial government revenues) as

Table 1

ROLE OF GOVERNMENTS IN THE PROVINCIAL ECONOMIES [TOTAL GOVERNMENT SPENDING (EXCLUDING INTERGOVERNMENTAL TRANSFERS) AS A PERCENT OF GDP]

Year	Newfoundland	Atlantic	Canada
1962	44.6	48.4	30.2
1967	57.7	54.6	32.3
1972	66.1	59.2	37.3
1977	74.9	70.6	40.2

Source: SC 13-213, Provincial Economic Accounts, 1962-1977.

Table 2

FEDERAL DEFICITS (SURPLUSES) AS A PERCENT OF GPE, 1961-1976 AND 1977

Year	Newfoundland	Atlantic	Canada
1961	21.7	22.2	1.0
1966	21.5	21.8	(0.4)
1971	25.8	22.2	0.2
1976	31.5	28.9	1.6
1977	36.1	32.4	3.4

Source: SC 13-213.

Table 3

FEDERAL TRANSFERS TO PROVINCIAL GOVERNMENTS AS A PERCENT OF PROVINCIAL REVENUES, 1961-1976 AND 1977

Year	Nfld	Atl	Que	Ont	M/S	Alta	BC	Total
1961	63.0	54.3	23.2	25.8	38.7	33.7	34.9	31.2
1966	56.4	50.2	20.5	16.2	28.9	19.4	15.3	22.0
1971	58.8	51.1	28.9	19.5	36	22.7	22.9	27.1
1976	48.7	49.4	23.9	22.7	27.8	14.3	23.7	24.9
1977	48.8	49.5	25.5	20.4	26.9	12.1	22.4	24.2

Source: SC 13-213.

all provinces combined; almost one-half of provincial revenues were in the form of federal transfers in 1977. The decline shown in this proportion since 1961 reflects changes in fiscal arrangements towards a greater use of transfers of tax points, and not a secular increase in the relative strength of the province's tax base. The most important source of federal transfers to the government of Newfoundland is the equalization program, which accounts for about 60 per cent of federal transfers to the provincial government in 1977.

With this descriptive material as a backdrop, we go on now to our discussion of government policies and the level of employment in Newfoundland. The next chapter deals with the possible effects of productivity improvement on provincial employment.

Notes

1 For a more general introduction to the Newfoundland economy and some of the policy issues the reader might refer to L. W. Copithorne, F. Flatters and P. Smith, "The Newfoundland Economy: An Introduction to the Issues." The current introduction focuses primarily on features of the Newfoundland economy not dealt with at sufficient length in the earlier monograph.

2 Statistics Canada, Destination of Shipments of Manufacturers, 1974, (Ottawa, 1978) Cat. No. 31-522 Occasional.

3 Ibid.

4 Export figures for this calculation are based on revisions of Brian Bursey's annual estimates of exports of major products (Table 3 in Statistical Appendix to Vol. II of A History of Economic Development in Newfoundland, first draft May 1979) GDP figures are from Provincial Economic Accounts.

5 These details on exports are based on Brian Bursey's revised estimates (ibid.). At current market prices, electricity exports would account for a much higher proportion of exports and exports would be a larger fraction of GNP. If we apply the Newfoundland government's 1978 Budget estimates of the market value of electricity (this estimate is conservative at current energy prices) to the 1976 export estimates (the most recent we have), we find that electricity exports to be over 40 per cent of total exports and exports to be 80 per cent of provincial GDP.

6 These are 1977 employment figures, obtained from Table 1, page 4 of Into the Eighties...A Blueprint for Development. Tourism accounts for another one per cent of employment. It should be noted that these employment figures are estimated in man-years or on an equivalent basis.

7 Ibid., Table 2, p. 5.

8 GDP figures from Provincial Economic Accounts and employment and value added from ...Blueprint..., Tables 1 and 2.

9 See footnote 7.

10 Government of Newfoundland and Labrador, "The Economy: A Mid-Year Review, 1978", p. 27. The 78 per cent figure is calculated from ...Shipments...1974, and is identical to Dick Zuker's estimate for 1966.

11 "...Blueprint...", p. 12.

12 Tables 1 and 2, Provincial Economic Accounts, 1961-1976 (12-213).

13 Calculated from figures in ibid.

14 Figures derived from Tables 1 and 2 of ...Blueprint...

15 Ibid.

16 Dick Zuker, "The Implications of the Pattern of Interregional Trade for Fiscal Policy in Canada," mimeo, June 1979, Table C.1.

17 Ibid.

18 Destination of shipments..., 13-522.

19 "...A Mid-Year Review...", p. 27.

20 See Table 3.19 of International and Interprovincial Migration in Canada 1961-62 to 1975-76 (StatCan 91-208) and Tables A.2 and A.11 of Historical Statistics of Newfoundland and Labrador. R. W. Boadway and A. G. Green, "The Economic Implications of Migration: The Case of Newfoundland," Economic Council of Canada Discussion Paper (forthcoming) provides a useful historical summary of migration in Newfoundland. See especially Chapter 1 of their study.

21 See footnote 16.

22 See Living Together, Table 4.1 and Copithorne, Flatters and Smith, Table 1.2.

23 Persons of labour force age are more heavily represented among migrants than among the total population. This differential is greater for Newfoundland than for any other province. See ...Migration... (91-208, July, 1977) Table A.1.

24 See L. Auer, Regional Disparities of Productivity and Growth in Canada (ECC, 1978) Table 4.5 and Copithorne and Smith, Table 1.7.

25 Revenue Canada Taxation, Taxation Statistics, 1976, (Ottawa, 1978), Table 9.

26 See memo by Paul Kovacs entitled Federal Employee Compensation Policy and Practice From a Regional Viewpoint, June 12, 1979.

27 See L. Auer, Regional Disparities of Productivity and Growth in Canada (ECC, 1978) Table 4.9, p. 80.

28 See Living Together Tables 4.6 and 4.7, pp. 44-5.

29 Ibid. These data apply to June, 1976.

30 See P. J. Kovacs, "Downwardly Sticky Wage Demands: Survey Measures and Analysis" (November 1979) for a summary and analysis of the evidence obtained from the survey.

31 As Russell Krelove has established in Chapter 4 of an earlier study [Flatters, Krelove and Smith (1979)]. Newfoundland's debt is not so much a problem in itself but rather as a symptom of major problems with past failures of the provincial government's development strategy. The real problem is that the province is saddled with paying off huge provincial investments (e.g. the Come-By-Chance oil refinery and the Labrador Linerboard Mill) which turned out to have no economic return and now have little or no book value. It is the asset rather than the debit side of the provincial balance sheet which is more informative.

32 Despite Newfoundland's generally low tax capacity, she still has a negative equalization entitlement with respect to three revenue sources -- forestry revenues, mineral revenues and water power rentals. This is due in part to the fact that the tax base is defined for equalization purposes as some measure of the volume of provincial output in the relevant sector. If for some reason the net market value (especially to Newfoundland) of this output is less than the national average, it might be argued that the formula is biased against Newfoundland. This is especially true in the case of hydro rentals, since it is the Quebec government, not Newfoundland, that collects the bulk of the rents from Churchill Falls power.

Chapter 2

Productivity and Employment in a Small Open Economy

A. Introduction

In this chapter we present a discussion of the relationship between productivity and employment growth in a dependent economy. Productivity improvement might be seen either as a goal in itself or as a means of raising incomes and employment. The Economic Council and many other economists and policy-makers in Canada have expressed great concern in recent years over the need for Canada to improve its competitive position through productivity improvement and unit-cost reductions.[1] This is a large part of what lies behind the current interest in a "science policy" or an "industrial strategy" for Canada. The argument has received similar emphasis in the Economic Council's work on regional economic disparities in Canada, and is one of the main focal points of the research of the Newfoundland Reference.[2] The question of the relationship between productivity and employment is clearly of general interest beyond the particular problems of the Newfoundland economy. However, we shall frame our analysis in such a manner as to be as relevant as possible to the Newfoundland situation.

There are many possible reasons for productivity (measured, say, as value added per worker) in one region to be lower than in

another, but the most important ones probably fall into three categories: (i) a lower quantity or quality of inputs (labour itself, capital equipment, managerial expertise, etc.); (ii) a smaller scale of operation which rules out the economic use of certain large scale techniques; (iii) unavailability of the "best" techniques, due maybe to simple ignorance of their existence or applicability, or else some sort of inability to discover or implement them. There is also the possibility that measured productivity differences are only statistical illusions caused by improper measurement techniques (e.g. excessive or inappropriate aggregation). Although we often see discussions of the benefits of productivity improvement (a subject to which we shall turn in a moment), it is more rare to discover an analysis of the feasibility, costs and net benefits of such improvements. For instance, it is difficult to imagine a productive activity in which output per worker could not be improved with the use of more skilled workers or more sophisticated capital equipment. However, higher quality workers and capital are also more costly. If the market system works tolerably well and if prices are not too badly distorted as measures of social opportunity costs, profit maximizing activity by producers will ensure that resources will be allocated between activities to roughly equalize the value of the marginal product of each between activities. There will be little, if any, net gain therefore from policies which reallocate resources in order to increase productivity in any particular endeavour. Similarly, subject to the limits imposed by the extent of the market, there

is at least a strong a priori case to be made that firms will operate at the scale of activity affording the least cost techniques available. Discovery of new techniques is, of course, a costly exercise as well. It should be emphasized, therefore, that productivity improvement has costs which ought to be weighed against the benefits that derive from it. In the absence of obvious market failures it might be more difficult than many persons imagine to find simple solutions to "problems" of low productivity.

Let us suppose for the moment, however, that the discovery of some new technique is costless, and let us examine one of the benefits of the resulting productivity improvement. It is alleged frequently that a major benefit of productivity improvement in a small open economy is that it will increase employment; such a prediction comes out of Neil Swan's model "Growth and Unemployment in Eastern Canada"[3] and has been a major influence in shaping the research of the Newfoundland Reference. The reasoning behind this "conventional hypothesis" is quite simple and appealing. A small open economy (e.g. Canada or one of its regions) faces fixed world prices in its import and export markets. Therefore any improvement in productivity (relative to the rest of the world) will make the economy "more competitive" and able to sell more of its goods in world markets; the subsequent increase in output will mean more employment. It is this conventional view of the relationship between productivity and employment which we scrutinize in this chapter.

We shall confine ourselves to productivity growth due to pure technical change and demonstrate first that neutral technical change in the production of traded goods does have the expected effect of increasing employment, but second, that technical change which has an overall labour saving bias, or which occurs in the non-traded goods sector, cannot be presumed to increase employment in a small open economy. Our model also shows the channels through which increases in transfers, improvements in the terms of trade and new resource discoveries all lead to increases in employment. While the model is meant to depict a small region such as Newfoundland, with a natural resource based export sector, an insignificant import competing manufacturing sector, a large (at least in terms of employment) non-traded goods sector, a highly elastic supply of capital (from outside the region) and rigid real wages, the reader (hopefully) would not be too badly mislead in applying the conclusions to the national economy. We also shall make some observations concerning the effects of changes in assumptions, particularly with respect to capital inflows and wage rates.

Part B is devoted to a presentation of the general model and the subsequent parts examine in turn the effects of productivity growth, transfers, the terms of trade and resource discoveries.

B. The Model

The production side of our model comprises two sectors, one producing export goods (X), and the other non-traded goods (N),

each under perfect competition and constant returns to scale.[4] The export goods sector uses inputs of labour (L), capital (K) and a regionally specific factor (F), representing natural resources; the non-traded goods sector uses only labour and capital. The price of the export good (p_X) and the rental price of capital (r) are assumed to be fixed in world markets (i.e. there is perfect interregional mobility of X and K). The real wage expressed in terms of the import goods (w/p_M) is assumed to be fixed for institutional reasons (unions, federal government employment practices, wage parity, etc.), and there is assumed to be an excess supply of labour at that wage.

Equilibrium on the production side of the model can be characterized by the following five equations:

$$(1) \quad a_{KX}r + a_{LX}w + a_{FX}f = p_X$$

$$(2) \quad a_{KN}r + a_{LN}w = p_N$$

$$(3) \quad a_{LX}X + a_{LN}N = L$$

$$(4) \quad a_{FX}X = F$$

$$(5) \quad a_{KX}X + a_{KN}N = K$$

where a_{ij} represents the amount of factor i demanded per unit of output in sector j at any given factor prices, w, r and f are the rental prices of labour, capital and resources, and X, N, L, F and K represent the amounts of export goods and non-traded goods produced, and of labour,

resources and capital employed.[5] The first two equations are the zero profit conditions -- price equals unit costs -- in each sector, and the third, fourth and fifth equations depict the demands for L, F and K.

The model is then closed by three more equations related to aggregate consumption:

$$(6) \quad N = N_D$$

$$(7) \quad \frac{N_D}{M} = g\left(\frac{P_M}{P_N}\right)$$

$$(8) \quad M = P_X X + T$$

Equation (6) states that the production of non-traded goods is equal to the local demand for them (N_D), and equation (7) says that the proportion in which expenditures are divided between non-traded goods and imports (M) depends on their relative prices. This form of the demand function implies, as well, unitary income elasticity of demand for both goods. The final equation is the region's balance of trade constraint: imports have to be paid for from the sale of exports or from transfer income (T). In the final equation the price of imports has been normalized to unity.

In order to perform comparative statics exercises with this model we shall have to differentiate all of the equations and derive relationships between rates of change of all of the variables. We shall concentrate initially on the production side of the model [equations (1) to (5)]. By totally differentiating these equations and rearranging terms we obtain:

$$(1)' \quad \theta_{FX} f^* = P_X^* - (\theta_{LX} a_{LX}^* + \theta_{FX} a_{FX}^* + \theta_{KX} a_{KX}^*)$$

$$(2)' \quad 0 = P_N^* - (\theta_{LN} a_{LN}^* + \theta_{KN} a_{KN}^*)$$

$$(3)' \quad \lambda_{LX} X^* + \lambda_{LN} N^* = L^* - (\lambda_{LX} a_{LT}^* + \lambda_{LN} a_{LN}^*)$$

$$(4)' \quad X^* = F^* - a_{FX}^*$$

$$(5)' \quad \lambda_{KX} X^* + \lambda_{KN} N^* = K^* - (\lambda_{KX} a_{KX}^* + \lambda_{KN} a_{KN}^*)$$

where an asterisk indicates the rate of change of a variable ($X^* \equiv \frac{dx}{x}$), θ_{ij} represents the share of factor i in the total cost of producing good j, and λij represents the proportion of the total amount of factor i employed in the production of good j. The assumption of fixed wages, capital rentals and import goods prices means $w^* = r^* = P_m^* = 0$. Export prices are also exogenous, but in order to examine the effects of terms of trade changes we shall not set P_X^* equal to zero. We shall assume that changes in resource utilization can come about either as a result of exogenous discoveries of new resources, represented by $\bar{F}^*$, or of induced resource "discoveries" due to increases in their rental values. If the elasticity of induced resource discoveries is given by η, we have $F^* = \bar{F}^* + \eta f^*$. To examine the effects of technical change, we decompose the changes in input-output coefficients into two components, one due to substitution of inputs in response to factor price changes and a second due to productivity improvement which decreases the amount of a factor employed per unit of output at any given factor price vector. In terms of our notation: $a_{ij}^* \equiv b_{ij}^* + c_{ij}^*$ where b_{ij}^* represents the change due to factor prices and c_{ij}^* that due to technological improvements. Making use of

this decomposition and of the fact that cost minimization by competitive firms implies

$$(9)\quad \theta_{Kj}b^*_{Kj} + \theta_{Lj}b^*_{Lj} + \theta_{Fj}b^*_{Fj} = 0, \quad j = N, X$$

and of the fact that $w^* = r^* = 0$ implies that $b^*_{LN} = b^*_{KN} = 0$, we can rewrite the five equations of change as:

$$(1)''\quad \theta_{FX}f^* = P^*_X + \Pi_X$$
$$(2)''\quad 0 = P^*_N + \Pi_N$$
$$(3)''\quad \lambda_{LX}X^* + \lambda_{LN}N^* = L^* - (\lambda_{LX}b^*_{LX}) - \Pi_L$$
$$(4)''\quad X^* = \bar{F}^* + \eta f^* - b^*_{FX} - \Pi_F$$
$$(5)''\quad \lambda_{KT}T^* + \lambda_{KN}N^* = K^* - \Pi_{KX}b^*_{KX} - \Pi_K$$

where: (a) Π_X and Π_N represent the proportionate cost reductions at initial factor prices due to technical change in the X and N sectors respectively, ($\Pi_X \equiv -(\theta_{LX}c^*_{LX} + \theta_{FX}c^*_{FX} + \theta_{KX}c^*_{KX}) > 0$ and $\Pi_N = -(\theta_{LN}c^*_{LN} + \theta_{KN}c^*_{KN}) > 0$ for technological improvement); (b) Π_L, Π_K and Π_F represent the overall changes in the demand for L, K and F respectively due to technical change in both industries at given factor prices ($\Pi_L \equiv \lambda_{LX}c^*_{LX} + \lambda_{LN}c^*_{LN}$; $\Pi_K \equiv \lambda_{KX}c^*_{KX} + \lambda_{KN}c^*_{KN}$; $\Pi_F = c^*_{FX}$); (c) the terms $\lambda_{LX}b^*_{LX}$, $\lambda_{KX}b^*_{KX}$ and b^*_{FX} represent the changes in demand for L, K and F respectively due to a change in relative factor prices with a given technology.

By definition of various partial elasticities of substitution we have the following expressions for factor price induced changes in input-output coefficients:[6]

$$b^*_{KX} - b^*_{LK} = - \sigma_{KLX} f^*$$

$$(10) \quad b^*_{FX} - b^*_{LX} = - \sigma_{FLX} f^*$$

$$b^*_{KX} - b^*_{FX} = (\sigma_{FLX} - \sigma_{KLX}) f^* \equiv \sigma_{KFX} f^*$$

Making use of these expressions as well as the condition (arising from cost minimization) that the factor share weighted average of factor price induced changes in input coefficients is zero in the traded goods sector:

$$\theta_{KX} b^*_{KX} + \theta_{LX} b^*_{LX} + \theta_{FX} b^*_{FX} = 0$$

we solve for each b^*_{ij}:

$$b^*_{LX} = (\theta_{KX} \sigma_{KLX} + \theta_{FX} \sigma_{FLX}) f^*$$

$$(11) \quad b^*_{KX} = - [(\theta_{LX} + \theta_{FX}) \sigma_{KLX} - \theta_{FX} \sigma_{FLX}] f^* = -[\theta_{LX} \sigma_{KLX} - \theta_{FX} \sigma_{KFX}] f^*$$

$$b^*_{FX} = - [(\theta_{KX} + \theta_{LX}) \sigma_{FLX} - \theta_{FX} \sigma_{KLX}] f^* = -[\theta_{LX} \sigma_{FLX} - \theta_{KX} \sigma_{KFX}] f^*$$

We then substitute these values into our five basic equations [(1)" to (5)"] to obtain:

$$(12) \quad \theta_{FX} f^* = P^*_X + \Pi_X$$

$$(13) \quad 0 = P^*_N + \Pi_N$$

$$(14) \quad \lambda_{LX} X^* + \lambda_{LN} N^* = L^* - \delta_L f^* - \Pi_L$$

$$(15) \quad X^* = \bar{F}^* + \eta f^* + \delta_F f^* - \Pi_F$$

$$(16) \quad \lambda_{KX} X^* + \lambda_{KN} N^* = K^* - \delta_K f^* - \Pi_K$$

where $\delta_L \equiv \lambda_{LX}(\theta_{KX}\sigma_{KLX} + \theta_{FX}\sigma_{FLX})$ and represents the percentage reduction in demand for L due to a one per cent fall in f (≥ 0 unless land and labour are strong complements);

$\delta_F \equiv \theta_{LX}\sigma_{FLX}+\theta_{KX}\sigma_{KFX}$ and represents the percentage fall in demand for F due to a one per cent rise in f (≥ 0); and

$\delta_K \equiv \lambda_{KX}(\theta_{FX}\sigma_{KFX} - \theta_{LX}\sigma_{KLX})$ and represents the percentage reduction in demand for K due to a one per cent fall in f, with a given technology (≥ 0 unless capital and land are strong complements).

These five equations represent the supply side of the economy and contain six endogenous variables: f^*, p_N^*, X^*, F^*, K^* and L^*. In order to close the system it will be necessary to turn to the demand side of the model. However, it is possible to provide some interpretation of the equations before completing the final step. The first equation (12) states that, with the real wage and the return to capital fixed any cost reduction due to technical change or any price increase in the export sector must be matched by an increase in the resource rent sufficient to leave unit costs equal to price. This rent increase will be larger the smaller is the cost share of the fixed factor in the traded goods sector. Algebraically, we have:

$$(12)' \quad f^* = (\Pi_X + P_X^*)/\theta_{FX}$$

The second equation (13) then shows that the price of the non-traded good is negatively related to the amount of technical

progress in that sector. Technical progress, by lowering costs (Π_N), will tend to lower the price. Substituting these solutions for f^* and P_N^* into the remaining three equations will reduce the number of equations and unknowns by two and will simplify the solution for the remaining unknowns when the demand side is introduced.

The equilibrium conditions on the demand side of the model were given in equations (6) to (8) above. To determine the relationship between rates of change of the variables we differentiate these equations and rearrange terms to obtain:

$$(17)\quad N^* = N_D^*$$

$$(18)\quad N_D^* - M^* = -\sigma_D P_N^*$$

$$(19)\quad M^* = \theta_{XM}(X^* + P_X^*) + \theta_{TM} T^*.$$

σ_D is the elasticity of substitution in consumption between N and M; θ_{XM} is the share of the import bill paid for by the sale of locally produced exports and θ_{TM} is the share paid for out of transfer receipts. It should be noted that (changes in) transfers could be either positive or negative and could be thought of as representing not only fiscal transfers between governments but also interregional factor payments, such as profits and rents transferred out of the region to owners of capital and resources who reside abroad. We have assumed once again that $P_M^* = 0$.

We are interested now in determining the effects of all of our exogenous variables on the demand for labour, or employment, in this economy. If we substitute the solutions for P_N^* and f^* from (12) and (13) into (14), (15), (16) and (18) and substitute N^* for N_D^* in (18), we will have five equations in the unknowns X^*, N^*, L^*, K^* and M^*. Since K^* appears only in (16) we also can ignore that equation for the moment. Solving for L^* from the remaining four equations yields the following general expression relating changes in employment to changes in each of the exogenous variables.

$$
\begin{aligned}
(20)\quad L^* = {} & (\Pi_L - (\lambda_{LX} + \theta_{XM}\,\lambda_{LN})\,\Pi_F) \\
& + \frac{(P_X^* + \Pi_X)}{\theta_{FX}}\,(\eta + \delta_L + (\lambda_{LX} + \theta_{XM}\lambda_{LN})\,\delta_F) \\
& + \sigma_D \Pi_N \lambda_{LN} + (\lambda_{LX} + \theta_{XM}\lambda_{LN})\,\bar{F}^* \\
& + \lambda_{LN}\theta_{XM}P_X^* + \lambda_{LN}\theta_{TM}T^*
\end{aligned}
$$

Before going on with a detailed analysis of the effects of technical change we shall first provide a brief interpretation of each of the terms in this expression.

The first three terms show the effects of technical change (Π_L, Π_F, Π_X, Π_N) on the overall demand for labour. The first term captures the overall factor saving bias of technical progress. Recall that Π_L and Π_F are both negative. What this term shows, then, is that if Π_L is sufficiently large in absolute value relative to Π_F, the factor saving bias of technical change

is labour saving and will reduce employment. On the other hand, if technical change has an overall resource (or capital) saving bias, this will tend to increase employment. The second term shows a factor price effect that arises from either technical progress or price increases in the export sector. Since either of these phenomena will cause a rise in resource rents (see equation (12)'), this will lead to both exploitation of new resources (the size of this effect depending on the magnitude of η) and a substitution of labour for resources in production of exports. Unless labour and resources are complements in production (making $\delta_L < 0$), both of these effects will tend to increase the demand for labour. If labour and resources are complements, then only the resource discovery effect will be positive and the pure substitution effect will tend to decrease employment. The third term is a demand, or expenditure switching effect resulting from technical change in the non-traded goods sector. To the extent that the consequent reduction in the price of non-traded goods tends to cause an increase in demand for and production of non-traded goods, this will tend to increase employment (abstracting from labour-saving effects captured in the first term of the equation).

The last three terms show the effects of exogenous resource discoveries, terms of trade improvements and transfers. A new resource discovery leads to an increase in export production (and employment) which also permits an increase in non-traded goods production, since not all of the consequent increase in incomes

is spent on imports. The last two terms show that an improvement in the terms of trade and an increase in transfers both cause an increase in employment through an income effect which increases the demand for non-traded goods. The increase in income will be proportional to the initial share of exports or transfers in paying for imports and the consequent increase in employment will depend on the labour intensity of the non-traded goods sector.

Following this brief description of the effects of all of the exogenous variables on employment, we now go on to provide a more detailed analysis of the effects of technical change.

C. Productivity Growth and Employment

It should be noted at the outset that when we discuss technical change which occurs in the region under discussion, it is really differential technical change between this region and the rest of the world. If technical change occurred uniformly across all regions, this would change some or all of our exogenous variables -- particularly the prices of traded goods and mobile factors of production. Since we are assuming all of these to be constant, the productivity improvement we analyze is that which occurs only in this particular region. In order to simplify the discussion of technical change, we shall assume initially that the terms of trade are constant, there are no exogenous resource discoveries and there are no transfers between this and other regions. Under these assumptions, equation (20) reduces to:

$$(21) \quad L^* = (\Pi_L - \Pi_F) + \frac{\Pi_X}{\theta_{FX}} (n + \delta_F + \delta_L) + \sigma_D \Pi_N \lambda_{LN}$$

The first term on the right side of (21), $\Pi_L - \Pi_F$, expresses the overall factor saving bias of productivity improvement in the two sectors. This will decrease the demand for labour if, and only if, the proportional reduction in labour requirements in the two sectors is greater than the proportional reduction in the demand for the fixed factor at the initial factor prices. By going back to the complete expressions for Π_L and Π_F, we can see that the necessary and sufficient condition for this effect to lead to a decline in the demand for labour is that $(\lambda_{LX} c^*_{LX} + \lambda_{LN} c^*_{LN}) - c^*_{FX} < 0$. This expression can be used to consider several special cases. First, with equal rates of Hicks neutral technical progress in both sectors ($c^*_{LX} = c^*_{FX} = c^*_{KX} = c^*_{LN} = c^*_{KN} < 0$), this effect leads to no changes in the demand for labour. With Hicks neutral technical progress in the export sector only, the change in demand for labour due to this differential factor effect is positive. Hicks neutral progress in the non-traded goods sector leads to a decrease in the demand for labour due to this effect. Purely labour-saving technical progress ($c^*_{Lj} < 0$, $c^*_{Fj} = 0$), whether it occurs in either or both sectors, decreases the aggregate demand for labour under this effect, purely fixed-factor saving technical change increases employment, and purely capital saving technical change occurring in either or both sectors causes no change in employment.

The second term represents a factor price effect. Recall that productivity improvement in the export sector raises the price of resources with the proportionate increase given by Π_T/θ_{FT}. This, in turn, will have two effects. The first will be to induce exploration and discovery of new resources (or utilization of previously unused resources) which will in turn lead to a proportionate increase in employment in the non-traded goods and export sectors. The magnitude of this effect will depend on the elasticity of supply of resources, η. The second effect will be to cause a substitution of labour for resources in the export sector, thus increasing the demand for labour by an amount depending on the degree of substitutability between the two factors in the economy at large. Of course, if labour and resources are complements rather than substitutes in aggregate, this effect will be negative. We shall assume, however, that they are substitutes (δ_F, $\delta_L \geq 0$) so that the factor price effect will be non-negative. In the case of either zero productivity improvement in the export sector, or fixed coefficients production functions in both sectors and zero supply elasticity of resources the factor price affect will disappear.[7]

The third term represents the demand effect, and can also be written more simply as $-\lambda_{LN}\sigma_D P_N^*$. Demand (and, hence, production) of non-traded goods will grow more rapidly the greater is the absolute size of p_N^* (i.e. the greater is the cost reduction due to technical change in the non-traded goods sector) and the greater is the elasticity of demand for these goods. The amount

by which the demand for labour grows varies with the labour intensity of this sector (λ_{LN}).

The net effect of productivity improvements on the demand for labour depends on the signs and magnitudes of all three terms on the right side of equation (21). The third term, representing the demand effect due to cost reduction in non-traded goods production will always be non-negative, as will the second term, the factor price effect due technical progress in the export sector only, if we assume (as we do) that labour and resources are substitutes in production in aggregate. The sign of the first term, the factor saving bias effect, is ambiguous. In order to give a sense of the sorts of results that are possible, equation (21) was examined for several different cases, depending on the nature and location of technical progress. The results are summarized in Table 1 where each cell represents a particular case and indicates either that we can predict unambiguously the sign of the change in employment ($L^*>0$) or else that the result is ambiguous due to differences in the signs of the three effects shown in equation (21): (1) the factor saving bias of technical change (the first term); (2) the factor price effect (the second term); and (3) the demand effect (the third term).[8] In none of the cases examined does our model predict that productivity growth must lead to a fall in employment. However, there are several cases where such an effect might occur. There are two forces which might lead to a fall in employment. First, neutral technical change in the non-traded goods sector reduces the

Table 1

Net Effect of Productivity Improvement on Employment

Nature of Technical Change	Sign of L*	Comments
(a) Hicks neutral, equal in both sectors	$L^* \geq 0$	FSB = 0
(b) Hicks neutral in X only	$L^* > 0$	DE = 0
(c) Hicks neutral in N only	$L^* \gtrless 0$ iff $\sigma_D \gtrless 1$	FPE = 0
(d) Pure L-saving, equal in both sectors	FSB < 0; FPE, DE ≥ 0	
(e) Pure L-saving in X only	FSB < 0; FPE ≥ 0; DE = 0	
(f) Pure L-saving in N only	FSB < 0; FPE ≥ 0; DE = 0	
(g) Pure non L-saving, equal in both sectors	$L^* > 0$	FSB > 0; FPE, DE ≥ 0
(h) Pure non L-saving in X only	$L^* > 0$	FSB > 0; FPE ≥ 0; DE=0; L* less than case (g)
(i) Pure K-saving in in N only	$L^* \geq 0$	FSB, FPE=0; DE ≥ 0; L* less than case (g)

FSB $\equiv$ factor saving bias effect $\equiv \Pi_L - \Pi_F$; FPB factor price effect $\equiv (\Pi_X/\theta_{FX})\ (\eta + \delta_F + \delta_L)$;
DE $\equiv$ demand effect $\equiv \sigma_D \Pi_N \lambda_{LN}$.

labour requirements per unit of output. Working against this is the increase in demand for (and output of) non-traded goods resulting from cost (and therefore price) reduction in this sector. If demand for non-traded goods is elastic, the demand effect will dominate and employment will rise. However, if demand is inelastic, the net effect will be a fall in employment. The absolute magnitude of the change in employment will be larger the greater is the portion of the economy's labour force employed in non-traded goods production (λ_{LN}). Second, if technical change in the economy has an overall labour saving bias, this might also lead to a fall in employment. Such a decrease in employment will be less likely the greater is the possibility of substituting labour for the resources or of discovering new resources as rents rise (if labour saving technical change is occurring in the export sector) or the greater is the elasticity of demand for non-traded goods (if labour saving progress is taking place in the non-traded goods sector).

We should return to our assumptions now in order to ensure that we have not "rigged" the model against the traditional hypothesis that productivity growth will raise employment. First examine the market for capital goods. To see the effect of the perfect capital mobility assumption we can go back to equation (16) to solve for the effects of technical change on K. The solution we obtain for K* is:

$$(22)\quad K^* = (\Pi_K - \Pi_F) + \frac{\Pi_X}{\theta_{FX}}\ (\eta + \delta_F + \delta_K) + \sigma_D \lambda_{KN} \Pi_N,$$

if we assume, as we did in deriving (21), that transfers are zero, the terms of trade are unchanging and there are no exogenous resource discoveries. This equation has a similar interpretation to (21). Consideration of all the cases of technical change examined for L* in Table 1 produces a similar table of results for K* (see Table 2). What this shows is that in all except one case (neutral technical change in the non-traded goods sector only) productivity increases lead to an inflow of capital. Since an inflow of capital will raise the marginal product of, and hence demand for, labour, this is one of the important links between technical progress and increases in employment. To the extent that there are any impediments to capital flows, we should expect to find increases in employment due to technical change less likely to occur -- i.e. our perfect capital mobility assumption biases the model in favour of the traditional hypothesis.

To determine the importance of this qualification to our results we constructed a similar model which had only a fixed factor and labour as inputs; by so doing we took the opposite extreme in which there are no interregional factor flows. In this case L and F are used in the production of X and N; otherwise the model is the same. The effect of technical change on the demand for labour in this model turns out to be given by:

$$(23)\quad L^* = (\Pi_L - \Pi_F) + \frac{\Pi_X}{\theta_{FX}}\,(\eta + \delta_F + \delta_L)$$

$$+ \sigma_D(\lambda_{FN} - \lambda_{LN})\,(\frac{\theta_{FN}}{\theta_{FX}})\,\Pi_X - \Pi_N).$$

As before, the first term represents the factor saving bias of technical change, the second is a factor price effect, and the third combines the effects of demand and differential factor intensities. Since resources are used in both sectors, the sign of P_N^* is ambiguous -- cost reduction caused by technical change tends to make it negative, while increases in f tend to make it positive. A fall in demand for labour due to this effect will occur if and only if there is either: (i) a sufficiently greater rate of technical change in non-traded goods production ($\theta_{FX}\Pi_N > \theta_{FN}\Pi_X$), causing by P_N to fall, and a relatively labour intensive export sector ($\lambda_{FN} < \lambda_{LN}$), causing the aggregate demand for labour to fall as production shifts from exports to non-traded goods production, or (ii) the opposite, a sufficiently greater rate of technical progress in export production ($\theta_{FX}\Pi_N < \theta_{FN}\Pi_X$) and a relatively labour intensive non-traded goods sector ($\lambda_{FN} < \lambda_{LN}$).

In this model relative factor intensities play a more important role and only one term in the labour demand solution (the factor price effect) is unambiguously non-negative (if we assume that capital and resources are not complements). Table 3, which is similar to Table 1 for our previous perfect capital mobility model, shows the effects of various types of technical change on

Table 2

Net Effect of Productivity Improvement on Demand for Capital

Nature of Technical Change	Sign of K*	Comments
(a) Hicks neutral, equal in both sectors	$K^* \geq 0$	FSB = 0; FPE, DE $\geq$ 0
(b) Hicks neutral in X only	$K^* > 0$	FSB $\geq$ 0; FPE $\geq$ 0; DE = 0
(c) Hicks neutral in N only	$K^* \gtrless 0$ iff $\sigma_D \gtrless 1$	FPE = 0
(d) Pure L-saving, equal in both sectors	$K^* \geq 0$	FSB = 0; FPE, DE $\geq$ 0
(e) Pure L-saving in X only	$K^* \geq 0$	FSB, DE = 0; FPE $\geq$ 0; K* less than case (d)
(f) Pure L-saving in N only	$K^* \geq 0$	FSB, FPE = 0; DE $\geq$ 0; K* less than case (d)
(g) Pure non L-saving, equal in both sectors	$K^* \geq 0$	FSB = 0; FPE, DE $\geq$ 0
(h) Pure non L-saving in X only	$K^* \geq 0$	FSB, DE = 0; FPE $\geq$ 0; K* less than case (g)
(i) Pure K-saving in in N only	$K^* \geq 0$	FSB, FPE = 0; DE $\geq$ 0; K* less than case (g)

FSB $\equiv$ factor saving bias effect $\equiv \Pi_K - \Pi_F$; FPE $\equiv$ factor price effect $\equiv (\Pi_X/\theta_{FX})\ (\eta + \delta_F + \delta_K)$;
DE $\equiv$ demand effect $\equiv \sigma_D \lambda_{KN} \Pi_N$.

the demand for labour. In eight of the eighteen cases shown, employment unambiguously rises, while in two cases it falls. In two other cases it is only the factor price effect that prevents employment from falling unambiguously. In the remaining six cases the factor saving bias and the demand/factor intensity effect work in opposite directions. If the elasticity of demand for non-traded goods and the elasticities of factor substitution and of supply of resources were zero or sufficiently low so that the demand/factor intensity or factor price effects were relatively insignificant, then four of these six cases would show a decline in employment. Once again, a fall in employment due to technical change appears to be more than a theoretical curiosity; in fact it appears to be more likely in the absence of capital mobility.

Let us turn finally to the labour market. Our model assumes a rigidity of real wages which persists in the face of productivity improvements and changes in the demand for labour. Productivity increases are capitalized in resource rents and do not affect real wages. While such an assumption is not entirely unreasonable for a region such as Newfoundland, we might consider briefly the implications of relaxing it. One possibility is that real wages respond in the usual way to variations in the excess supply of labour; an increase (decrease) in the demand for labour leads to a rise (fall) in real wages. Such a mechanism would not alter the sign of the change in demand for labour predicted by equation (21). Rather, it would serve only to dampen the

Table 3

Net Effect of Productivity Improvement on Employment in Model Without Capital Flows

Nature of Technical Change	Factor Intensity Assumption	
	N relatively L-intensive	N relatively F-intensive
(a) Hicks neutral, equal in both sectors	$L^* > 0$	$L^* > 0$
(b) Hicks neutral in X only	FSB, DE < 0; FPE > 0	$L^* > 0$
(c) Hicks neutral in N only	$L^* > 0$	$L^* < 0$
(d) Pure L-saving, equal in both sectors	FPE, DE > 0; FSB < 0	FPE, DE > 0; FSB < 0
(e) Pure L-saving in T only	FSB, DE < 0; FPE > 0	FSB < 0; FPE, DE > 0
(f) Pure L-saving in N only	FSB < 0; FPE $= 0$; DE > 0	$L^* < 0$
(g) Pure non L-saving, equal in both sectors	$L^* > 0$	$L^* > 0$
(h) Pure non L-saving in X only	FSB, FPE > 0; DE < 0	$L^* > 0$
(i) Pure K-saving in in N only	$L^* > 0$	FSB > 0; FPE $= 0$; DE < 0

FSB $\equiv$ factor saving bias effect $\equiv \Pi_L - \Pi_F$; FPE $\equiv$ factor price effect $\equiv (\Pi_X/\theta_{FX})\ (N + \delta_F + \delta_L)$;
DE $\equiv$ demand - factor intensity effect $\equiv \sigma_D(\lambda_{FN} - \lambda_{LN})\ \left(\frac{\theta_{FN}}{\theta_{FX}}\Pi_X - \Pi_N\right)$.

magnitude of any such changes. Another possibility, however, is that labour is successful in capturing at least a part of any productivity improvements immediately in the form of higher wages. Without working this out formally, it is clear that this would have the effect of decreasing (increasing) the size of any increase (decrease) in the demand for labour predicted by our model. Furthermore, there is the distinct possibility that in some cases where our model predicts an increase in the demand for labour, such a mechanism would produce a decrease. Once again, therefore, it would appear that our model has been biased in favour of the conventional hypothesis that productivity improvements lead to a rise in employment in a small open economy.

We turn finally to the examination of one last assumption. In deriving equation (21) showing the effects of productivity growth on employment we assumed that transfers were zero and did not change as a result of changes in productivity. In Newfoundland, of course, interregional tansfers are not zero. Suppose first of all that transfers are positive but unchanging. To determine the effect of productivity improvements on employment it will be necessary to return to the more general equation (20), but with the last three terms set equal to zero. It can be seen that we still have three effects to consider, and that the demand effect is unchanged by the existence of a constant level of transfers. However, in the terms representing the factor saving bias and the factor price effects the parameters Π_F and δ_F now have weights of

less than unity. This means that two of the terms that tend to cause an increase in employment have been reduced in magnitude. Consequently the factor price effect of technical change is reduced by transfers as is the factor saving bias effect. It is now more likely that the latter effect will be negative in fact. Therefore the existence of a constant inflow of transfers reduces the employment creating effects of technical improvements and makes a reduction in employment more likely.

The other possibility that must be considered once transfers have been introduced is that technical change will cause changes in the level of transfers. First, many government transfers are due to low income or employment levels in the province. If this is the case, productivity improvements which increased employment might reduce the inflow of transfers (and vice versa), or improvements which raised income levels would cause transfers to fall. Second, another component of transfers is the outflow (and any inflows) of profits and dividends to rentiers living outside of Newfoundland. As we have seen, productivity improvements often tend to increase the inflow of capital from the rest of the world, and, whenever they occur in the export sector, to cause an increase in resource rents. Any increase in the amount of "foreign" owned firms will undoubtedly lead to an increased outflow of profits and dividends from the province. Whether we look at government or private transfers, therefore, a strong case could be made for the argument that productivity improvements will cause a decrease in transfers flowing into the region. To

see the effect of this we can return to equation (20) with P* and $\bar{F}$* still set equal to zero, but with T* negative. As we saw before, changes in transfers tend to cause employment to vary in the same direction. Consequently this negative transfer effect of productivity improvements will tend to counteract any employment creating effects observed in the first three terms of equation (20) (or will tend to reinforce any employment decreasing effects). Whether this will be sufficient to overturn any of our previous predictions will depend on the precise nature of the links between productivity and transfers, and on the magnitudes of various parameters of the model. It is clear, however, that the neglect of the role of transfers in our analysis of the effect of technical change served to bias the argument against the possibility of reductions in employment.

D. Conclusions

We have constructed a stylized model of a region such as Newfoundland in order to examine the effects of productivity, transfers, resources and the terms of trade on employment. With rigid wages, perfect interregional capital mobility and a fixed level of transfers we have seen how productivity improvements, by lowering costs, enable the province to sell more of its goods locally and in external markets. This increase in output will tend to increase employment. Working against this, however, is the fact that productivity increases mean that less labour is required per unit of output. Therefore, if either demand for

Newfoundland's goods is sufficiently inelastic, which might well be the case for non-traded goods, or else if the overall factor saving bias of technical change is sufficiently labour saving, its output increasing effects will not be sufficient to counteract the reduction in unit labour requirements. In this case productivity improvements will tend to cause employment to fall rather than rise. We also have seen how productivity improvements in the export sector tend to put upward pressure on resource rents. To the extent that labour and capital are technological substitutes for resources in the production of exports, or to the extent that the supply of resources is elastic with respect to the rents they can earn, employment will tend to increase. We also have seen how the discovery of new resources, terms of trade improvements and increases in transfers have an aggregate income effect which causes an expansion of the non-traded goods sector and hence of employment. In addition, exogenous resource discoveries cause an increase in output and employment in the export sector and increases in export prices put upward pressure on rents with consequent factor substitution and resource supply effects which also tend to increase employment.

In the postwar period Newfoundland has experienced above average rates of productivity growth and massive net inflows of federal government transfers and yet the unemployment rate remains extremely high relative to the national average. We can offer several possible explanations of this, some deriving from our model and others from outside of it. We deal initially with

those suggested by the model. First, it is possible that productivity growth has had an aggregate labour saving bias (chain saws vs. hand saws in forestry, fish filleting machines and off-shore trawlers in fishing, etc.) and has also been occurring in the non-traded goods sector where demand is inelastic, or monopoly power has prevented prices from falling (new shopping malls). Second, productivity improvements might have induced a large outflow of profits and dividends -- a negative transfer effect. It probably would not be difficult to establish that firms in many of the important sectors of the Newfoundland economy are owned outside of the province, and it certainly is true that the provincial government uses taxes, royalties and other leasing arrangements to appropriate only an insignificant share of the resource rents accruing in the province. Third, productivity improvements and federal government transfers undoubtedly have had significant wage-increasing effects in Newfoundland. A large part of any gains from transfers and productivity growth have been captured in higher real wages rather than in increases in employment.

We turn finally to explanations from outside of our model. The model has ignored the supply side of the labour market; all we have assumed is that labour is homogeneous and that it is in excess supply at the going real wage rate. In order to understand what is happening to unemployment it is necessary to know more about labour supply. For instance, even if productivity improvements and transfers have been causing employment to grow,

this will not be sufficient to reduce unemployment if labour supply has been growing more rapidly. In fact, Newfoundland's net labour supply growth rate has been very high, despite the large amount of migration out of the province, due to two factors: first, a high rate of natural increase of the population, and second, a high rate of migration into the province from other parts of the country.[9] The labour supply cannot be viewed entirely independently of what is going on in the rest of the economy, however. While the birth rate might be considered to be largely independent of economic forces, this certainly is not true of migration. Migration decisions are at least in part based on economic factors and in particular will respond to changes in job opportunities and wage rates. In Chapter 3 below we present a model of such a process, and for the moment we will make only two observations on the subject. First, to the extent that transfers and productivity growth create new jobs in the province they might induce new migration into the province (or reduce the rate of outmigration), thus leaving the unemployment rate virtually unchanged. Similarly, wage increases due to productivity improvements and transfers might have a similar effect on migration and actually cause the unemployment rate to rise. Second, any jobs created by technical change or transfers might be more easily filled from outside the province than from within. This will be particularly true if the jobs are in remote regions of the province or require skills that are in more plentiful supply elsewhere.

The general conclusion, therefore, is quite simple. There is no general presumption that productivity improvements will increase employment in a province such as Newfoundland. And even if they and/or transfers do increase the number of jobs they will not necessarily increase employment of Newfoundlanders or reduce the province's unemployment rate.

Notes

1 See, for instance, ECC, Fifteenth Annual Review: A Time for Reason (Ottawa, 1978), Chapter 4 and references therein to other Council studies.

2 ECC, Living Together (Ottawa, 1977), Chapter 5; L. Auer, Regional Disparities of Productivity and Growth in Canada (Ottawa, 1979); F. Martin, N. Swan et al., The Interregional Diffusion of Innovations in Canada (Ottawa, 1979).

3 ECC Discussion Paper #105, February, 1978.

4 While Neil Swan's model (1978) has traded and non-traded goods appearing in a meaningful way on the demand side, they are indistinguishable in production -- the production side is a one sector model. His model also does not permit anything other than Hicks neutral technical change.

5 This method of representing the production side of such a general equilibrium model will be familiar to those who have read R. W. Jones, "The Structure of Simple General Equilibrium Models," Journal of Political Economy, December 1965. While both our model and the questions we ask are different than Jones', the method of analysis is quite similar. The reader who is befuddled by any of the intermediate steps in our analysis would do well to refer to Jones' now classic paper.

6 The partial elasticities of substitution in X are derived as:

$$\sigma_{KLX} \equiv \sigma_{KwX} + \sigma_{KrX};\ \sigma_{FLT} \equiv \sigma_{FwX} + \sigma_{FrX},$$

where:

$$\sigma_{KwX} \equiv \frac{\partial\left(\frac{K}{L}\right)_X}{\partial\left(\frac{w}{f}\right)} \cdot \frac{\left(\frac{w}{f}\right)}{\left(\frac{K}{L}\right)_X};\quad \sigma_{KrK} \equiv \frac{\partial\left(\frac{K}{L}\right)_X}{\partial\left(\frac{r}{f}\right)} \cdot \frac{\left(\frac{r}{f}\right)}{\left(\frac{K}{L}\right)_X};\quad \sigma_{FwX} \equiv \frac{\partial\left(\frac{F}{L}\right)_X}{\partial\left(\frac{w}{f}\right)} \cdot \frac{\left(\frac{w}{f}\right)}{\left(\frac{F}{L}\right)_X};$$

$$\sigma_{FrX} \equiv \frac{\partial\left(\frac{F}{L}\right)_X}{\partial\left(\frac{r}{f}\right)} \cdot \frac{\left(\frac{r}{f}\right)}{\left(\frac{F}{L}\right)_X}.$$

7 Suppose that technical change occurs in an industry in the traded goods sector that does not make use of any fixed factors. We might think, for instance, of an import-competing industry in which no production occurs before the change. If the change is sufficient to make the industry competitive with imports, production will commence and the local market will be served entirely by local production under our assumption that all factor prices except those of the fixed factor are constant. In the

presence of transportation costs there need be no danger that a small technical change would permit the new import-competing industry to supply external markets. Instead of a factor price effect, then, we would have an import substitution effect showing an increase in demand for labour proportional to the size of the local market and the labour intensity of the industry experiencing technical change. If the change occurred in an already existing import-competing industry there would be an increase in demand for labour due both to the factor substitution effect and to cost reductions which lead to an increase in local demand depending on the elasticity of demand for the good. The latter effect is similar to the demand effect for non-traded goods to be discussed next, as is the factor saving bias effect that also would occur (see above).

8 Ron Jones, in his "The Structure of Simple General Equilibrium Models," op. cit. refers to the first effect as a "differential factor effect" and the third as a "differential sector effect" of technical change.

9 See L. Copithorne, F. Flatters and P. Smith (1979) and R. W. Boadway and A. G. Green (1981) for details.

Chapter 3

Evaluating the Opportunity Cost of Labour: The Case for Regional Employment Policies[1]

In this chapter we deal with an issue of fundamental importance to regional economic policy decisions: what is the social opportunity cost of labour in a region experiencing chronically high levels of unemployment? The answer to this question will inform governments of the shadow price at which to evaluate labour costs when contemplating government projects in the region and it will determine whether there is an efficiency basis for special employment subsidies directed at the region. In a fully employed, undistorted market economy, the opportunity cost of any particular type of labour in any region is its market wage in that region, and there is no efficiency basis for regional employment subsidies. However, a common argument is that in the presence of high levels of unemployment in a region, any new employment simply will reduce the pool of the unemployed and not displace any other employment. In that case the social opportunity cost of labour is simply the value of leisure to the unemployed. It might even be less than that if excessive unemployment breeds crime, delinquency and other social problems which require the expenditure of society's resources for their treatment. Since the value of leisure is less than the market wage rate, so is the social opportunity cost of labour and it would be incorrect for governments to value additional labour requirements in government projects at the market wage. An

extreme version of this argument is that the value of leisure and hence the social opportunity cost of labour in a poor region is zero. Consequently, in determining, say, whether to decentralize a federal government department from a fully employed to a high unemployment region, a comparison of labour costs at going wages in the two regions would place a serious bias in favour of centralization according to this argument. There is a strong case for regional employment subsidies. A third view is that any new employment in a disadvantaged region simply slows down the rate of out-migration to more productive parts of the country. Therefore the social opportunity cost of labour in the poor region is unrelated to either the value of leisure or the wage rate in that region; rather it is given by the market wage rate in the rich region of the country (the destination of potential migrants from the poor region). If the wage rate in the rich region is greater than in the poor region, this calls for a tax on employment in the poor region. A fourth approach to determining the opportunity cost of labour might be termed the local fiscal approach. The idea here is to determine the externality associated with an extra employed person (and hence to be subtracted from the market wage rate in arriving at the social opportunity cost of labour) by calculating the net addition to provincial government revenues (or provincial government revenues plus federal transfer receipts by individuals) resulting from the existence of one more employed person.

In order to evaluate the merits of these different approaches to the determination of the social opportunity cost of labour we construct a general equilibrium model of a multi-regional economy in which one region suffers from high levels of unemployment and migration takes place between regions, at a cost. The unemployment is due to wage rigidity. Although the model is highly stylized, it is intended to be broadly in accordance with general descriptions of the Canadian regional economy and in particular with what we know about Newfoundland and its relations with the rest of Canada. The most novel features of the model are the incorporation of interregional transfers and of reverse migration (from rich to poor provinces). Both of these features, which are empirically important in Canada, turn out to be significant determinants of the opportunity cost of labour and have the effect of overturning many conventional views on the subject. Besides the question of regional employment subsidies, we also make some observations concerning optimal mobility programs. The emphasis throughout is on the efficiency of national labour markets.

The following section outlines the basic model and describes the method of analysis. Following that, shadow wage rates are derived under a variety of assumptions. A comparison of these shadow wage rates with market wages forms the basis for making judgements about appropriate employment policy (e.g. subsidies to firms) or shadow wage rates for project evaluation.

A A Two-Region Model with Costly Migration

The economy consists of two regions, R (rich) and P (poor). Each region is endowed with a given amount of labour at the outset of the period under analysis, $\bar{L}_r$ and $\bar{L}_p$. There is assumed to be some migration from P to R according to a mechanism described below, and the equilibrium labour supplies in the two regions are L_r and L_p. Thus,

$$L_r + L_p = \bar{L}_r + \bar{L}_p = L \qquad (1)$$

Because there will be unemployment in P we must distinguish between labour supply and labour demand. The latter is N_p. It is assumed that L_r is fully employed. Outputs in the two regions are labelled X_r and X_p which sell for prices p_r and p_p. The economy is taken to be a small open one so that output prices are fixed. For simplicity we normalize output prices to unity. The wage rates in the two regions are w_r and w_p.

Production in the two regions is given by the production functions:

$$X_r = f(L_r) \; ; \; f'(.) > 0 \; , \; f''(.) \leq 0 \qquad (2)$$

$$X_p = g(N_p) \; ; \; g'(.) > 0 \; , \; g''(.) \leq 0 \qquad (3)$$

We have suppressed all other arguments from the production function since they are inessential to our analysis. The above production functions allow for the fact that outputs produced in the two regions may differ owing to differences in resource bases or technologies. Firms maximize profits in competitive markets so that the usual marginal productivity conditions hold:

$$w_r = f'(L_r) \tag{4}$$

$$w_p = g'(N_p) \tag{5}$$

Per capita utility is assumed to be linear in incomes in the rich region. In the poor region individuals obtain utility from income when employed and from leisure when unemployed, both linear relations for simplicity. Furthermore, it is assumed that all workers are identical in P and have an equal probability of obtaining the existing jobs.[2] Per capita utility in R and expected utility in P may be written:

$$\bar{U}_r = w_r \tag{6}$$

$$EU_p = \frac{N_p}{L_p} w_p + (1-\frac{N_p}{L_p})h \tag{7}$$

where h is the value attached to leisure. Note that N/L_p is the probability of employment which we shall frequently denote by Π.

Let m be the cost of migration interpreted broadly to include both the actual cost of moving and the non-pecuniary advantages attached to the migrant's home region. Then, migration will occur until at the margin the following condition holds:[3]

$$U_r = EU_p + m$$

$$w_r = \frac{N_p}{L_p}(w_p - h) + h + m. \qquad (8)$$

In this section we are ignoring any government transfer programmes.

The simplest explanation for unemployment in such a model, and one that is commonly used in the literature, is rigid wages.[4] As we have seen in earlier chapters, this assumption does not seem to be inconsistent with the way in which labour markets work in Newfoundland. Let us suppose w_p is fixed at some level above the full employment level. Then,

$$w_p = \bar{w}_p \qquad (9)$$

The above conditions describe a labour market equilibrium in our economy. In particular, equations (1), (4), (5), (8), (9) may be solved for L_r, L_p, w_r, w_p and N_p. However, matters can be simplified by substituting all other equations into (8) to yield the single equation in L_r and N_p:

$$f'(L_r) = \frac{N_p}{\bar{L}_p + \bar{L}_r - L_r}(\bar{w}_p - h) + h + m \qquad (10)$$

In addition, with fixed $\bar{w}_p$, N_p can be determined from (5). Thus, we may regard (10) as determining a value for L_r given the values of the exogenous variables in the system ($\bar{L}_r$, $\bar{L}_p$, $\bar{w}_p$, h, m). It is the basic reduced form equilibrium condition of this model.

In order to aid in the understanding of the model and to give it a pseudo-dynamic flavour, we offer the following interpretation of it. During any time period the labour force which was in the economy at the beginning of the period allocates itself between the two regions until expected utility net of migration costs is equalized between regions. If there is an excess supply of labour in P at the beginning, this means that there will be migration from P to R until (8) (or (10)) is satisfied. At the beginning of the next period the initial endowments of labour will consist of the equilibrium allocations of the previous period plus the natural growth in the labour force in each region. We assume that natural growth relative to productivity in the poor region is sufficiently high that workers can gain by moving from P to R. Such migration will cause wages to fall in R and the unemployment rate to fall in P and will continue until condition (8) or (10)) holds again. In the subsequent analysis we shall enquire into the social opportunity cost of a government employment or job creation policy introduced at the beginning of the period being analyzed.

Before proceeding we will use (10) to determine the effects of changes in certain of the exogenous variables. The size of some of these effects will turn out to be of critical importance in determining the magnitude of the shadow wage rates in this economy. First, to determine the effect of a change in the wage rate in P we differentiate (10) with respect to $\bar{w}_p$, yielding:

$$\frac{\partial L_r}{\partial \bar{w}_p} = \frac{N_p + (\bar{w}_p - h)\ \partial N_p/\partial \bar{w}_p}{L_p f''(L_r) - (\bar{w}_p - h)\ N_p/L_p} \tag{11}$$

The denominator is negative and $\partial N_p/\partial \bar{w}_p < 0$. Thus,

$$\frac{\partial L_r}{\partial \bar{w}_p} \gtrless 0 \quad \text{as} \quad N_p + (\bar{w}_p - h)\ \frac{\partial N_p}{\partial \bar{w}_p} \lessgtr 0 \tag{12}$$

or

$$\frac{\bar{w}_p}{\bar{w}_p - h} \lessgtr \xi_{NP}$$

where ξ_{NP} is the elasticity of demand for labour in P. An increase in $\bar{w}_p$ has two opposing impact effects (i.e. before any migration response occurs): first, at a given unemployment rate an inrease in $\bar{w}_p$ makes P a more attractive place in which to work, and second, an increase in $\bar{w}_p$ causes unemployment to rise (or the demand for labour to fall), making P less attractive. For a sufficiently high elasticity of demand for labour, an increase in wages in P will cause migration to R to

rise. For this to occur the elasticity would have to exceed unity and exceed it by a greater amount the greater is the value of leisure (h) relative to wages in P. The smaller is the elasticity of demand for labour and the larger is the value of leisure in P the more likely is it that an increase in wages in P will decrease migration from P to R.

In a similar fashion we can determine the effects of changes in $\bar{L}_p$ and $\bar{L}_r$. In terms of our earlier interpretation of the model, these could be thought of as changes in the rate of labour force growth in the period under examination or as absorption of part of the labour force into the public sector into new government projects. Differentiation of (10) yields

$$\frac{\partial L_r}{\partial \bar{L}_p} = \frac{\partial L_r}{\partial \bar{L}_r} = \frac{\Pi\ (\bar{w}_p - h)}{\Pi(\bar{w}_p - h)\ -\ L_p f''(L_r)} \qquad (13)$$

Since $f''(L_r) \leq 0$ and labour market equilibrium in P requires that $\bar{w}_p - h > 0$, (13) implies that:

$$0 < \frac{\partial L_r}{\partial \bar{L}_p} = \frac{\partial L_r}{\partial \bar{L}_r} \leq 1. \qquad (14)$$

This result has a simple explanation. Since, with a fixed $\bar{w}_p$, employment in P is fixed, the immediate effect of, say, a

decrease in $\bar{L}_p$ is to decrease the unemployment rate in P. Since this raises expected utility in P relative to R, L_r must fall, causing an increase in the unemployment rate in P and the wage rate in R. Since w_r is rising, the unemployment rate in P will not rise to its initial level. A special case to which we shall refer often is that in which $f''(L_r) = 0$, i.e. region R is not operating under diminishing returns or the relevant changes in the labour force are sufficiently small relative to the size of R's initial supply of labour.[5] In this case $dw_r = 0$ and $\frac{\partial L_r}{\partial L_p} = 1$. We shall refer to this as the Harberger case. This means that if changes in migration from P to R do not affect wages in R, any exogenous change in P's labour force is matched by an equal change in migration and there is no effect on employment or unemployment in P. This case would seem to coincide with the third view of the effects of regional job creation programs put forward in the introduction to this chapter.

Similarly, a decrease in $\bar{L}_r$ is matched by a less than equal decrease in L_r and an increase in w_r and in the unemployment rate in P, unless $f''(L_r) = 0$ in which case $dL_r = d\bar{L}_r$, $dw_r = 0$ and P's unemployment rate is unchanged. An important point to note is that the change in L_r (and in all other endogenous variables) is the same regardless of the region in which the change in labour endowments occurs.[6]

A similar, but possibly more relevant question for the purposes of this chapter, concerns the effect of the creation of a new job in either region. The removal of one worker from the labour force in P is not equivalent to the creation of one new job at the going wage rate. The difference is that under our assumed expectations mechanism workers, in estimating the probability of employment in P, take into account the existence of any newly created jobs. Workers are assumed to behave as if all jobs, including new ones, are filled randomly from the labour force in the region.[7] Thus the creation of a new job in P will reduce migration from P to R by a greater amount than will a reduction of P's labour endowment by one member. This can be confirmed algebraically. The creation of a job in P is equivalent to an increase in employment in P, dN_p. If we differentiate the equilibrium condition (10) with respect to N_p holding all other exogenous variables constant we obtain:

$$\frac{\partial L_r}{\partial N_p} = \frac{(\bar{w}_p - h)}{L_p f''(L_r) - \Pi(\bar{w}_p - h)} \qquad (14)$$

$$= -\frac{1}{\Pi} \frac{\partial L_r}{\partial \bar{L}_p} \leq 0$$

where, as previously, $\Pi = N_p/L_p$ is the probability of getting a job in P. Note that if $f''(L_r) = 0$, then $\partial L_r/\partial N_p = 1/\Pi$. For every job created in P, $1/\Pi$ (>1) workers are induced not to migrate to R. This corresponds exactly to what might be termed the "Harberger model" used for determining shadow wages in less developed countries. If $f''(L_r) < 0$, then $-\partial L_r/\partial N_p < 1/\Pi$

and the reduction in migration is less than in the Harberger case. In either case, however, the creation of a job to which all workers feel they have potential access reduces emigration from P by a greater amount than does a reduction of P's labour endowment by one member. The higher the equilibrium unemployment rate in P, the greater is the number of workers, in addition to those who actually fill the newly created jobs, who will be induced to remain in P in expectation of employment as a result of any job creation programme. On the other hand, since there is assumed to be full employment in R, there is no difference between the effects of exogenous changes in the endowment of labour and in the number of jobs in that region, i.e. $\partial L_r/\partial L_r = \partial L_r/\partial N_r$.

The method of analysis is as follows. The shadow wage rate is the reduction in the value of the output of society including changes in the imputed value of leisure and any migration costs from reducing a region's labour endowment or bidding workers from the labour force to fill newly created jobs. A comparative static analysis based on equilibrium condition (10) is performed in order to establish the changes in output, leisure and migration costs resulting from such exogenous changes in each region. The shadow wage(s) thus derived for region P are compared with $\bar{w}_p$ to establish whether a <u>prima facie</u> case can be made for subsidizing labour usage in P. A similar analysis is conducted for region R in order to determine whether there is a

case for differential subsidization of labour between the two regions.[8]

B The Shadow Wage Rate in a Rigid Wage Model Without Transfers

The general expression for a change in social welfare from any comparative static change in this simple model is:

$$\begin{aligned} dW &= dX_r + dX_p + hd(L_p - N_p) - md(\bar{L}_p - L_p) \\ &= w_r dL_r + \bar{w}_p dN_p + hd(L_p - N_p) - md(\bar{L}_p - L_p) \end{aligned} \quad (15)$$

That is, output changes are valued at their unit prices; changes in leisure, $d(L_p - N_p)$, are valued at h; and changes in migration, $d(\bar{L}_p - L_p)$, are costed at m.[9] We shall use this general expression to obtain shadow wage rates for L_p and L_r.

B1. The Shadow Wage Rate in P

There are two alternative ways to view the shadow wage rate in P. The first is to derive the change in welfare resulting from an incremental change in the initial labour endowment in P ($d\bar{L}_p$). According to this view the shadow wage rate in P is the value (cost) to the economy of having one more (less) worker initially in P.[10] We shall term this the shadow price of

labour. The other method is to determine the change in social welfare from creating a job in P (dN_p). We shall call this the shadow price of a job. It will turn out that these two methods give different expressions for the shadow wage rate.[11] We shall discuss the appropriateness of these two for policy purposes below.

a) The Shadow Price of Labour. Imagine there being an incremental change in the original work force in P, $d\bar{L}_p$. The resulting effect on L_r is given by (13). Noting that X_p and N_p are unchanging, (15) can be written as:

$$dW = w_r dL_r + h(d\bar{L}_p - dL_r) - mdL_r \qquad (16)$$

The shadow price of labour in P, denoted s_{Lp}, is given by $dW/d\bar{L}_p$. It can be interpreted as the opportunity cost of hiring a worker on a project in P when the job created is not one which the workers fill by random selection as in the private sector jobs. The important point is that the existence of this new government job does not alter workers' perceptions of the probability of obtaining employment; their expectations are determined only by the number of previously existing jobs and the size of the region's labour force exclusive of those hired on the new project. From (16) we obtain:

$$s_{LP} = \frac{dW}{d\bar{L}_p} = (w_r - h - m)\frac{\partial L_r}{\partial \bar{L}_p} + h \qquad (17)$$

Alternatively we may write (17) as:

$$s_{LP} = (w_r - m) \frac{\partial L_r}{\partial \bar{L}_p} + h \frac{\partial L_p}{\partial \bar{L}_p} \qquad (18)$$

This shows that the shadow price of labour in P is a weighted average of (w_r-m) and h. The proportion of the project's labour force obtained by reducing migration from P to R $(\partial L_r/\partial L_p)$ has a social opportunity cost equal to the loss in production in R, w_r, less the saving in migration costs, m. Because of the fixed wage rate and hence the fixed employment (exclusive of the new project) in P the remaining proportion of the project's labour force $(\partial L_p/\partial \bar{L}_p)$ is drawn out of unemployment in P and thus has a social opportunity cost of h, the value of leisure.

What is the relative value of s_{LP}? First, an expression for w_r-m can be obtained by rearranging the equilibrium condition (8):

$$w_r - m = \Pi \bar{w}_p + (1-\Pi)h \qquad (19)$$

Thus, $w_r - m$ is a weighted average of $\bar{w}_p$ and h. Since $\bar{w}_p > h$, this implies $\bar{w}_p \geq (w_r-m) \geq h$. Therefore, we have from (18):

$$\bar{w}_p > w_r - m \geq s_{LP} \geq h \qquad (20)$$

This shows that the shadow price of labour in P is less than the market wage. The shadow wage to be used in project evaluation on projects which remove labour from the market sector would be less than the wage rate, implying the existence of a case for some amount of subsidization of labour use in P.

An explicit relation between s_{LP}, $\bar{w}_p$, and the employment rate in P can be obtained by substituting (19) into (17) to give:

$$s_{LP} = \Pi(\bar{w}_p - h) \frac{\partial L_r}{\partial \bar{L}_p} + h \qquad (21)$$

Now, by substituting (14) for $\partial L_r / \partial L_p$ we obtain:

$$s_{LP} = \frac{\left[\Pi(\bar{w}_p - h)\right]^2}{\Pi(\bar{w}_p - h) - f''(L_r) \cdot L_p} + h \qquad (22)$$

The argument for employment subsidies continues to hold in the Harberger case (i.e. when $f''(L_r) = 0$). In this case expression (22) becomes:

$$s_{LP} = \Pi \bar{w}_p + (1-\Pi)h \qquad (23)$$

and s_{LP} is shown to be a weighted average of $\bar{w}_p$ and h, the weights being the employment and unemployment rates in P respectively and $s_{LP} < \bar{w}_p$ (unless $\Pi=1$). This means, first of all, that a decrease in P's unemployment rate due, say, to an

increase in productivity with a given $\bar{w}_p$ raises the shadow price of labour P; i.e. as might be expected the shadow wage in P is negatively related to the unemployment rate. Suppose, however, that a change in the unemployment rate is brought about, not by a change in productivity, but rather by a change in the level of wages in P. From examination of (23) it would appear that the effect of this on s_{LP} is ambiguous; for a given π a wage decrease tends to lower s_{LP}, but a fall in $\bar{w}_p$ also tends to change unemployment in P, hence tending to raise or lower s_{LP}. What is the net effect of these two forces? Differentiation of (23) yields

$$\frac{\partial s_{LP}}{\partial \bar{w}_p} = \Pi + (\bar{w}_p - h) \frac{\partial \Pi}{\partial \bar{w}_p} \qquad (24)$$

Noting that $\partial L_p/\partial \bar{w}_p = -\partial L_r/\partial \bar{w}_p$, we can use (11) to solve for $\partial \Pi/\partial \bar{w}_p$ under the assumption that $f''(L_r) = 0$. We find that

$$\frac{\partial \Pi}{\partial \bar{w}_p} = - \frac{\Pi}{\bar{w}_p - h}$$

which we can substitute into (24) to discover that $\partial s_{Lp}/\partial \bar{w}_p = 0$; i.e. changes in the level of wages in P do not affect the shadow price of labour in P.

b) The Shadow Price of a Job. We consider here the opportunity cost of creating a new job in which a worker in P is hired at the going wage rate $\bar{w}_p$. The difference between the shadow price

of a job and the shadow price of labour arises from the assumption that workers, in estimating the probability of employment in P, take into account the existence of any newly created jobs. As we demonstrated previously (equation (14)), the creation of a job reduces migration from P to R by more than does the removal of a worker from the labour force in P.

The change in welfare from hiring a worker in the labour market to fill a newly created job is obtained from equation (15) as follows:

$$dW = (w_r - h - m)dL_r - hdN_p \qquad (25)$$

Notice that we have not included the value of the output created by the new job in the welfare change measure. We are concerned only with the opportunity cost of hiring a worker to fill the job. The shadow price of job creation, s_{JP}, is:

$$s_{JP} = \frac{dW}{dN_p} = -(w_r - h - m)\frac{\partial L_r}{\partial N_p} + h \qquad (26)$$

$$= (w_r - h - m)\frac{1}{\Pi}\frac{\partial L_r}{\partial \bar{L}_p} + h \geq s_{LP}$$

The "shadow price of a job" exceeds the "shadow price of labour" because of the greater reduction in migration from P to R in the case of job creation.

From the labour market equilibrium condition (8) notice that $(w_r - h - m) = \Pi(\bar{w}_p - h)$. Therefore (26) can be rewritten as:

$$s_{JP} = \bar{w}_p \frac{\partial L_r}{\partial \bar{L}_p} + h \frac{\partial L_p}{\partial \bar{L}_p} \qquad (27)$$

This shows s_{JP} to be a weighted average of $\bar{w}_p$ and h with the weights $\partial L_r/\partial \bar{L}_p$ and $\partial L_p/\partial \bar{L}_p$ respectively.

In the Harberger case in which $f''(L_r) = 0$, it will be recalled from our discussion of equation (13) that $\partial L_r/\partial \bar{L}_p = 1$ and $\partial L_p/\partial \bar{L}_p = 0$. Therefore in this case $s_{JP} = \bar{w}_p$ and no case can be made on efficiency grounds for subsidizing job creation in P. However, if $f''(L_r) < 0$, s_{JP} is less than $\bar{w}_p$ and a <u>prima facie</u> case can be made for subsidizing job creation in P.[12]

B2. <u>The Shadow Wage Rate in R</u>

No distinction need be made between the shadow price of labour and the shadow price of a job in R since no uncertainty or randomness is attached to employment in R. The opportunity cost of hiring a worker in R is the loss in welfare resulting from

removing a worker from the labour market in R. To derive the shadow wage in R we imagine changing the initial endowment of labour in R by $d\bar{L}_r$ while holding $\bar{L}_p$ constant. From (15) the change in societal welfare is:

$$dW = (w_r - h - m)dL_r + (h+m)d\bar{L}_r. \tag{28}$$

The shadow wage rate s_R is given by:

$$s_R = \frac{dW}{d\bar{L}_r} = (w_r - h - m)\frac{\partial L_r}{\partial \bar{L}_r} + h + m \tag{29}$$

where $\partial L_r/\partial \bar{L}_r$ is given by (13) and is less than or equal to 1. This might also be written in the following form:

$$s_R = w_r \frac{\partial L_r}{\partial \bar{L}_r} + (h+m)\frac{\partial L_p}{\partial \bar{L}_r} \tag{30}$$

that is, the shadow wage rate in R is a weighted average of w_r and $(h+m)$. The proportion of the labour force drawn from employment in R ($\partial L_r/\partial \bar{L}_r$) has an opportunity cost of w_r and the proportion drawn from increased migration from P to R ($\partial L_p/\partial \bar{L}_r$), has a social opportunity cost of $h+m$. (Recall that with $\bar{w}_p$ fixed, employment in P is unchanged so that any workers drawn from P ultimately result in a reduction in unemployment in P.)

From the equilibrium condition (8) we can infer that $\bar{w}_p > (w_r - m) > h$. Therefore $w_r > (h+m)$ and so from (30) $w_r \geq s_R \geq (h+m)$.
In the Harberger case $\partial L_r / \partial \bar{L}_r = 1$ so that $S_R = w_r$ and there is no case for interfering with labour markets in R. However, if $f''(L_R) < 0$ so that $\partial L_r / \partial \bar{L}_r < 1$, then the shadow wage rate is less than the market wage rate ($S_R < w_r$) and there is a case for subsidizing the employment of labour in R as well as in P.

3. Regional Employment Policies

In the above sections we have shown that if $f''(L_R) < 0$, there is a case for subsidizing the employment of labour in both R and P. This may be accomplished by evaluating projects using a shadow wage of s_R or by outright subsidies on the employment of labour. In the case in which $f''(L_R) = 0$ (the Harberger case) no interference with labour markets is called for except when we interpret the shadow wage rate as the shadow price of labour in P. If so, the shadow wage rate is less than w_p. However, there is no case for creating jobs on an equal footing with jobs already existing.

Suppose for the moment that $f''(L_R) < 0$ so that subsidization is called for in both regions. Let us investigate whether more effort should be made in P or in R. Note that by subtracting (18) and (27) respectively from (30) we obtain the following:

$$s_R - s_{LP} = m \tag{31}$$

$$s_R - s_{JP} = (w_r - \bar{w}_p) \frac{\partial L_r}{\partial \bar{L}_r} + m \frac{\partial L_p}{\partial \bar{L}_r} \tag{32}$$

If we assume that $w_r > \bar{w}_p$ (which is not implied by our analysis but which is the case in Canada), s_R exceeds the shadow wage in P regardless of which notion of the latter we use. Otherwise, however, we cannot say a priori whether s_R is greater or less than s_{JP}. (s_{JP} always exceeds s_{LP}.) With $w_r < \bar{w}_p$, s_R is more likely to exceed s_{JP} the smaller is the difference between w_r and $\bar{w}_p$, the greater are migration costs, m, and the smaller is the amount of migration induced by reduced population pressure in R (or increased labour force growth in P). But we cannot rule out the possibility that the shadow price of a job will be greater in P than in R.

In spite of this, however, we still can draw definite conclusions concerning the appropriate relative rates of subsidization of labour in the two regions implicit in the shadow prices derived. Consider first the relationship between s_R and the shadow price of labour in P, s_{LP}. Subtracting $\bar{w}_p$ from both sides of equation (8) and noting that $w_p = \bar{w}_p$ we obtain:

$$w_r - \bar{w}_p = -(\bar{w}_p - h)(1-\pi) + m \tag{33}$$

Using (31) this may be rewritten:

$$(w_r - s_r) - (\bar{w}_p - s_{LP}) = -(\bar{w}_p - h)(1-\Pi) < 0 \qquad (34)$$

This states that the per worker employment incentive should be higher in P than in R. In addition, if $\bar{w}_p < w_r$, the ad valorem employment incentive should also be greater in P than in R. Thus, in this simple model at least, a prima facie case can be made for special measures to encourage employment in the have-not region.[13]

This general prescription continues to hold in most cases when the shadow price of creating a job is used for the shadow wage rate in P even though s_{JP} exceeds s_{LP}. Subtracting $w_r - \bar{w}_p$ from both sides of equation (31) (and multiplying by -1) yields:

$$(w_r - s_r) - (\bar{w}_p - s_{JP}) = (w_r - \bar{w}_p - m)(1 - \partial L_r / \partial \bar{L}_p)$$

Using (33) for $(w_r - \bar{w}_p - m)$ this may be written:

$$(w_r - s_R) - (\bar{w}_p - s_{JP}) = -(1-\Pi)(\bar{w}_p - h)(1 - \partial L_r / \partial \bar{L}_p) \leq 0 \qquad (35)$$

If $f''(L_r) = 0$, so that $\delta L_r / \delta L_p = 1$, then, as we have shown above, no encouragement of employment is called for in either P or R since $w_r = s_R$ and $\bar{w}_p = s_{JP}$.

Otherwise, whenever $f''(L_r) < 0$ there is a case for subsidizing employment in both P and R, but the subsidy per job should be greater in P than R.[14] Thus, a case can be made for a regional employment policy when either of the notions of the shadow wage rate is used, provided that $f''(L_r) < 0$.

B4. Mobility Grants

Before introducing rudimentary transfer schemes into the model it is worth briefly investigating the appropriateness of another policy instrument -- mobility grants. Suppose migrants are granted a subsidy at the rate x to assist in the costs of migration. The labour market equilibrium condition may be written:

$$f'(L_r) = \frac{N_p}{(\bar{L} - L_r)} (\bar{w}_p - h) + h + m(1-x) \qquad (36)$$

Differentiating this equation with respect to x yields:

$$\frac{\partial L_r}{\partial x} = \frac{m}{N_p(w_p - h)/L^2_p - f''(L_r)} > 0 \qquad (37)$$

To evaluate the welfare change from mobility grants equation (15) in this case reduces to (assuming the subsidies are financed in a non-distortionary way):

$$dW = w_r dL_r + (h+m) dL_p \qquad (38)$$

Noting that $dL_r = - dL_p$ here with $\bar{L}$ unchanged the change in welfare from a change in x is:

$$\frac{dW}{dx} = (w_r - h - m) \frac{\partial L_r}{\partial x} \qquad (39)$$

since $w_r > (h+m)$ from (8), when $x = 0$, $dW/dx > 0$ so that a case can be made for introducing a mobility grant (in addition to subsidizing employment). The net effect of any induced migration from P to R is to reduce unemployment in P, at a social cost of h per migrant, increase migration costs by m per migrant, and increase output in R by w_r per migrant.

Of course, as the mobility grant is introduced, the shadow wage rate itself will be changed and so, consequently, will the appropriate employment subsidy. In general, the welfare impact of a mobility grant will depend on the regional employment policies being pursued and the optimal employment policy will depend on the level of mobility grants. Note, however, that when the optimal migration grant is being pursued, a case remains for subsidizing employment. The optimal mobility grant will make $dW/dx = 0$, or, from (39), $(w_r - h - m) = 0$ and similarly, from (26), $s_{JP} = h$. Therefore, both s_{LP} and s_{JP} are less than $\bar{w}_p$ and so employment should be subsidized in P. By the same token, in R, $s_R = h + m$ from (29) so that a case exists for subsidizing employment in R; but, as before, a greater subsidy is called for in P than in R.

C Shadow Wages and Government Transfers

The previous section presented an efficiency argument for employment subsidies or job creation programmes (when $f''(L_r) < 0$) which would have the effect of increasing employment in the poor region and reducing migration to the rich region. However, the case for such programs was weakened the greater was the consequent responsiveness of migration. Suppose now that the economy was characterized not only by a rigid wage in the poor region but also by interregional income transfers from R to P. It has been argued (Courchene 1970 and 1978) that such transfers to individuals and to governments in Canada have had profound effects on the interregional distribution of labour and on the process of adjustment of labour markets to economic shocks. Would such effects change the general policy prescriptions we have derived so far? We shall consider in this section the introduction to the model of very simple unemployment insurance and interregional income transfer schemes. It will turn out that our earlier policy conclusions are no longer unambiguous. Whether employment in P should be subsidized depends on the parameters of the system.

C1. Unemployment Insurance

First we consider the effects of a simple unemployment insurance program which provides benefits to the unemployed at a

rate b per worker and which is financed by a tax at a rate t per employed worker in both regions. Before examining the effects of such a program in detail, let us return to the expressions for the shadow wage rates. The expressions for s_{LP} and s_{JP}, the shadow price of labour and of a job respectively in P, are the same as those derived in the previous section. Since unemployment insurance is simply a transfer from the employed to the unemployed, it does not affect the derivation of the shadow wage rates. The shadow price of labour in P is a weighted average of (w_r-m) and h with the weights, shown in equation (18), $\partial L_r/\partial \bar{L}_p$ and $(1-\partial L_r/\partial \bar{L}_p)$ respectively. This does not mean that the unemployment insurance programme does not alter the actual value of s_{LP}. On the contrary, if, as we might expect, unemployment insurance program, by making P a more desirable place to reside at the margin, reduces L_r and hence raises w_r, this will tend to raise the shadow price of labour in P. Similarly, if unemployment insurance increases (decreases) $\partial L_r/\partial \bar{L}_p$, it correspondingly raises (reduces) the shadow price of labour. This is as we would expect; if unemployment insurance causes an increase in the responsiveness of migration, then any increase in employment (or decrease in the labour force) in P will cause a greater reduction in migration and hence the shadow price of labour will be higher. Similar observations hold for the shadow price of a job.

Under what conditions might the presence of unemployment insurance eliminate the case for encouraging employment in P? So long as $\partial L_r/\partial \bar{L} \leq 1$, it can be shown that $s_{LP} < \bar{w}_p$ and so by this criterion there is an efficiency argument for a wage or employment subsidy in P. To see this note that if $\partial \bar{L}_r/\partial \bar{L} \leq 1$, it follows from (18) that $s_{LP} \leq (w_r - m)$. In the presence of our unemployment insurance program the labour market equilibrium condition becomes:

$$f'(L_r) - t = \Pi \cdot (\bar{w}_p - t - h - b) + h + b + m, \qquad (40)$$

which can be rearranged to give:

$$(w_r - m - t) = \Pi(w_p - t) + (1-\Pi)(h+b) \qquad (41)$$

which implies in turn that $(w_r - m) < \bar{w}$. Therefore, $s_{LP} < \bar{w}_p$. On the other hand, if $\partial L_r/\partial \bar{L}_r > 1$, then $s_{LP} > (w_r - m)$ and it is possible that $s_{LP} > \bar{w}_p$. Consequently if it is possible for $\partial L_r/\partial \bar{L}$ to be greater than one under unemployment insurance, there is no general presumption regarding the desirability of regional employment subsidies in the presence of such a program.

Let us determine whether this is possible. If the unemployment insurance scheme is self-financing, then budget balance requires that:

$$t \cdot (L_r+N_p) = b \cdot (L_p-N_p) = b \cdot (\bar{L}_r+\bar{L}_p-L_r-N_p) \qquad (42)$$

For any given value of b, we can think of t as being determined from (42) for every given value of L_r, N_p, $\bar{L}_r$, $\bar{L}_p$.

Thus we write:

$$t = t(L_r, N_p, \bar{L}_r, \bar{L}_p) \qquad (43)$$

Suppose we define $t_1 = \partial t/\partial L_r$, etc. Then from (42):

$$t_1 = t_2 = -b\bar{L}/(L_r+N_p)^2 < 0$$

$$t_3 = t_4 = b/(L_r+N_p) > 0 \text{ and } \leq -t_1, -t_2 \qquad (44)$$

If the scheme obtains residual revenues from the central fisc rather than from the payroll tax, we can think of t and b as being parameters ($t_1 = t_2 = t_3 = t_4 = 0$). This will turn out to affect the shadow pricing rules significantly.

We now are in a position to find the determinants of the values of $\partial L_r/\partial \bar{L}_r$ and $\partial L_r/\partial \bar{L}_p$. Differentiation of the labour market equilibrium conditon (40) with respect to L_r and $\bar{L}_p$ (where t is given by (43) and b is exogenous) yields:

$$\frac{\partial L_r}{\partial \bar{L}_r} = \frac{\partial L_r}{\partial \bar{L}_p} = \frac{(\Pi/L_p)(\bar{w}_p-t-h-b) - t_3(1-\Pi)}{(\Pi/L_p)(\bar{w}_p-t-h-b) + t_1(1-\Pi) - f''(L_r)} \qquad (45)$$

Since $t_1 < 0$ and $t_3 > 0$, negative terms have been added to both the numerator and denominator. Furthermore, $|t_1| > t_3$. Since

$f''(L_r) \leq 0$, this means that we cannot determine a priori whether $\partial L_r/\partial \bar{L}_r$ exceeds or falls short of unity. In general this will depend on the relative magnitudes of $f''(\bar{L}_r)$ and b. If $f''(L_r) = 0$, then $\partial L_r/\partial \bar{L}_r \geq 1$. In general, the smaller in absolute value is $f''(L_r)$ the more likely it is that $\partial L_r/\partial \bar{L}_r < 1$. Also, the larger is b, the larger will be t_3 and t_1 in absolute value, and hence the larger will be $\partial L_r/\partial \bar{L}$. So long as there is a budget balance requirement on unemployment insurance it seems clear that the program will cause the migration response to exogenous labour force changes to be higher than in its absence, the more so the greater is the benefit level b.[15] If the residual financing of unemployment insurance comes from general revenues, however, then $t_1 = t_3 = 0$ and $\partial L_r/\partial \bar{L}_r \leq 1$ as before and its magnitude will be less with the unemployment insurance program than without. We conclude therefore that an unemployment insurance induced increase in the response of migration sufficient to overturn our earlier policy prescriptions is indeed possible whenever (marginal) budget balance is imposed on the program. Under unemployment insurance there is no assurance that the shadow price of labour in the poor region will be less than that region's wage rate.

In the Harberger case we have seen that $\partial L_r/\partial \bar{L} \geq 1$. In the special case in which $t_1 = t_3 = 0$ (that used by Jenkins and Kuo), $\partial L_r/\partial \bar{L} = 1$ and from the previous discussion $s_{LP} < w_p$. The shadow price of labour is less than the market wage and

therefore some case can be made for using a shadow wage rate below the market wage in projects which have as their effect a removal of labour from the market. (Jenkins and Kuo treat the creation of permanent jobs in this manner). However, if t_1, $t_3 \neq 0$, then $\partial L_r/\partial \bar{L} > 1$ and no general presumption for government employment policy can be deduced since it is no longer necessarily the case that $s_{LP} < \bar{w}_p$.

Next consider the effects of job creation in P. Differentiation of (40) with respect to N_p yields:

$$\frac{\partial L_r}{\partial N_p} = - \frac{(1/L_p)(\bar{w}_p - t - h - b) + t_3(1-\Pi)}{(\Pi/L_p)(\bar{w}_p - t - h - b) + t_1(1-\Pi) - f''(L_r)} \qquad (46)$$

As in the case of changes in L, we do not know unambiguously whether $\partial L_r/\partial N_p \gtrless 1$. If $t_1 = t_3 = 0$ (i.e. residual financing comes from general revenues), then $-\partial L_r/\partial N_p = (1/\Pi)\partial L_r/\partial \bar{L}$ as was true in the absence of transfers.[16] However, with $t_3 > 0$ and $t_1 < 0$, $-\partial L_r/\partial N_p < (1/\Pi)\partial L_r/\partial \bar{L}$.

Therefore, in general:

$$- \frac{\partial L_r}{\partial N_p} \leq \frac{1}{\Pi} \frac{\partial L_r}{\partial \bar{L}} \qquad (47)$$

Indeed it is now even possible that the change in migration in response to job creation is less than that due to a change in the labour force (i.e. $-\partial L_r/\partial N_p < \partial L/\partial \bar{L}$). In the Harberger case, $-\partial L_r/\partial N_p > 1/\Pi$. Thus the response of migration to changes in $\bar{L}_p$

and N_p in this case are both larger when there are transfers present.

Note finally that if the residual financing of unemployment insurance comes from general revenues, then $t_1 = t_3 = 0$. In this case, the expressions for $\partial L_r/\partial \bar{L}_p$ and $\partial L_r/\partial N_p$ give results similar to those obtained in the absence of transfers. That is, $\partial L_r/\partial \bar{L}_p < 1$ and $\partial L_r/\partial N_p = -(1/\Pi)\partial L_r/\partial \bar{L}_r$ (with $\partial L_r/\partial \bar{L}_p = 1$ in the Harberger case[16]).

Let us now examine the magnitude of the shadow price of a job (s_{JP}) under the unemployment insurance program. From (26) we get:

$$s_{JP} = -(w_r - h - m)\frac{\partial L_r}{\partial N_p} + h, \tag{48}$$

where $\partial L_r/\partial N_p$ is given in this case by (46). Using (47) we see that

$$s_{JP} \leq (w_r - h - m)\frac{1}{\Pi}\frac{\partial L_r}{\partial \bar{L}_p} + h \ . \tag{49}$$

Using (40) to solve for $(w_r - h - m)$, this may be written:

$$s_{JP} \leq (\bar{w}_p - h)\frac{\partial L_r}{\partial \bar{L}_p} + h + \frac{(1-\Pi)}{\Pi}(b+t)\frac{\partial L_r}{\partial \bar{L}_p} \ . \tag{50}$$

We cannot say unambiguously whether s_{JP} is greater or less than $\bar{w}_p$ in the presence of unemployment insurance. The greater

is $\partial L_r/\partial \bar{L}_p$, the less likely is it that $s_{JP} < \bar{w}_p$. Even when $s_{LP} < \bar{w}_p$, it could still be the case that $s_{JP} > \bar{w}_p$.

Consider now the Harberger case in which $f''(L_r) = 0$. Since $-\partial L_r/\partial N_p > 1/\Pi$ in this case, equation (26) becomes:

$$s_{JP} \gtrless (w_r - h - m)/\Pi + h \tag{51}$$

Obtaining an expression for $(w_r - h - m)$ from (40) and substituting into (51) yields:

$$s_{JP} \gtrless \bar{w}_p + (1 - \Pi)(b + t)/\Pi \tag{52}$$

Thus, the opportunity cost of creating a job always exceeds the market wage and no case can be made for subsidizing jobs. On the contrary, if anything, a tax is called for. Note that in the special case used by Jenkins and Kuo where both $f''(L_r) = 0$ and $t_1, t_3 = 0$, equation (52) becomes an equality. The opportunity cost of creating temporary jobs always exceeds the market wage and such a policy should not be instituted.

To summarize our discussion of the shadow wage in P we note that <u>a priori</u> both s_{LP} and s_{JP} can be greater or less than the market wage. If $\partial L_r/\partial \bar{L} \leq 1$, it must be the case that $s_{LP} < \bar{w}_p$. However even in this case $s_{LP} \gtrless \bar{w}_p$. If $\partial L_r/\partial \bar{L} > 1$ (which is perhaps the more likely case) then nothing qualitative can be

said without further restriction. In the Harberger case $s_{JP} > \bar{w}_p$, but $s_{LP} \gtrless \bar{w}_p$. In the special Harberger case used by Jenkins and Kuo ($t_1 = t_3 = 0$), $s_{LP} < \bar{w}_p$ and a case can be made for creating "permanent" jobs but not "temporary" ones; that is, for creating jobs which are not perceived by potential migrants as being filled by the random selection process as opposed to those which they feel they have a chance at filling. However, this result depends critically on the assumptions that $f''(L_r) = 0$ and $t_1 = t_3 = 0$.

The shadow wage rate in R is given again by (23) or (24). If $\partial L_r/\partial \bar{L} < 1$, then $s_r < w_r$ and a case can be made for subsidizing employment in R. In this case, though, $s_{LP} < \bar{w}_p$ as well. We may, however, proceed as before to determine whether preference ought to be given to employment policy in R or P.

The relative difference between the market wages and shadow wages is determined in a manner analogous to before. Equation (31) is still valid with unemployment insurance. Subtract $w_p(1-t)$ from both sides of (40) and use (31) to obtain:

$$(w_r - s_R) - (\bar{w}_p - s_{LP}) = -(1-\Pi)(\bar{w}_p - t - h - b) + t \gtrless 0. \qquad (53)$$

That is, the difference between the shadow wage and the market wage could be larger for either region. It is more likely to be

greater in P the smaller is t. The same ambiguity remains when s_{JP} is used as the shadow wage in P. The case for employment incentives in the poor region is no longer generally valid in the presence of unemployment insurance. It all depends upon the parameters of the system.

C2. Interregional Income Transfers

Income transfers in a multi-region federation come in many forms. There may be various transfers to individuals via the income tax system, social insurance, and income maintenance schemes. There may also be transfers among governments which ultimately influence tax rates levied in the regions. For our purposes we choose a very simple way of modelling interregional income transfers. In the rich region a per person tax of t is imposed while in the poor region an income transfer of z is received per person. Ignoring unemployment insurance the labour market equilibrium condition becomes:

$$f'(L_r) - t = \Pi(\bar{w}_p - h) + h + m + z. \qquad (54)$$

Budget balance of the transfer system requires that $tL_r = zL_p$. Thus, we may write:

$$t = zL_p/L_r = z(\bar{L}-L_r)/L_r = t(L_r, \bar{L}, z). \qquad (55)$$

For any given level of transfer, z, t is a function L_r and $\bar{L}$. Denoting by t_i the derivative of t (·) with respect to the ith argument, we obtain:

$$t_1 = \frac{z\bar{L}}{L_r^2} < 0 ; \qquad t_2 = \frac{z}{L_r} > 0 . \tag{56}$$

Also notice that $|t_1| > t_2$. If the scheme is financed out of general revenues at the margin rather than being self-financed, $t_1 = t_2 = 0$.

Differentiating (54) with respect to L and N in turn we obtain:

$$\frac{\partial L_r}{\partial \bar{L}} = \frac{(\Pi/L_p)(\bar{w}_p - h) - t_2}{(\Pi/L_p)(\bar{w}_p - h) + t_1 - f''(L_r)} \tag{57}$$

$$\frac{\partial L_r}{\partial N_p} = - \frac{(1/L_p)(\bar{w}_p - h)}{(\Pi/L_p)(\bar{w}_p - h) + t_1 - f''(L_r)} \gtrless -1 \tag{58}$$

These are qualitatively very similar to the equivalent expressions obtained under unemployment insurance, (45) and (46). However, we can be certain now that $|\partial L / \partial N_p| > \partial L_r / \partial \bar{L}$ regardless of their absolute magnitudes.

The shadow wage expressions are the same as before. Given that $\partial L_r / \partial \bar{L}$ and $\partial L_r / \partial N_p$ are qualitatively similar to (45) and (46) the shadow wage results are as well. That is, s_{LP} and s_{JP} are greater than they were before. s_{LP} will be less than $\bar{w}_p$

if $\partial L_r/\partial \bar{L} < 1$ but we cannot be certain that s will be. Also, s will be less than w if $\partial L_r/\partial \bar{L} < 1$ so that we may want to subsidize labour employment in R in addition to, or instead of, in P. The desired relative rate of subsidization in R and P remains ambiguous.

D The Effects of Reverse Migration

So far our analysis has been conducted under the assumption that all migration is from P to R; the effect of an exogenous labour force shock is to speed up or slow down this migration flow. In fact there has traditionally been a significant amount of gross migration from rich to poor regions in Canada and in recent years the net flow of migration between certain regions has reversed itself. From 1970 to 1979 the Atlantic Provinces have been recipients of a net inflow of over 23,000 migrants from other provinces in Canada.[17] The gross flows have, of course, been much larger. The simplest way to generate reverse migration in our model is to assume that there is no natural labour force growth in P or R in the time period under consideration. In that case any migration induced by increases in employment in P will be from R to P, (while the opposite will be the case for job creation in R). In the presence of migration costs it is also possible, as we shall see, that job creation programmes will induce no migration. We should expect in general to find the following two differences between the conclusions of this section and the previous ones. First, when job creation in

P induces return migration from R to P the shadow wage in P will be higher than when increases in employment reduce the outflow of labour from P to R. In the former case there is an increase in migration costs as a result of the project while in the latter there is a reduction in migration costs. Second, if job creation induces no migration, the shadow wage might be lower than when it slows down the rate of out migration since, in effect, all new jobs are filled by the unemployed in P and there is no reduction in output in region R. Against this would have to be weighed the reduction in migration costs in the latter case. The consideration of return migration introduces some interesting new issues concerning the effects of policy errors in forms such as aborted development projects and prematurely closed projects.

In this section we shall abstract from government transfer programmes. When migration in either direction is possible, our equilibrium condition must be modified. No worker will be able to increase his expected utility by migrating when:

$$|w_r - (\Pi(\bar{w}_p - h) + h)| \leq m. \qquad (59)$$

Two particular cases are of interest. The first, given by equation (8), is that in which workers are just indifferent about migrating from P to R (but a worker in R would incur a net loss in expected utility of m by moving to P):

$$w_r = \Pi(\bar{w}_p - h) + h + m. \qquad (8)$$

The second case is that in which workers are indifferent about migrating from R to P but would incur a net loss of m per worker by moving from P to R:

$$w_r = \Pi(\bar{w}_p - h) + h - m \ . \qquad (60)$$

We can consider four different changes in $\bar{L}$: an increase or decrease in $\bar{L}_p$ and the same with $\bar{L}_r$. Changes in $\bar{L}_p$, by affecting the unemployment rate in P will change the expected utility of residing in P, while changes in $\bar{L}_r$, by altering w_r (unless $f''(L_r) = 0$) will change the expected utility of residing in R. If equilibrium condition (59) holds with strict inequality, it is possible that none of these shocks will cause any migration to occur. If the condition holds as in equation (8) an increase in $\bar{L}_r$ or a decrease in $\bar{L}_p$ will not induce any migration unless the change is sufficiently large relative to m. The same holds for a decrease in $\bar{L}_r$ or an increase in $\bar{L}_p$ if equation (60) holds.

When no migration is induced by changes in employment, the shadow wages are very easily determined. Since changes in $\bar{L}_p$ simply cause corresponding changes in the number of unemployed in P, the shadow price of labour in is given by h, the value of leisure. Changes in $\bar{L}$ reduce output in R by $f'(L_r)$ and so the shadow price of labour in R is given by w_r. We now go on to consider the cases in which employment changes do induce interregional migration.

D1. Shadow Wages in Region P

If equilibrium condition (60) holds, so that the marginal worker in R is indifferent between moving to P and not moving then the withdrawal of some of the labour force from P (into, say, a public works project) will induce some migration from R to P until w_r rises and/or expected utility in P rises sufficiently to restore equilibrium. Following our earlier reasoning, the change in aggregate social welfare resulting from this increase in $\bar{L}_p$ is

$$dW = (w_r+m)\, dL_r + h dL_p$$

so that the shadow price of labour in this case is:

$$s^-_{LP} = \frac{dW}{d\bar{L}_p} = (w_r+m)\frac{\partial L_r}{\partial \bar{L}_p} + h\frac{\partial L_p}{\partial \bar{L}_p}$$

$$= (w_r+m-h)\frac{\partial L_r}{\partial \bar{L}_p} + h > s_{LP} \qquad (61)$$

Since $\partial L_r/\partial \bar{L}_p$ is still given by equation (13), a comparison of (61) with (18) shows, as expected, that the shadow price of labour in P is higher when employment induces return migration than when it simply reduces the rate of emigration from P.

Similarly, the shadow price of a job created in P ($dN_p > 0$) can be shown for this case to be:

$$s^+_{JP} = -\frac{dW}{dN_p} = -(w_r+m-h)\frac{\partial L_r}{\partial N_p} + h$$

$$= (w_r+m-h)\frac{1}{\Pi}\frac{\partial L_r}{\partial \bar{L}_p} + h > s_{JP} \qquad (62)$$

Comparison of (62) with (61) and (26) shows that, as in Section C, the shadow price of a job is greater than the shadow price of labour, and as just above, the shadow price of a job is greater when it induces return migration than when it slows down emigration.

Next we consider the effect of <u>increasing $\bar{L}_p$</u>, or decreasing N_p (due, say, to the conclusion of a project). If equilibrium condition (60) holds, there will be no interregional migration effects, unless the change were sufficiently large or m were sufficiently small, and the shadow price of labour or the shadow price of a job in P would be equal to h. However, if condition (8) holds, this increase in $\bar{L}_p$ or decrease in N_p would induce workers to migrate from P to R. The shadow price of labour s^+_{LP} and the shadow price of a job, s^-_{JP}, would be precisely the same as those given by equations (18) and (26) respectively. This means that the shadow price of labour for decreases in $\bar{L}_p$, s^-_{LP}, is greater than the shadow price of labour for increases in $\bar{L}_p$, s^+_{LP}, and similarly $s^+_{JP} > s^-_{JP}$. These differences in shadow prices which depend on the signs of the exogenous changes to $\bar{L}_p$ and N_p, that is differences in the opportunity cost of increasing and of decreasing employment in P, raise an interesting question concerning the effects of changes in employment policies. We deal with this next.

D2. Opportunity Cost of Labour in Aborted Projects

In this section we consider the effect of initiating an employment increasing project which is shut down at a later date. For instance, we might suppose that a poor province attracts a major new industry which, several years later proves to be non-viable and is closed down. If the economy is originally in an equilibrium described by (60) the shadow price of a job created in the project would be given by (62).[18] If, at the time the project is shut down, the equilibrium is still described by (60), the closing might induce no migration back to R (especially if the project is sufficiently small). In this case the shadow price of the laid off workers would be h. Consequently, one effect of this policy mistake is to cause a depreciation in the value of the workers employed in the project. The amount of this depreciation per worker is given by the difference in the shadow price s^{+}_{jp} and h:

$$d = (w_r+m-h)\,\frac{1}{\Pi}\,\frac{\partial L_r}{\partial \bar{L}_p} \qquad (63)$$

This expression has a simple explanation. For the workers brought into the project from unemployment in P there is no depreciation since they simply return to unemployment when the project closes. With respect to the workers who are induced by the newly created jobs to move from R to P and who end up being unemployed in P after the shutdown, their value is reduced by the

output they would have produced in R, w_r, plus the migration costs incurred in moving, m, minus the value of leisure consumed in P while they are unemployed, h.

Another possibility is that when the project begins, the equilibrium is given by (60), as above, but by the time the project is aborted, conditions have changed so that the equilibrium is described by (8). In this case the shadow wages are s^+_{JP} (equation (62)) at the start of the project and $s^-_{JP} = s^+_{JP}$ (equation (26)) at its close; both the starting and finishing of the project induce migration flows -- from R to P in the first instance and vice versa in the second. The depreciation in the value of a worker employed in the aborted project in this case is given by:

$$d = s^+_{JP} - s^-_{JP} = \frac{2m}{\pi} \frac{\partial L_r}{\partial \bar{L}_p} \qquad (64)$$

This is less than (63). In this case, after the shutdown the economy returns to the initial equilibrium and the only social cost in addition to the lost output elsewhere during the life of the project is due to the migration cost of the workers who moved from R to P and back again.

What this part of the exercise shows is that whenever changes in public employment induce interregional migration flows, the opportunity cost of labour hired "by mistake" and subsequently

laid off is greater than that indicated by our equation (62) which is derived under the assumption that the project is permanent. To this shadow wage must be added the "depreciation" of labour indicated in equation (63) or (64).

We also might ask whether similar effects might occur when a project is mistakenly aborted and subsequently resumed. The Labrador Linerboard Mill in Stephenville, Newfoundland might be an example of such a case (and also of the previous type of case). Analysis similar to that above produces two results for the case in which the release of labour from the project in region P induces migration from P to R (i.e. equilibrium condition (8) holds). First, if the subsequent resumption of the project induces reverse migration from R to P, there is a depreciation in the value of labour (identical to that given in equation (64) above) equal to $2m/\Pi$ times the proportion of the released labour that is induced to migrate. Second, in the case where resumption of the project induces no reverse migration (i.e. condition (8) continues to hold), there is a net appreciation in the value of a worker initially released from the project which is given by:

$$a = (w_r - m - h) \frac{1}{\Pi} \frac{\partial L_r}{\partial \bar{L}_p} \qquad (65)$$

When the project is shut down, the proportion of the released workers who migrate to R yield a net social product of $w_r - m$;

when the project is resumed, they are replaced by unemployed workers in P at a cost only of the value of leisure, h. The effect of shutting down the project and subsequently resuming it in this case is to replace "high cost" workers with "lower cost" workers and there is a net gain or "appreciation" of the labour force released by an amount given by expression (65).

D3. Shadow Wages in Region R

If job creation in R induces no interregional migration, the shadow wage rate is simply w_r. There are two other cases to be considered here: first an increase in government employment ($d\bar{L}_r < 0$) which induces migration from P to R, which will occur if condition (8) holds, and second a decrease in government employment ($d\bar{L}_r > 0$) which causes workers to move from R to P (i.e. when condition (60) holds). In the first of these cases, a withdrawal of some of the labour force from R, the shadow wage rate is identical to that in equation (30) derived in Part B above:

$$\bar{s_R} = s_R = \frac{dW}{d\bar{L}_r} = w_r \frac{\partial L_r}{\partial \bar{L}_r} + (h+m) \frac{\partial L_p}{\partial \bar{L}_r} \qquad (66)$$

The proportion of the labour force drawn from employment in region R has an opportunity cost of w_r while the proportion drawn from the pool of the unemployed in region P has a social opportunity cost of the value of leisure foregone plus the

migration costs incurred. In the second case, an exogenous increase in the labour force in R, the shadow wage turns out to be:

$$s_R^+ = \frac{dW}{d\bar{L}_r} = w_r \frac{\partial L_r}{\partial \bar{L}_r} + (h-m) \frac{\partial L_p}{\partial \bar{L}_r} < s_r \qquad (67)$$

That is, the shadow wage of the proportion of the new labour force that is employed in R is that region's wage rate, while the opportunity cost of the proportion that moves into unemployment in region P is the value of leisure consumed less the cost of moving.

One conclusion we can draw from this section is that the existence of reverse migration leaves the shadow price of job creation in region R unchanged relative to that derived in Part B for the case in which migration always flowed from P to R. Earlier we showed that the existence of return migration raised the opportunity cost of job creation in region P ($s_{JP}^+ > s_{JP}$). This means that the existence of return migration weakens the efficiency argument for regional employment policy directed at region P. In fact, depending upon the parameters of the system, it might even create a case for a greater rate of job subsidization in region R.

E Summary of Principal Results

We have investigated the efficiency basis for regional employment subsidies in a simple two region Ricardian general equilibrium model with rigid wages and unemployment in the low income region and with costly migration. We have found that there is a grain of truth in several of the polar views about shadow wages stated in the introduction to this chapter; shadow wage rates in both regions are weighted averages of the market wages in the two regions, the value of leisure and migration costs. These variables are also linked through labour market equilibrium conditions, particularly as they relate to the migration process. The weights to be used in calculating shadow wages are, in turn, dependent on the responsiveness of migration to the creation of new jobs or reductions in the labour force caused by increases in public sector employment. In general the shadow wage in the poor region is higher and the efficiency argument for employment subsidization in the poor region is weaker the greater is the responsiveness of migration to new employment opportunities in that region. So long as there is some elasticity of the wage rate in the rich region to migration induced changes in employment in that region, however, some subsidization of jobs in the poor region will be called for in the absence of interregional transfer programs and of reverse migration. Furthermore, the size of wage subsidy called for will be greater in the poor region than in the rich region under these circumstances.

In the presence of interregional transfer programs the story is different. Unemployment insurance programs which provide benefits to the unemployed in the low income region or income transfers to all workers in that region, both of which programs are financed in whole or in part by taxes on workers in the rich region, are very likely to increase the responsiveness of migration to labour market shocks. The creation of ten new jobs in the poor region might well reduce migration to the rich region by more than ten workers in the presence of these programs. Under such circumstances there is no presumption that shadow wage rates in the poor region will be less than local market wages. Existing evidence seems to suggest that migration in Newfoundland is highly responsive to interregional transfers and new employment opportunities.[19] This raises the distinct possibility of a policy prescription to discourage employment in the poor region and subsidize jobs in the rich region. A similar conclusion emerges when we introduce the possibility of reverse migration -- from the rich to the poor region -- as a response to newly created employment opportunities in the latter region.

F Additional Considerations

In this section we conclude with several observations relevant to the policy implications of the previous analysis. Our first remarks concern the wage rigidity assumption which is central to our model. The downward inflexibility of wages in the model is

the cause of unemployment in the poor region and is the basis for any argument in favour of wage or employment subsidies in that region. This part of the argument is not novel; it was pointed out, for instance, by James Buchanan and John Moes (1960), and reiterated by George Borts (1966). Earlier in this study we pointed out some of the possible explanations for high and rigid wages in a region such as Newfoundland. Suppose for a moment, however, that the wage level is somehow related to the level of transfers (unemployment insurance or other interregional income tranfers) or, more importantly, to the extent of wage subsidy or public employment programs in the region. In this case, the high wage problem in the poor region, which is the basis for a regional employment program, might be caused or aggravated by the programs themselves. Consequently, the argument for regional employment subsidies would be considerably weakened and the likely effect of any such subsidies on the level of employment in the poor region would be diminished considerably. A similar type of problem has been encountered in evaluations of public employment and employment tax credit programs in the U.S. Daniel Hamermesh (1979) points out how a low elasticity of supply of labour will cause the main effect of wage subsidies to be felt in higher wages rather than in increased employment. If currently employed workers are successful in translating the effects of regional employment programs into higher wages rather than increases in employment, the programs will meet with limited success. What this is suggesting, therefore, is that the

assumption of the exogenously given rigid wage needs further examination. Just as in our earlier analysis of productivity and employment, the regional wage determination mechanism turns out to be an important phenomenon in policy analysis. The determination of the optimal level of wage subsidization and the design of a wage subsidy or public employment scheme require that careful attention be paid to this. If it is found that there is a tendency for wages to rise with the introduction of regional employment programs, it might be possible to design a program which could minimize such effects.

An alternative to either the strict rigid wage assumption or the hypothesis of a direct positive relationship between wage subsidies and the poor region's wage rate is the assumption of wage parity (or a constant wage differential) between the poor and rich regions. In the absence of any responsiveness of wages in the rich region to migration-induced changes in the labour force the model would be unaffected by replacing wage rigidity with wage parity; the poor region's wage rate will be <u>de facto</u> rigid. However, if the rich region's wages are responsive ($f''(L_r) < 0$), then migration will be more responsive to regional employment programs under wage parity than under wage rigidity. The introduction of a regional employment subsidy will decrease migration to the rich region, raising w_r, and hence increasing w_p; this will induce a greater reduction in migration than if w_p were unchanged. Since the case for

regional employment subsidies is weakened by more responsive migration, such subsidies would be less likely to be justified in a wage parity model than in a rigid wage model.

Suppose, however, that careful investigation of the relevant parameters reveals that a wage or employment subsidy is called for in the poor province. How should the subsidy be financed? Should the subsidy be temporary or permanent? If it is to be permanent, should its size be expected to grow or diminish over time?

The presumption is often encountered that programs aimed at improving conditions in low-income provinces ought to be financed at the national level. After all, could the taxes required to finance a program at the local level not defeat the intentions of the program? This is not necessarily the case. The purpose of a wage subsidy program in a poor region would be to alter the relative price of labour, not to provide a gift to the poor region. It is the high cost of labour, not the low level of income in the province, that is source of unemployment. But would not a wage subsidy program of the desired magnitude be very costly and impose large tax or debt burdens nevertheless? This is certainly possible, regardless of the level of government at which the program is financed, especially if the elasticity of demand for labour in the region is quite low (as it might well be in Newfoundland) and if the subsidy program being contemplated is

a general wage subsidy applied to all employment in the province. The way to avoid a large part of the cost of such a program is to narrow its scope either by targeting it at only certain classes of workers, occupations or industries or else by designing an incremental employment or wage subsidy. We shall deal briefly with the former issue of universal versus categorical employment programs later, and focus on the incrementality question at the moment. Even in the face of a highly inelastic demand for labour a reasonably low level of costs can be attained by designing an incremental program which subsidizes only newly created jobs or payroll increments in excess of some well-defined trend. Incremental programs are meant to avoid the very expensive provision of windfall gains to employers who would have provided a large number or jobs regardless of the existence of the subsidy program. Of course, to the extent that the windfall gains created by non-incremental programs are captured by workers through higher wages rather than by employers, this will put additional wage pressure on incremental jobs as well and, as discussed above, tend to defeat the purpose of the subsidy. This is another argument in favour of incremental subsidy programs. Administrative problems in the design of incremental programs are well-known and have been discussed elsewhere (e.g. Hamermesh (1979)).

It is not obvious to us that an effective low cost wage subsidy program could be designed to be financed at the national level

any more easily than at the regional level. Are there any advantages to local rather than national financing? A major advantage, in terms of labour market efficiency, of a locally financed program arises from the fact that a nationally funded subsidy carries with it in addition to a pure wage subsidy effect a pure transfer effect. As our analysis indicates, such inter-regional income transfers tend to impede migration, increase the marginal response of migration to regional employment programs and hence reduce the efficiency of such programs. In addition, to the extent that local wages increase in response to transfers, this will be an additional disadvantage of a nationally financed program. We conclude, therefore, that any general presumption in favour of national financing is very likely to be incorrect. Since our analysis shows how the existence of interregional income transfer programs weakens the argument for regional employment subsidies, what this seems to suggest is that the best way to finance a wage or employment subsidy programme would be through a reduction in some current income transfer programme.

We turn now to the question of the likely permanence of a regional employment program. A program of the sort we have been describing here cannot be thought of as a temporary measure. Although many types of special employment measures are aimed at cyclical unemployment or at providing on the job training to unskilled workers and hence can be planned with relatively short time horizons in mind (the length of the business cycle in the

first instance and the time needed to train the targeted workers in the second), the regional wage subsidy we have been discussing is based on a structural problem resulting in high levels of regional unemployment at existing wage rates. There is nothing in the nature of the employment programs being contemplated that would cause the underlying structural problems to disappear. In fact there is a danger, as we have indicated already, that these programs might cause local wages to rise, thus exacerbating the structural problem. In the absence of increases in demand for local products, decreases in the labour force or employment increasing improvements in local productivity, the need for regional employment programs, once established, will persist over time. Furthermore, if, as is hypothesized by Thirlwall (1979), the problem of the poor region is a disparity in the growth of productivity, demand and labour supply relative to other regions, not only will the necessity for a wage subsidy persist, but the size of the subsidy will grow over time.

We conclude with observations on two more subjects: the first related to the effects of interregional transfer programs and the second concerning the issue of universal versus categorical employment subsidies. It has been observed elsewhere[20] and earlier in this chapter that there might be a legitimate efficiency argument for interregional fiscal transfers due to fiscal externalities of migration. We observed in footnote 9 of the present chapter that the existence of such externalities would

require a modification to the migration term in our shadow wage rate expressions. However, if the existing system of equalization grants were the optimal one considering these externalities, no change would be required in our analysis. It would be important to recognize, though, that these equalization grants would not be like our simple unemployment insurance or interregional income transfer programs in affecting the argument for regional employment subsidies. Only to the extent that the level of equalization payments was greater than that required on grounds of the fiscal externality argument would they be analogous to our other interregional transfer programs.

Finally we look at the question of the universality of coverage of regional employment programs. We have not had to deal with this issue so far because we have assumed all labour to be homogeneous; therefore it only made sense to consider universal programs. We might now consider two possible departures from this homogeneity assumption. First, there might be several different and easily distinguishable types of workers. If they differ with respect to any of the parameters in our expressions for the shadow wage rates, then there might well be reason to treat them differently under regional employment programs. For instance, suppose that one type of worker is completely interregionally immobile, while the other type is highly mobile. Then there might well be a strong argument for providing much higher rates of employment subsidies to the former group than the

latter. The only qualification to this relates to the degree of substitutability between the two groups in employment. If, at the extreme, they are perfect substitutes, creation of jobs for the immobile group might provoke a large migration response by the other group. This indirect migration response would be no less important than the direct effects considered in our model with homogeneous labour and would have the same effect of raising the shadow wage for the immobile workers. The less is the possibility of such substitution in employment, the greater is the argument for distinguishing between groups in regional employment programs.

A second possible departure from our assumption of labour force homogeneity is that some types of workers (e.g. in particular industries) might be treated quite differently under existing interregional transfer schemes. Following from the discussion immediately above, the obvious effect of this would be to require differences in treatment under regional employment programs. Subject to the same qualifications as above, the optimal wage subsidy for workers already in receipt of sizeable transfers might be expected to be much less (maybe even negative), all other things equal, than that for workers who are ineligible for the transfers. For instance, we might find that inshore fishermen, who receive various subsidies including differential treatment under unemployment insurance, might require a much smaller wage subsidy than, say, iron mine workers.

Footnotes

1 The theoretical work on which this chapter is based is derived from joint work by Robin Boadway and myself. See R.W. Boadway and F.R. Flatters (1981).

2 The inspiration for this assumption about employment and for the migration equilibrium mechanism is drawn from Harris and Todaro (1970). As discussed below our model differs from theirs in a number of ways, most notably by allowing for costs of migration, transfers, and a positive value of leisure.

3 This equation is valid only for the case in which migration goes from P to R. If initial endowments were such that it went from R to P, the migration cost variable m would appear on the left hand side of the equation. An alternative view of the migration process which assumes that migration takes time so that the equilibrium condition (10) is approached more or less slowly in response to a shock to the system may be found in Todaro (1969). Our model can be viewed more as a long run equilibrium model. A useful synthesis of the two approaches may be found in Blomqvist (1978).

4 The use of rigid wages to generate unemployment in neo-classical models is fairly common. See, for example, Brecher (1974), Harris and Todaro (1970), Jenkins and Kuo (1978). At various places it is justified by institutional rigidities (e.g. minimum wage laws, unions, public sector wages), non-Walrasian equilibrium (e.g. Barro and Grossman, 1976; Malinvaud, 1977; Muellbauer and Portes, 1978), or implicit contracts (e.g. Baily, 1974; Azariades, 1975). In our model a (weak) theoretical justification for the assumption is as follows. If workers in P could choose the market wage most appropriate from their own point of view they would choose that which maximized per capita utility (9) subject to condition (10) which determines the utility they could attain elsewhere. Carrying out that maximization problem using $w_r = f'(L_r)$ and $w_p = g'(N_p)$ from (4) - (7), the first-order condition with respect to N_p reduces to:

$$w_p = g'(N_p) = h - N_p g''(N_p)$$

This equation determines N_p and thus w_p, solely as a function of h and the production technology in P. Workers may be better off accepting some unemployment in return for which they obtain a higher expected wage if employed. This provides some justification for a minimum wage. As we observed in Chapter I, the assumption of wage rigidity finds some empirical support in the case of Newfoundland. An alternative to the wage rigidity assumption would be that of wage parity. We make some observations about this later.

5 This is the assumption used in Harberger (1971) and also in Jenkins and Kuo (1978).

6 The change in the initial endowment is viewed as taking place before the migration equilibrium gets worked out. One would obtain different results if the labour supplies were changed after the equilibrium migration. For example, adding a worker to R may induce some reverse migration. The problem of return migration will be dealt with in Section D below.

7 This is the assumption used by Harberger (1971) and Harris and Todaro (1970). Jenkins and Kuo (1978) assume that jobs can be distinguished according to whether they are "temporary" or "permanent". The creation of a temporary job in their terminology is similar to what we describe here as simply the creation of a job. On the other hand, their "permanent jobs" are not filled randomly and the effect of the creation of such a job would be similar to our previous experiment, a reduction in the region's initial labour endowment.

8 Bhagwati and Srinivasan (1974) conclude in their analysis of the Harris-Todaro model that the optimal policy is subsidization at equal rates in both the flexible wage and sticky wage sectors (regions) of the economy.

9 This methodology is fairly standard and the expression for welfare change could readily be derived from an underlying utility function. See, for example, Boadway (1979), Sen (1972), and Findlay and Wellisz (1976) for precursors. It should be noted, however, that we are assuming that there are no externalities such as those described in Flatters, Henderson and Mieszkowski (1974) and Flatters and Parris (1980) associated with migration. The existence of such fiscal, congestion or scale externalities would necessitate the addition a new term to m to represent such effects. Although such effects might be quantitatively important, their exclusion from the model in this chapter does not affect the qualitative conclusions we derive.

10 This is the methodology used, for example, in Srinivasan and Bhagwati (1978).

11 This method corresponds to that used by Harberger (1971) and Harris and Todaro (1970), as well as what Jenkins and Kuo (1978) call the shadow wage rate of a "temporary" job. Our shadow price of labour corresponds to their shadow wage rate of a "permanent" job. Their discussion (especially Figure 1; p. 238) seems to assume that the shadow wage rate always falls below the market wage rate even in the presence of unemployment insurance. Our results in the following section call that into question.

12 If we accept the Jenkins-Kuo (1978) distinction between temporary and permanent jobs, a case can still be made for creating permanent jobs when $\partial L_r/\partial \bar{L}_p = 1$ since $s_{LP} = w_r - m < \bar{w}_p$ under these conditions.

13 It ought to be noted that this result is not sensitive to the assumption that the migrants are identical to the non-migrants in P in the sense that all have an equal probability of being employed if they stay in P. Alternatively, one might consider the extreme case in which those who migrate are persons who would have been unemployed had they stayed. The equilibrium condition for the marginal migrant is $w_r = h + m$. This determines L_r so both N_p and L_r are predetermined. Therefore, any increase in L_p simply increases unemployment with no change in output or migration. Thus, the shadow price in P is simply h. Similarly, an increase in L_r acts to increase unemployment and reduce migration by the full amount. Thus, $s_R = h + m$. Then, $s_{LP} < s_R$ and employment should definitely be encouraged in P relative to R.

14 This contrasts with the conclusion reached by Bhagwati and Srinivasan (1974) that equal wage subsidies are called for in both sectors of their economy.

15 That does not mean that L_r itself is higher. Indeed, we would expect it to be smaller.

16 Jenkins and Kuo (1978) implicitly work under the assumption that $t_1 = t_3 = 0$, which, as we see, ensures the result that $s_{LP} \leq w_p$.

17 Atlantic Development Council of Canada, The Atlantic Region Economy: A Development Strategy for the 1980's, (Nov. 1978), Table 7, p. 11.

18 It is assumed not only that the government intends that the jobs created be permanent, but, more importantly, that the workers believe this to be the case.

19 See Courchene (1970) and Boadway and Green (1981) for instance.

20 See Flatters, Henderson and Mieszkowski (1974) and Flatters and Parris (1980).

Chapter 4

Expenditure Switching Policies and Problems of Regional Adjustment

What sorts of economic adjustments and policy instruments are available for a small regional economy such as Newfoundland's in which the rate of growth of employment has been chronically less than that required to achieve full employment of the labour force? In the previous two chapters we have examined in particular the role of productivity improvements and of wage or employment subsidy programs in this context. We now present a general discussion of a broad range of possible adjustments and then analyze the effectiveness of several programs directed at regional economic adjustment in Newfoundland. These include transportation subsidies, fiscal incentives for the fishing industry and industry-specific subsidy programs. We make use of the similarity between regional adjustment problems and balance of payments problems for a national economy in order to focus on adjustment policies as particular forms of expenditure switching policies.

A. Regional Adjustment Mechanisms

We begin with a discussion of regional adjustment mechanisms. Since many similar presentations are available elsewhere,[1] we will not attempt to be exhaustive. Consider a region experiencing a decrease in demand for its export goods (or an increase in

demand for imports). The immediate impact of this change will be to cause a (greater) current account deficit and, barring a corresponding offsetting change in capital inflows, it will cause a balance of payments deficit. Although this deficit might be financed temporarily by running down the region's liquid assets or by short term credit, further economic adjustments soon will occur. The sorts of market adjustments that might occur can be grouped into three broad categories: changes in local prices, most importantly factor prices; changes in output and employment, showing up particularly in increased unemployment; changes in labour supply, both in the form of reduced labour force participation and of increased flows of outmigration. Various forms of non-market policy interventions, especially increased transfers, might serve as a substitute for market adjustment. We briefly examine each of these modes of adjustment to an initial shock of a decrease in the world price of a region's exports good(s).

First consider local price changes. Most economic models have the property of being homogeneous of degree zero in all prices; i.e., it is relative, not absolute, prices that are important in determining the allocation of resources so that a given percentage change in <u>all</u> prices which would leave relative prices unchanged, would have no effect on resource allocation. If this were the case, then a fall in the prices of all other goods and

factors of the same relative magnitude as the initial export price decrease would be sufficient to return the economy to its initial state; production and employment would be at the same levels as they had been before the shock. Unfortunately this adjustment is not possible because of rigidity of some prices. In particular, for a small region import prices and the prices of interregionally mobile factors of production are fixed in world markets. A decrease in import prices would cause a disappearance of the supply of imports and a decrease in the return to capital goods would lead to an outflow of capital. However, in order for full employment to be restored in the region, costs must fall, which means that the burden of adjustment must fall on regionally specific factors of production. Since such factors account for only a portion of total costs, wage rates and prices of other fixed factors must fall by more than the amount of the original decline in export prices; there must be a decline in the real incomes of regionally specific factors of production. If wages do not fall, then the region will be in a position similar to that postulated in the models employed in Chapters 2 and 3 - there will be quantity rather than price adjustments and the economy will experience unemployment due to wage rigidity. We will return to this type of adjustment and the possibility of policy changes to relieve such unemployment below, but first we wish to use the comparison with balance of payments adjustment for a national economy to examine another hypothetical way out for a regional economy.

The balance of payments analogy draws attention to a policy not available to a regional economy - a currency devaluation. An often encountered argument is that a regional economy in a position such as that we have described above suffers by not having its own currency and hence by its inability to alter its exchange rate with the outside world. If Newfoundland were able to devalue its currency, this would have the effect of raising the local relative price of tradeable goods and switching local expenditures in favour of locally produced goods. This increase in domestic production would eliminate the region's unemployment. Although this is a plausible argument, it rests crucially on the assumption that wages do not rise in response to the devaluation. We could illustrate the real effects of a devaluation with a constant nominal wage with reference to our two sector model in Chapter 2. Rather than considering the effects of productivity improvements we could determine the effects of an exogenous increase in the local price of traded goods, both exports and imports, by the amount of the devaluation. Under the assumption of perfect capital mobility the rental price of capital denominated in local currency also would have to rise by the amount of the devaluation. With the nominal wage assumed to be constant, these changes would have two types of effects on the aggregate demand for labour. First there would be substitution effects: increases in the price of the fixed factor resulting from the devaluation induce more intensive use of resources and possibly an increase in their supply, permitting more production

of traded and nontraded goods, and also induce factor substitution in favour of labour. Second, there is an expenditure switching effect in favour of nontraded goods. While the prices of traded goods rise directly by the full amount of the devaluation, the price of the nontraded good does not rise by as much since the price of one of its inputs (labour) is assumed to be constant. As a consequence there would be an increase in demand for and production of local goods and an increase in employment. The extent of this increase would depend on the elasticity of demand for nontraded goods and the labour intensity of that sector.

However, the ultimate success of a currency devaluation depends on the questionable assumption of rigid nominal wages in the face of exchange rate changes. Economic theory, international evidence[2] and our knowledge of the Newfoundland economy (especially its structure of imports and exports) all suggest that the ability to devalue would at best bring short term results and could not solve longer run structural problems of the sort we are concerned with. We conclude therefore that the ability to devalue would not be of much assistance to Newfoundland in securing real wage adjustments in response to adverse external shocks or secular trends. If real wages do not adjust, this is due probably to several factors, none of which would be eliminated to a very great extent by the existence of separate currency in Newfoundland. The province's problem is probably much more due to the close connectedness of its labour

and goods markets with the rest of Canada than to its inability to devalue. To the extent that price adjustments, with or without the aid of currency devaluations, do not occur, much more weight is thrown onto quantity adjustments in the form of changes in employment, labour force participation and migration. It might be noted before proceding to these, that in the context of the comparison of regional with national economies one advantage that a region has over a separate nation is that the migration adjustment is generally much more accessible to a region.

There is little that needs to be said about quantity adjustments. A region suffering a once and for all deterioration or a secular decline in its terms of trade (or in the demand for its goods relative to its ability to produce them) and which does not make the necessary factor price adjustments will be faced with an increase in unemployment. This is likely to lead to two further types of adjustments: a decrease in labour force participation and an increase in outmigration. As we observed in Chapter 1, Newfoundland's wage levels do not seem to have been particularly responsive to local labour market conditions. At the same time, however, her labour force participation rate has lagged behind much of the rest of Canada's (and also seems to have had much more pronounced seasonal and cyclical variations than the national unemployment rate). In addition Newfoundland has had very high rates of outmigration.

B. Transfers as a Substitute for Adjustment

What policy instruments are available to a region in this situation? We shall examine two types of instruments: transfers and expenditure switching policies. As we pointed out in the previous chapter, some policies, such as a wage subsidy financed by the federal government, would have elements of both types (i.e., transfer and relative price) of effects. We shall begin our discussion here with a brief review of the effects of a pure transfer program.

We examined the effect of transfers in our model in Chapter 2. We saw there that with rigid real wages any increase in transfers will have an income effect that will expand production and employment in the nontraded goods sector. With our assumption of unitary income elasticity of demand for nontraded goods and imports the size of the export sector is unchanged by an inflow of transfers. If, say, nontraded goods had greater than unitary income elasticity there would be in addition a transfer of employment from the export to the nontraded sector. In the case of Newfoundland, there can be no doubt that the effect of transfers has been to lead to expansion of the nontraded goods sector which is, by and large, much more labour intensive than the traded goods sector. With transfers being such a large portion of the balance of payments in Newfoundland, a very large amount of employment in the province is directly dependent on these transfers. Further examination of the model also would

confirm that the inflow of transfers has caused a substantial capital inflow to increase the capacity of the nontraded goods sector. To the extent that the returns to this capital are remitted to owners outside of the province, the effects of transfers on employment and on the incomes of Newfoundlanders would be less than those that would be suggested by this model.

This discussion illustrates how transfers can substitute for the market adjustments that otherwise would occur in a declining region. In particular, the inflow of transfers can serve to reduce or eliminate the real wage or employment decreasing effects of falling demand (or price) of a region's goods relative to its ability to produce them. In Chapter 2 we also posed the question of why it is that Newfoundland, despite massive inflows of transfers, has continued to be cursed with such high levels of unemployment. We suggested three possible responses to this question. The first was that the level or rate of growth of transfers has simply not been sufficiently high relative to the disparity between Newfoundland and the rest of the country. The second referred to labour supply responses. As we demonstrated in the model in Chapter 3, increases in employment in Newfoundland might be met by a reduction in outmigration (or an increase in inmigration) since migration decisions are based on employment opportunities available in the province. In the presence of transfers we indicated, in fact, that it was possible for the reduction in outmigration to be greater than the number of new jobs which are created. A similar sort of phenomenon

might occur with respect to labour force participation decisions. This might be even more important if the receipt of some transfers (especially unemployment insurance) is dependent on labour force participation at some point in time. The net effect of such labour supply responses might mean that quite massive changes in employment might occur without being reflected in major changes in the unemployment rate. The third resolution of the puzzle of the coincidence of high levels of transfers and continued high rates of unemployment relied on wage rate adjustments. We also discussed this somewhat in the previous chapter. Although Newfoundland's unemployment might be due to insufficient downward flexibility of wages, it is still possible that inflows of transfers will cause wages to rise; workers might be able to capture at least part of the transfers in higher real wages. To the extent that this occurs transfers will be reflected in higher wages for those who currently are employed rather than in increases in employment. Therefore, as was the case with wage subsidies which we discussed in the previous chapter, the effectiveness of transfers in increasing employment depends crucially on the wage determination mechanism. In either case, however, the effect of transfers is to eliminate the downward adjustment in real wages that might occur in their absence and to cause employment to be higher than it would be otherwise.

This characteristic of transfers as a method of maintaining employment while preserving (or even increasing) the level of

real wages in the face of adverse economic shocks as opposed to price adjustments which accomplish the same goal by causing a fall in real wages and returns to other fixed factors is an important practical matter in examining short run adjustments to cyclical shocks. In the case of such periodic shocks the economy must make adjustments not only when times are abnormally bad but also when markets are unusually good. When transfers are the policy tool being used, and especially when these transfers are being financed out of general revenues of the federal government, there is a great danger that it will be difficult to run the policies in reverse when markets are buoyant. Suppose that Newfoundland's export markets are subject to cyclical swings as is characteristic of many primary products industries. When price adjustments are occurring, the effect of depressed export markets will be to lower real returns in this sector and possibly to cause factors of production to move out of this sector. The average return to resources in the export sector over the whole cycle of primary products prices would be roughly equal to the opportunity cost of these resources in other sectors plus some allowance for risk. However, if the response of the federal government is to subsidize the export sector owners when prices are low (as they did to the fishing industry during the Great Crisis of the mid-70's), real returns will not necessarily fall and capacity in the industry might expand to a level closer to that which could be sustained in an unsubsidized market in which prices remained perpetually at their peak level. The Newfoundland export sector would be permanently dependent on the

federal transfer program. If the industry and the provincial government felt they could count on continuation of the subsidies, they would have every incentive to press for expansion of the industry and one can see the potential for conflict between provincial and federal governments with respect to licensing quotas and price supports. An alternative to ad hoc transfer programs to aid export industries in times of depressed prices would be a well designed income stabilization program whose budget would be planned to be balanced in the long run.

C. Expenditure Switching Effects of Government Policies

Transfers to the export sector have more than a pure transfer effect, of course; they also are intended to alter relative prices and to have expenditure switching effects. We turn now to an examination of expenditure switching policies. Broadly defined, expenditure switching programs are designed to induce changes in relative factor prices or goods prices in order to induce increased expenditures on locally produced goods and hence to increase local employment. The most direct, and presumably first best such policy aimed at reducing rigid wage induced unemployment is a general wage subsidy as we discussed in the previous chapter. In the absence of other distortions to justify them, expenditure switching policies of any other form will be less efficient than a wage subsidy since they will induce inefficient substitutions in other markets.[3] For instance, a capital subsidy which might well have the effect of attracting

sufficient capital inflows to increase employment, will have the side effect of inducing inefficiently high capital intensities in the choice of production techniques. Similarly a transportation subsidy on exports would induce an excessive expansion of the most transportation intensive export goods production and an inefficient substitution of production of export goods relative to imports, import substitutes and nontraded goods. Since we have presented most of the general issues related to expenditure switching programs in our discussion of wage subsidies in the previous chapter, we shall devote the remainder of this chapter to some questions related to the expenditure switching effects of a few particular government policies in Newfoundland.

C.1 Transportation Subsidies and Hydro Transmission Taxes

We turn first to transportation subsidies. Table 1, taken from Volume 2 of the Report of the Commission of Inquiry into Newfoundland Transportation[4] (the Sullivan Report) indicates that federal government transportation expenditures in Newfoundland have been enormous. The $168 million expenditure in 1977 was significantly greater than the province's expenditures in servicing the provincial debt in that year. The Sullivan Commission estimated that in excess of $100 million of this expenditure went towards the subsidy requirements of transportation services which are unique and constitutionally guaranteed to Newfoundland under the terms of Union with Canada.[5] Apart from subsidies for capital facilities (highways, ports, airports,

etc.) the major transportation subsidy programs that affect the allocation of resources in Newfoundland are 1) freight rate subsidies under the Maritime Freight Rates Act (MFRA), and the Atlantic Region Freight Rates Assistance Act (ARFAA), 2) the Gulf

Table 1 1977 Federal Transportation Expenditures in Newfoundland

	Operations and Maintenance[a]	Capital Outlay	Total
Gulf	$48,603,000		$48,603,000
		($6,900,000)	6,900,000
Argentina	2,221,000[b]		2,221,000
Intra Ferries	2,059,166		2,059,166
Railway[c] - Carload Freight	(13,200,000)		13,200,000
Express	(7,200,000)		7,200,000
Bus	(2,100,000)		2,100,000
Coastal Boats	25,484,000		25,484,000
Airports	12,809,400	4,133,600	16,943,000
Coast Guard	(8,392,000)		8,392,000
Marine Navigational Aids	(2,107,106)		2,107,106
Nfld. Steamships	3,780,963		3,780,963
MFRA	(1,200,000)		1,200,000
ARFAA	(300,000)		300,000
Feed Grain Assistance	500,000		500,000
DREE(1978)	27,736,100		27,736,100
			$168,226,335

a 1976 figure in brackets.
b Small, due to limited service, as a result of the sinking of the William Carson. The usual figure is approximately $5,000,000.
c Losses on CN Railway in Nfld. met through cross subsidization from within CN.

Source: Sullivan Report, vol. 2, p.62.

subsidy which subsidizes the rail ferry link between Newfoundland and the mainland and covers the deficits of railroad operations on the island, and 3) the direct water subsidy to Newfoundland Steamships Line on freight carried from Montreal to St. John's

and Corner Brook. The MFRA and ARFAA are intended to provide increased access to Canadian markets for goods produced in the Atlantic region. There are two components to the subsidy: 1) a 30 per cent subsidy to all rail and truck freight of Atlantic region goods outbound to Canadian markets west of the region plus a further 20 per cent subsidy to a selected list of commodities, and 2) a 15 per cent subsidy to rail and truck freight movements of a selected list of locally produced goods being shipped to other points within the Atlantic region. The Gulf subsidy, which was constitutionally guaranteed under the terms of Union, was intended to underwrite any deficits that would be incurred by a rate structure on the Gulf Ferry rail link and the Newfoundland railroad itself which treated all goods and passengers as if they were shipped on a continuous rail between the mainland and the destination in Newfoundland. Since the cost of the ferry and the trans-shipment to the narrow gauge railway in Newfoundland are far in excess of a continuous rail link, the amount of the subsidy is enormous. The Sullivan Commission estimated the current subsidy on the ferry service from North Sydney to Port-aux-Basques to be in the order of $60 per ton for rail and $40 per ton for truck freight. As a percentage of total costs the implicit rate of subsidy is quite staggering. Table 2 presents the Sullivan Commission's estimates of the rate of cost recovery from tariff charges. As can be seen, the percentage of costs covered by subsidy, which is 100 minus the percentage cost recovery shown in the third column; ranges from a low of 67 per cent to a high of 95 per cent.

Table 2 Unit Costs and Revenues for Traffic Carried on Gulf

	Unit Costs Including Capital & Operations	Average Revenue	% Cost Recovery
Rail Car	$832	45	5
Auto	82	18	22
Tractor Trailers	494	82	17
Passenger	18	6	33

Source: Sullivan Report, Volume 1, p.129.

The direct water subsidy to Newfoundland Steamships Ltd. currently is applied at a rate of $15.64 per ton on all traffic from Montreal to St. John's and Corner Brook.[6] All of these subsidies are paid for from federal government revenues.

Now recall Newfoundland's trade pattern as described in Chapter 1 above. While about 80 per cent of Newfoundland's imports come from the rest of Canada, at most 20 per cent of her exports are to markets within Canada. Consequently, to the extent that the transportation subsidies are reflected in changes in the prices of Newfoundland's traded goods sector, they will tend to cause decreases in the prices of import goods in Newfoundland and to have very little effect on the prices received for her export goods.

What would be the effect of a decrease in import prices on unemployment in a province such as Newfoundland? There would be two effects on employment: a pure income or transfer effect and

an import substitution effect. The transfer effect can be understood best by considering a special case in which Newfoundland was completely specialized in production of exports and nontraded goods. In that case a decrease in import prices would be like a pure transfer which relaxed the province's balance of payments constraint. As we saw in our earlier discussion, the effect of such a transfer is to expand production in the nontraded goods sector and hence to increase employment, with the size of the increase depending on the labour intensity of nontraded goods production. The only difference between this and the pure transfer case is that the import price decrease will cause consumers to substitute imports for nontraded goods consumption and this will tend to dampen the employment increasing transfer effect.[7] The import substitution effect will be felt only if Newfoundland initially produced some import substitutes. In this case the import price decrease will cause a decline in local production of import substitutes and hence will tend to decrease employment.[8] The magnitude of this effect will depend on the initial size of the import competing sector, the elasticity of local production costs with respect to output, and the labour intensity of this sector. Whether a fall in import prices will cause a rise or fall in employment in Newfoundland, therefore, depends on the relative sizes of these counteracting effects. Since the size of the import competing sector in Newfoundland never has been particularly large and since the nontraded goods sector is undoubtedly more labour intensive than the import competing sector, we would predict that the transfer effect would

be very likely to dominate the import substitution effect. Reinforcing this is the possibility, unaccounted for in our model, that the income elasticity of demand for nontraded goods might be greater than one. This would tend to make the transfer effect greater than that predicted by the model. In summary, then, while a decrease in import prices will certainly cause some loss of employment in the import competing sector, it is most likely that the net aggregate effect of such price changes would be to increase employment in Newfoundland. This view certainly is contrary to that of the Sullivan Commission.[9] The reason for this difference is that the Sullivan Commission view considers only the direct effects on the import competing sector and ignores the general equilibrium effects (particularly the transfer effect) on the rest of the Newfoundland economy.

We have assumed so far that the main effect of transportation subsidies in Newfoundland has been to decrease import prices by the amount of the subsidy. What other effects are possible? First, Newfoundland does export some goods and services to other parts of Canada. If the province is a price taker in these export markets, then the transportation subsidies will tend to raise the price received by Newfoundlanders for these exports. This will have both a direct employment creating effect in the export sector and an indirect transfer effect working in the same direction.

Second, to what extent have the transportation subsidies simply altered modal choices without actually lowering transport costs? If the subsidies have tended to favour the highest cost producer of transportation services, then it is possible that their main effect would have been to permit that producer to maintain (or expand) his share of the transportation market without significantly affecting the cost of the services to users. In fact the subsidy might preserve the monopoly position of a dominant supplier of transportation services and actually have the effect of raising transportation prices above what they would be in the absence of the subsidy.[10] The MFRA and ARFAA have long come under criticism for discriminating between different traffic modes (initially in favour of the railroad) and have gradually been amended to extend their coverage. However the Gulf Subsidy on the rail ferry link from North Sydney to Port-aux-Basques and the accompanying operating subsidy to the railroad have been of a completely different order of magnitude than the subsidies granted to any other transportation mode in Newfoundland. This distortion has had a profound effect not only on modal choice but on the spatial structure of the Newfoundland economy. The Economist Intelligence Unit concluded in 1967 that "The Canadian taxpayer has therefore been required to subsidize the most costly method of getting traffic to and from Newfoundland and to enable the railways to drive lower cost carriers out of business".[11] Despite the huge differential subsidy in favour of the rail ferry link, and despite previous pricing practices on the ferry which further discriminated

against trucking, other shipping modes have developed to provide some alternative to the gulf ferry and rail route.[12] However there is no doubt that the discriminatory subsidy rate structure still imposes very heavy costs simply through the economic waste caused by inefficient modal choices. This waste is illustrated very well by the following example constructed by the Sullivan Commission:

> "Suppose - to take a hypothetical example of a subsidy being paid directly to the carrier from the Newfoundland situation - the transportation of goods to Newfoundland by a combination of rail and gulf crossing actually costs $80.00 per ton. A subsidy of $65.00 per ton can be paid which would reduce the cost to the shipper to $15.00 per ton. Direct water shipment may cost only $20.00 per ton, but if no subsidy is paid, then the resulting cost to the shipper is $20.00 per ton. Given these circumstances, the shipper would undoubtedly select the mode of shipment for which he had to pay $15.00 rather than that for which he had to pay $20.00 per ton. This would be so, even if there were definite advantages for the customer in the direct water shipment. That is, the direct water shipment might provide a somewhat better service in terms of total time taken, dependability, door to door delivery, etc., but unless these advantages were such that they could totally compensate for the $5.00 per ton difference which the shipper would be required to pay, the shipper would, quite understandably, elect to ship by the method for which he would pay least. This would mean, in effect, that an extremely expensive and inconvenient service would persist while the cheaper and more effective service would suffer in comparison and might eventually be forced out of business entirely.[13]

The inefficiencies arising from modal choice decisions are not the only ones introduced by the subsidy system. To the extent either that goods vary in transportation costs per dollar of final value or that the subsidies vary across commodities, there will be further waste induced in the choice of production levels

of various goods in the economy. If goods vary in their "transportation intensity", transport subsidies will tend to bias production in favour of more transport intensive export goods and less transport intensive import goods in Newfoundland, leading in both cases to an excessive use of resources in the transportation sector. If subsidies discriminate across commodities, there will be a tendency to increase use of the heavily subsidized goods to a point where their social opportunity cost is greater than that of less heavily subsidized commodities.

The current bias of transportation subsidies in Newfoundland tends to favour the nontraded goods sector at the expense of the import competing and export sectors. A particular and enormously important instance of this, one not often thought of in this context, is the case of the export of Churchill Falls hydro electric power. In order to export this power through Quebec (the most efficient route) it was agreed to sell the power to Hydro Quebec under the terms of a long term agreement at a price of about 3 mills. Since the current market price of hydro electric power is greater than 20 mills, the agreement with Quebec amounts to a very sizeable transportation tax on exports of electricity. The total size of this tax was estimated to be $725 million in 1978.[14] This is more than four times larger than the total level of federal transportation expenditures in Newfoundland in 1977 (see Table 1 above). Since the same problem must be faced in the development of further hydro electric capacity in Newfoundland, this transportation tax will be a

considerable factor in distorting future resource allocation decisions in the province. An additional irony here is that while it is Quebec, through this transportation tax, that has managed ex post to capture most of the economic rents from Churchill Falls, it is Newfoundland that suffers from getting a large negative equalization entitlement in respect to this provincial revenue base.

We can summarize our major conclusions concerning transportation policies rather briefly. The large subsidies on the transportation of Newfoundland's imports probably have caused a shrinkage of the import competing sector in Newfoundland, but probably have had an overall affect of increasing employment in the province.[15] The "transport tax" on hydro electric exports has served to delay future developments of the resource and has had enormous negative transfer effects that undoubtedly have blocked a major source of employment growth in the province. To the extent that it is felt desirable to continue the use of transportation subsidies for employment creation, these subsidies should be nondiscriminatory across classes of commodities (e.g., exports vs. imports) or modes of transport (e.g., rail vs. truck). However to minimize the costs of employment creation, general production subsidies for all commodities would be preferable to general transportation subsidies, and general wage subsidies would be better still. Transportation subsidies are a very blunt instrument for this purpose and introduce many costly and unnecessary distortions in the allocation of resources. The

distances between Newfoundland and Canadian markets are real and the social costs of traversing these distances are large. These costs must be borne by someone, and so it is in the social interest to price transportation services so as to reflect these costs and to induce people not to squander these valuable resources. If this results in socially unacceptable levels of unemployment, this problem can be attacked directly through wage or employment subsidies.

C.2 The Fishery and Other Industry-Specific Subsidies

We turn now to another expenditure switching type of policy instrument aimed at increasing employment, industrial subsidies, either general or directed at particular firms or industries. We look first at a particular industry that has received many types of subsidies, the fishing industry, and then we go on to discuss some general issues.

The Sullivan Commission's preoccupation, alluded to above, with jobs created or lost in particular industries (in their case the import competing industries) is a common problem with economic planning. In fact a very common approach to development planning is to examine the employment prospects in particular key sectors and then to devise policies to supplement projected employment if this falls short of anticipated job requirements. The result is often a proliferation of subsidies and tax concessions to particular industries or sectors instead of an overall policy

(such as a wage subsidy) aimed directly at the major source of the region's problems (unemployment due to unfavourable demand expansion relative to labour supply growth, combined with insufficient downward inflexibility of wages). The cost of these ad hoc policies can be enormous from the viewpoint both of public sector revenue requirements and of the waste due to inefficient resource allocation decisions induced by the discriminatory nature of the subsidies which mask the market signals regarding relative scarcities in the economy.

The fishery always has been a key sector in the Newfoundland economy, and although its economic importance has diminished over time, its symbolic value has not. The industry has always received a great amount of attention and support from both levels of government, but the amount and variety of subsidization expanded enormously in the early 1970's during the "Great Crisis" when fish stocks were depleted by overfishing and fish prices fell as well. Now, as the fish stocks are recovering and Canada has claimed exclusive jurisdiction out to the new 200 mile limit, there is renewed optimism and a need to reassess government policies in relation to the fishery. In an impressive series of documents, particularly Setting a Course, the Kellog Report and the Minister of Fisheries' White Paper the provincial government has set forth a body of analysis and plans concerning the future development of the fishery. Although the emphasis in these documents is on the implications of the 200 mile limit (extended jurisdiction) and on the issue of the division of harvesting

resources between the inshore and the offshore sectors, they also contain some fascinating analysis and recommendations concerning the extent and nature of government subsidization of the industry. It is to these issues that we wish to draw some attention. Since we have not closely examined the Kellog Report, most of our comments will be related to the other two documents.

All of these documents recognize the very great extent to which the fisheries have relied on public support in many different forms and come down in favour of a significant lessening of this dependency by establishing a viable self supporting industry in the private sector. It might be worthwhile to quote at some length from the Executive Summary of SAC (pp. 11-12):

> "Prior to 1974, government assistance to the fishing industry was primarily directed towards increasing the capability of the harvesting sector. The near-shore and inshore (longliner) sectors continue to be supported by considerable provincial funding. Furthermore, the Province is still committed to a fishing gear assistance program based primarily on the volume of landings a fisherman makes in any given year. The major direct assistance program presently provided by the Federal Government is a groundfish deficiency payment which provides direct payments to independent vessel operators. It is anticipated that this program will terminate later this year.
>
> The Unemployment Insurance Program provides a major source of supplementary income to seasonal fishermen and plant workers. The need for supplementary income and direct support programs will be reduced as reasonable levels of income are generated by an increasingly viable fishery.
>
> Government support can play a significant short term role in stimulating development in certain sectors of the fishery. Such programs should be carefully designed and time limited because if they

> become institutionalized, they tend to encourage marginal and sub-marginal operators to enter the fishery. The ultimate goal must be to eliminate direct government support when the fishery can generate sufficient returns to remain a viable and stable sector of the economy. This does not necessarily preclude government assistance should the industry experience extraordinary difficulty because of factors such as weakened market conditions or catch failures. Even those conditions should, for the most part, be addressed through mechanisms such as contributory Catch Insurance and Market Stabilization Funds".

In a similar vein the White Paper states (p. 23):

> "The single most important role of government in fostering fisheries development is to create the proper environment in which private sector initiatives, through rational resource exploitation, can provide maximum social and economic benefits to the economy at large. It is recognized that government financial support can provide a meaningful short term role in stimulating development in various sectors of the fishery. However, the ultimate goal must be to eliminate direct government support when it is apparent that the industry can generate sufficient internal returns to meet its development requirements."

These general recommendations are supported in SAC by a description of the history and some of the effects of government assistance in all sectors of the fisheries industry. In the case of the harvesting sector, it is estimated that provincial financial support in the 1977-78 fiscal year, in the form of tax rebates on fuel and gear, subsidy payments for vessels and gear, interest rate subsidies to boat buyers, etc., amounted to $11.7 million, or 13.8 per cent of total value landed (SAC p. 134). This does not include capital or operating costs of publicly provided fishing facilities or federal subsidies in the form of support prices, vessel subsidies, marine insurance, seasonal UIC

benefits, etc. It is concluded that all this public sector support does little to increase total fishing incomes; rather, it serves to increase harvesting costs through over capitalization and, price increases of many inputs, and to induce many marginal fishermen to enter the fishery. (SAC pp. 136-38) The report recommends "a planned phase-out of existing subsidy programs (as) a means of increasing the viability of fishing units (and) encourag(ing) fishermen to increase the amount of effort they expend in the fishery. The least efficient fishing units will withdraw from the fishery and those remaining would, perforce, be more productive". (SAC p. 129) The specific proposal is for a "Catch Incentive Program" whereby "all support programs operated by the province could be incorporated into a single program which supports the inshore fishery on a 'volume-of-landings' basis". (SAC p. 144)

Conspicuously absent at this stage of recommendations is any mention of the UIC program. This is unfortunate since, as was pointed out in our report from SAC above, unemployment insurance serves as a major source of income support, especially for the seasonal inshore sector. The effect of unemployment insurance in seasonal industries can be illustrated as follows. In the absence of unemployment insurance coverage of seasonal workers, workers would reallocate themselves between seasonal and non-seasonal employment until

$$w_s(1 - t_s) + h = w_n(1 - t_n)$$

where w_s and w_n are annual wages received in the seasonal

and nonseasonal sectors respectively, t_s and t_n are the corresponding tax rates, and h is the value of the additional "leisure" time enjoyed by seasonal workers during the off-season. In the absence of other distortions the resulting allocation will be efficient. The introduction of unemployment insurance benefits for seasonal workers adds another term to the left side of the equilibrium condition so that it becomes

$$(w_s + b)(1 - t_s) + h = w_n(1 - t_n).$$

The term b represents the annual unemployment insurance benefits (assumed to be taxable) that can be expected by a seasonal worker. Viewed this way, unemployment insurance creates a distortion inducing a greater than optimal supply of labour in the seasonal sector of the economy. In addition, since the relative size of the seasonal sector will have grown, the amount of seasonal unemployment in the province will be larger. In effect the UI Act provides a guaranteed annual income supplement to workers in the seasonal fishery.[16] The size of the wedge introduced by this aspect of unemployment insurance depends on the size of b. Very rough estimates suggest that the size of this wedge for seasonal fishermen might be in the neighbourhood of $3,000 per fisherman per year. One effect of unemployment insurance, therefore, is not only to exacerbate the common property resource over exploitation problem, but also to distort the allocation of workers between the seasonal (inshore) and nonseasonal (offshore) fishery.

Another distortion caused by unemployment insurance in the fishery arises from the short qualifying period. When the qualifying period is less than the normal employment season, workers might be expected to reduce their work effort since the opportunity cost of an extra day's wages becomes not only a day of leisure but also some unemployment insurance income. This is aggravated by the rules governing part-time work while on unemployment insurance and the determination of benefit levels. The ceiling on allowable part-time work acts as a strong disincentive for, say, fish processors to work for short periods of time late in season as do the rules which determine benefit levels as a percentage of the most recent work period's wages rather than, say, the best 10 weeks' wages during the qualifying period. "The ten week syndrome" is a phrase that has been coined to describe this complex of phenomena. The same rules make it very difficult for firms to recruit workers for short term work after they have met the 10 weeks eligibility requirement.

It also is alleged that the current unemployment insurance system encourages various forms of communal work sharing to maximize unemployment insurance benefits. For instance, if a group of individuals agrees to share a job so that each one works just a sufficient length of time to qualify for unemployment

insurance benefits and then passes the job on to the next person in order to collect benefits for the rest of the year, the combined market, non-market and transfer income of the group would be much larger than it would be in the absence of unemployment insurance. Such schemes might, of course, be quite advantageous to the people of Newfoundland and only result in a loss of real output to the extent that they lower productivity and provide a disincentive for the labour force to move out of industries or locations where such schemes are possible. If there is very little learning by doing or if the human capital acquired by work experience does not decay very rapidly from lack of use, the productivity effects might be quite low. However, we would be surprised if this does not hinder the migration of labour from rural to more urbanized environments. In addition, it also must tend to increase labour force participation and measured unemployment.

While the magnitude of any of these effects is unknown, it is clear that the unemployment insurance system as it applies to fisheries provides many adverse incentives and we would not be surprised if the coexistence of unemployment insurance as currently administered and a small, rural, seasonal labour market combine to make the effects greater than might be found in other industries and other parts of the country. This makes it particularly disappointing that the authors of Setting a Course did not deal with the issues arising from unemployment insurance when making policy recommendations. It seems clear that whether

the goal is to provide income support to workers in the fishing industry or to provide insurance against the risk of cyclical swings in the industry, far better policies than unemployment insurance might be imagined. At the very least, many obvious amendments to the unemployment insurance program could have been proposed.

The general discussion in SAC of the processing sector is similar to the analysis of the harvesting sector. There is a discussion of the various forms of public sector intervention. The provincial government controls entry through its licensing requirements. A recent change in policy requires an impact study for new licence applications to establish that the granting of a licence will not adversely affect existing plants. With respect to financial support there is a description of the tendency in recent years for DREE and to some extent NLDC funding of expansion to replace other provincial programs (SAC pp. 216-18). The general role of the federal government in supporting the industry during depressed market conditions is well documented (SAC pp. 215-16). Finally, there is a description of government equity involvement in the form of provincial ownership of large plants in particular instances and in the form of provision of provincially owned community facilities which are adapted at minimal cost by the private sector to provide the scores of small seasonal processing operations throughout the province. Almost all small plants are of this type. (SAC pp. 218-19 and 224). It is concluded that there is no need for this government support.

With respect to new investment, "the private sector can effectively respond to processing sector requirements". In addition the province also is advised to divest itself of any publicly owned establishments and, where such ownership continues, to rent facilities at full market value. (SAC pp. 355-56).

The general message in SAC is that public sector intervention tends to misallocate resources within the fishing sector and between fishing and other activities; it distorts market signals and prevents resources from responding to changes in the environment. The cost to the people of Newfoundland might be quite large. It is a great disappointment, therefore, to discover that while the White Paper utilizes much of the free market rhetoric of SAC (see the earlier quotation above) the actual recommendations look very much like simply more of the same policies so effectively criticized in SAC. There is no proposal for consolidating and for reducing the bewildering set of subsidies to the fishing industries. There is no mention of amending the UIC scheme or implementing a catch insurance program. All the government is able to say is that the existing subsidy programs "will be modified in response to changing needs within the industry" (White Paper p. 23). In addition to the continuation of existing programs the government proposes that a set of new "initiatives will be undertaken by government in the short term to promote further developments" within the industry (ibid. p. 23). Central to the plan is a "Primary Landing and

Distribution Centre Concept" at a cost of at least $61 million exclusive of fleet costs.

While the economic analysis in SAC is sound and the explanation of the ways in which various policies have created economic waste is lucid and informed, when it comes time to make recommendations, expecially in the White Paper, the government seems to ignore the existence of scarcity in the fisheries sector. The White Paper seems unwilling to acknowledge that the fishery can provide decent incomes for only a limited number of persons. Even if the fairly labour intensive midshore and inshore options outlined in SAC are pursued, it is unlikely that with the current market situation (generally acknowledged to be a boom time) any number of inshore and midshore fishermen close to the almost 21,000 outlined in the White Paper (see Appendix IV) could be supported with reasonable incomes in the absence of massive and permanent subsidization. While the government seems to be aware that some short term assistance might be required to achieve its goals, it seems to feel that the fishery is an "infant industry". Notwithstanding the fact that the fishery has existed in Newfoundland for four centuries, the view appears to be that the industry is at an infant stage where with some initial "developmental" assistance it can soon expand and become viable in the longer run without any further government assistance. (See p. 24 of the White Paper). More likely, in our opinion is that to achieve the government's employment goals would require that the industry be made a costly and permanent ward of the state.

The infant industry argument, the distortions caused by ad hoc collections of subsidies to particular activities, and many of the other phenomena observed in this discussion of the government support of the Newfoundland fishery simply illustrate some of the general problems we had raised in other contexts earlier. We conclude this discussion of industrial subsidies as a form of expenditure switching policy with a few more general observations.

First, the infant industry argument seems to be implicit in more than just fishing subsidy programs. DREE'S RDIA program, for instance, gives grants for capital expansion to create new jobs for a maximum of three years. The assumption must be that after these three years the firm will be able to continue at this higher level of activity without further government support. It is not at all clear why this would be the case, unless, of course, the subsidy simply gave the firm a temporary advantage which permitted it to displace another firm in the industry. To the extent that this is the case, of course, the net job creation from RDIA grants is considerably diminished.

What might happen is that industries will be created in which it is fully expected that government support is required in order to succeed. If a firm does not succeed in getting government support, it will fear competition from firms that do succeed in getting such support. There are three effects this will have. First, industries in which government support is prevalent might,

ironically, produce less capacity than they would have in the absence of subsidization. This might be particularly true in cases where the form of government subsidization is to acquire ownership of firms in the industry. For instance, despite apparent excess demand for hotel space in Newfoundland, there seems to be little capacity expansion. It might be the case that potential entrants fear competing with the government owned Holiday Inn chain in the province or other hotels who benefit from significant subsidies from DREE or other government agencies. The other effect is that a great deal of entrepreneurial effort will be expended in seeking government funding rather than in more socially productive activities such as market research, etc. As Dan Usher put it, there is danger that subsidies will "alter the whole climate of business in the region... You create situations where the way to make money is to convince someone that you need a subsidy ... It can create a situation where firms become clients of the government, where the way to make money is to persuade somebody... that you need a subsidy, and to put your resources into the process of persuasion".[17] The third effect, implicit the other two is that through discriminatory subsidization the government might create monopoly situations where none might have existed in the absence of the subsidies. This sort of effect certainly has occurred in the past in the transportation industry serving Newfoundland.

The final point we want to make concerning the usefulness of industrial subsidies to achieve expenditure switching effects is that it is important to consider the possibility of retaliation by other jurisdictions. Under Section 303 of the U.S. Tariff Act of 1930, when any foreign country pays a "bounty or grant upon the manufacture or production or export of any article or merchandise", a countervailing duty equal to the amount of the bounty or grant must be imposed (in addition to any existing protection). This provision has been applied in several recent cases: 1) to the export of tires from the Michelin plant in Nova Scotia after it had received a DREE grant; 2) to the export of optics liquid level sensing systems by Honeywell Ltd., of Toronto after they had received an R & D grant under the Program for the Advancement of Industrial Technology; 3) to the export of groundfish because of subsidies to the fishing and trawler industries in Canada. These practices impose severe limits on the ability of the federal or provincial governments to pursue many types of expenditure switching policies, particularly when they are aimed at export promotion. One of the reasons for the underdevelopment of the fish processing industry in Newfoundland is the high level of effective protection afforded the New England industry by the U.S. tariff system. It is unlikely that "countervailing subsidy" programs in Canada would not be met by retaliatory measures in the U.S. The United States, of course, is not the only possible "villain" in this piece. In fact, we need not go outside of the boundaries of Canada to recognize the potential for competition between provinces to lure industry into

a particular jurisdiction. While it might appear in the first instance to be reasonable for a poor province to offer tax concessions or subsidies to attract industry into the province for employment reasons, the recent case of the location of a new Ford plant in Ontario leaves no doubt as to which provinces (if any) would be the winners in the case of general competition of this sort.[18] The general point here is that programs cannot be designed without considering the possible responses of other governments. Such responses will create serious constraints on any use of industrial subsidies to create employment.

D. Conclusions

The Newfoundland economy is heavily dependent on government transfers from the rest of Canada and these have served to keep the levels of employment, the size of the non traded goods sector and the real wage much higher than they would have been in the absence of transfers. In the absence of real wage reductions and exogenous changes in productivity, export demand, etc. all of which might cause employment to rise and permit Newfoundland to become less dependent on transfers one could imagine, and in fact governments have tried, various types of expenditure switching policies designed to accomplish the same goal. We argued that if expenditure switching policies are to be used at all the first best expenditure switching policy would be a wage subsidy program of the sort discussed in the previous chapter. Any other type of subsidy would introduce unnecessary and wasteful distortions in the allocation of resources between different types of activities in the province.

We examined several types of expenditure switching programmes currently affecting the Newfoundland economy and pointed to a great deal of waste induced by them. The massive transportation subsidies on the Gulf and the railroad have probably done very little for the Newfoundland economy and have produced large intermodal distortions. At the very least the introduction of a scheme of transportation subsidies that was neutral with respect to modal choice and the destinations of products should be called for. Better still would be the use of this money for some form of general production subsidy or wage subsidy in the province. The fishery has also been the target of a bewildering and expensive set of subsidies ranging from gear subsidies to the guaranteed annual income supplement to seasonal workers provided under the current unemployment insurance system. These programmes have been introduced under different circumstances and for different purposes -- some for special income support during cyclical downturns and others to provide more general and permanent subsidization to one group or another. Far better than the present system would be, first, a properly designed income stabilization programme to deal with problems of cyclical instability, and second, an employment wage or output subsidization programme that was neutral not only between different activities within the fishery (inshore or offshore; harvesting vs. processing) but also between the fishery and other sectors of the economy. We have little doubt that this would have the effect in the short run of inducing quite large reallocations of labour -- in particular the number of inshore fishermen would be likely to

fall drastically. To cope with this a very generous adjustment assistance programme would have to be designed as part of the general change in policy.

In the final pages of the chapter we drew attention to some general problems with the design and implementation of expenditure switching policies -- particularly in the form of industrial subsidies. These included: misuse of the infant industry argument for subsidization; subsidies as a barrier to entry; misallocation of entrepreneurial talents in a subsidy-ridden economy; and the possibility of retaliation by other governments.

Footnotes

1 See, for instance, A.D. Scott (1965), Wayne Thirsk (1973), T.J. Courchene (1970) and (1978)

2 See Bruno (1978), Krugman (1978), Officer (1976) and Samuelson (1964) for instance.

3 This is an example of the general rule that the first best policy to direct at any market distortion is one aimed at the marked in which the distortion occurs - in this case the labour market. The literature on distortions and welfare has been well summarized elsewhere. See, for instance, J. Bhagwati (1968), (1970), H.G. Johnson (1965), W.M. Corden (1974).

4 This table appeared on p. 62 of Volume 2 of the Sullivan Report.

5 Ibid., p. 62.

6 Ibid., p. 38.

7 This substitution effect is considerably diminished by the fact that a large part of the nontraded goods sector comprises the distribution and sales of import goods. Consequently there is a considerable degree of complementarity between the two sectors; an increase in imports will increase employment in the distribution and sales sector.

8 It is also possible, of course, that the release of factors of production from the import competing sector will cause their prices to fall. If these factors are a major determinant of costs in the export sector, there would be an expansion in output of export goods. Then, whether the import substitution effect caused a rise or fall in employment would depend on relative labour intensities of the import and export goods sectors. A fall in factor prices would also cause a greater increase in production of nontraded goods.

9 See especially p. 201 of Volume 1 and pp. 39-41 of Volume 2 of the Sullivan Report.

10 This argument is outlined in H. Mohring (1974).

11 Atlantic Provinces Transportation Study, Volume VII, Special Studies of Newfoundland, p. 18.

12 See pp. 74-80 of Volume VII of the Atlantic Provinces Transportation Study which describes the tariff structure, the inadequate facilities for handling trucks on the ferries, and discriminating rules such as the requirement that all vehicles be accompanied by drivers and all semi-trailers by tractors. Many of these observations are less valid today than they were at the time this study was written in the mid-1960's.

13 Sullivan Report, Volume 1, pp. 198-199.

14 See Government of Newfoundland and Labrador (1978).

15 Any shrinkage of the import competing sector that occurred at the time of Confederation in 1949 might just as easily have been the effect of higher wages caused by the large inflow of transfers in all forms that came at the time of Union, as well as the wage parity forces that were unleashed by the promises of being able to emulate Canadian living standards as a result of Confederation. The expenditure switching effects of import substitution induced by transport subsidies might have been quite small.

16 See S. Ferris and C. Plourde (1979), "Fisheries Management and Employment in the Newfoundland Economy" (mimeo., ECC Newfoundland Reference).

17 Dan Usher (1977), p. 157.

18 This practice is, of course, not new to Canada. T. Naylor (1975) Chapters 12, 13 provides a provocative description of the "bonusing system" in Quebec and Ontario in the late nineteenth century. This is the system whereby manufacturers provoked competition among governments to maximize the concessions they would extract to locate in a particular municipality.

Chapter 5

Conclusions

Newfoundland has a small and very open economy with many important links with other regions of Canada. These links include goods markets (especially imports), labour markets (migration and wage rate determination), capital markets (investment and technology transfer) and governments (a high level of net transfers from the federal government). Her economy is also much more troubled than those of many other regions. The most important manifestation of regional disparities is the very high rate of unemployment in Newfoundland.

We have constructed several simple models of interregional adjustment mechanisms based on the general characteristics of the Newfoundland economy and have used these to examine the nature of the economic environment and the effectiveness of various economic policies which might be or have been used by governments in order to reduce disparities between Newfoundland and other regions. The first of these models (Chapter 2) outlined some of the processes whereby transfers and productivity growth affect the level of employment. The major conclusion was that productivity improvements cannot be relied upon to raise employment levels. First, the cost of productivity improvements (through capital investment, speeding up adoption of technology, investment in the discovery of new production techniques) might be very

high and must be weighed against any possible benefits. Second, it is not at all clear that productivity growth will have the desired effect on the level of employment. If the new technology has a labour-saving bias (e.g. replacement of axes by chain saws in lumbering or of inshore fishing boats by deep-sea trawlers) or if it is introduced in the non-traded goods sector (e.g. construction or retailing), it may well have the effect of reducing overall employment. Furthermore it may also have the effect of increasing the wages of those who are currently employed or, worse still from the viewpoint of Newfoundlanders, increasing the outflow of profits to foreign owners of Newfoundland's resources. Third, even if employment is increased this will not reduce unemployment (it might well increase it!) if the creation of new jobs reduces the rate of outmigration, leads to new inmigration or induces increases in labour force participation (see Chapter 3). While there is no doubt that productivity growth can be beneficial in a more general sense, there are many reasons to believe that it will not manifest itself in a reduction in Newfoundland's unemployment problem.

The view of the unemployment rate as an equilibrium phenomenon in conjunction with wage rigidity (or wage parity) and in flows of government transfers was developed further in Chapter 3 in order to explore the evaluation of the social opportunity cost of labour in Newfoundland. Contrary to some popular views we argued that the existence of high levels of unemployment in Newfoundland is not sufficient to prove the case that the social opportunity

cost of labour there is less than the market wage rate and that employment in Newfoundland should be subsidized. The social opportunity cost of labour depends not only on Newfoundland's unemployment and wage rates but also on the responsiveness of migration to new job creation in the province and on the wage rates in regions of destination (and source) of Newfoundland's migrants. If the decrease in migration from (or increase in immigration to) Newfoundland is sufficiently large, as it might well be especially in the presence of current high levels of interregional transfers, the opportunity cost of labour will actually exceed the market wage rate in Newfoundland. On the basis of available evidence the efficiency argument for wage subsidies in Newfoundland, especially for the more mobile segments of the labour force is very weak indeed.

If, however, it is decided on either efficiency or equity grounds to make use of expenditure switching policies to increase employment in Newfoundland, we argue that the first best or most efficient policy is some form of wage or employment subsidy. In the latter part of Chapter 3 we discuss some practical aspects related to the design of such a program, and in Chapter 4 we deal with other forms of expenditure switching policies and analyze the effects of some such policies which have been or are in effect in Newfoundland, or which have been proposed for the future. We illustrate the extent of waste that can be generated by inappropriate policies and argue that there is great scope for improvement in Newfoundland's economic performance simply through

some major redirection of subsidy (and tax) policies. These points are illustrated with reference to transportation subsidies, "taxes" on exports of hydro electric energy, fisheries subsidies and other industry-specific subsidy programs.

The economy and therefore the people of Newfoundland have suffered too long at the expense of misguided policies emanating from both federal and provincial governments. While there are no simple solutions to the problems faced in Newfoundland, some of the simple principles underlying the economic models presented in this study might aid in the understanding of the implications of different policy choices.

References

Atlantic Development Council of Canada (1978), The Atlantic Region Economy: A Development Strategy for the 1980s, (Nov.).

Auer, L. (1979), Regional Disparities of Productivity and Growth in Canada, (Economic Council of Canada).

Azariades, C.L. (1975), "Implicit Contracts and Underemployment Equilibria", Journal of Political Economy, 83 (Dec.) 1183-1222.

Baily, M.N. (1974), "Wages and Employment under Uncertain Demands", Review of Economic Studies, 41 (Jan.) 37-50.

Barro, R.J., and H.I. Grossman (1976), Money, Employment and Inflation, (Cambridge and New York, Cambridge University Press).

Bhagwati, J.N., and T. Srinivasan (1974), "On Reanalysing the Harris-Todaro Model: Policy Rankings in the Case of Sector-Specific Sticky Wages", American Economic Review, Vol. 64, No. 3, (June).

Bhagwati, J. (1968), The Theory and Practice of Commercial Policy, Frank Graham Memorial Lecture (1967), (Princeton University, International Finance Section).

_____, (1970), "The Generalized Theory of Distortions and Welfare", in J. Bhagwati et al. (eds.), Trade, Balance of Payments and Growth (Amsterdam: North Holland Pub. Co.).

Blomqvist, A.G., "Urban Job Creation and Unemployment in LDC's", Journal of Developments Economics, 5 (1978), 3-18.

Boadway, R.W. (1978), "A Note on the Treatment of Foreign Exchange in Project Evaluation", Economica, 45 (Nov.) 391-9.

Boadway, R.W. and A.G. Green (1981), "The Economic Implications of Migration: The Case of Newfoundland" Economic Council of Canada discussion paper (forthcoming).

Boadway, R.W. and F.R. Flatters (1981), "The Efficiency Basis for Regional Employment Policies" Canadian Journal of Economics (February).

Borts, George H.L. (1966), "Criteria for the Evaluation of Regional Development Programs", in W.Z. Hirch (ed.), Regional Accounts for Policy Decisions, Papers presented at the Conference on Regional Accounts, 1964, Resources for the Future, Inc., (Baltimore: The Johns Hopkins Press).

Brecher, R.A. (1974), "Minimum Wage Rates and the Pure Theory of International Trade", Quarterly Journal of Economics 88 (Feb.) 98-116.

Bruno, M. (1978), "Exchange Rates, Import Costs and Wage-Price Dynamics", Journal of Political Economy.

Buchanan, James and John E. Moes (1966), "A Regional Countermeasure to National Wage Standardization", American Economic Review, Vol. 50, No. 3, (June) pp. 434-38.

Bursy, Brian (1979), "A History of Economic Development in Newfoundland" Economic Council of Canada, mimeo.

Canadian Kellog Company (1979), A Primary Landing and Distribution Centre Feasibility Study (St. John's,) (Kellog Report).

Copithorne, L., F. Flatters and P. Smith (1979), "The Newfoundland Economy: An introduction to the Issues", Economic Council of Canada, mimeo.

Corden, W.M. (1974), Trade Policy and Economic Welfare (London, Oxford University Press).

Courchene, T.J. (1978), "Avenues of Adjustment: The Transfer System and Regional Disparities", Chapter 4 in Michael Walker (ed.), Canadian Confederation at the Crossroads: The Search for Federal-Provincial Balance, (The Fraser Institute).

_____, (1970), "Interprovincial Migration and Economic Adjustment", Canadian Journal of Economics 3 (Nov.) 550-76.

Economic Council of Canada (1977), Living Together, Minister of Supply and Services Canada.

_____, (1978), Fifteenth Annual Review: A Time for Reason, (Ministry of Supply & Services).

The Economist Intelligence Unit, (1967), Atlantic Provinces Transportation Study, (Ottawa, Queen's Printer, January).

Ferris, S. and Plourde, C. (1979), "Fisheries Management and Employment in the Nfld. Economy" (mimeo, ECC Nfld. Reference).

Findlay, R., and S. Wellisz, (1976), "Project Evaluation, Shadow Prices, and Trade Policy", Journal of Political Economy 84, (June) 543-52.

Flatters, F.R. and D.D. Purvis (1980), "Ontario: Between Alberta and and the Deep Blue Sea?" Queen's University, mimeo.

Flatters, F.R., R. Krelove and P. Smith (1979), "Notes on Governments and the Newfoundland Economy" Economic Council of Canada, mimeo.

Flatters, F.R., V. Henderson and P. Mieszkowski (1974), "Public Goods, Efficiency and Regional Fiscal Equalization", Journal of Public Economies (May).

Government of Canada (1978), Report of the Commission of Inquiry into Newfoundland Transportation, Volume 1 (Minister of Supply and Services Canada, July) (Sullivan Report).

_____, (1979), Report of the Commission of Inquiry into Newfoundland Transportation, Volume 2 (Minister of Supply and Services Canada, February) (Sullivan Report).

Government of Newfoundland and Labrador, Department of Fisheries (1979) Setting a Course: A Regional Strategy for Development of Newfoundland Fishing Industry to 1985, (St. John's).

Government of Newfoundland and Labrador, Minister of Fisheries (1979) White Paper on Strategies and Programs for Fisheries Development to 1985, (St. John's).

Government of Newfoundland and Labrador (1978), "Into the 1980's: A Blueprint for Development" (St. John's).

Hamermesh, Daniel S. (1978), "Subsidies for Jobs in the Private Sector", in J. Palmer (ed.). Creating Jobs: Public Employment Programs and Wage Subsidy, (Washington: Brookings Inst.)

Harberger, A.C. (1971), "On Measuring the Social Opportunity Cost of Labour", International Labour Review, 103 559-79.

Harris, J.R., and M.P. Todaro (1970), "Migration, Unemployment and Development: A Two-Sector Analysis", American Economic Review, 60 (March) 126-42.

Jenkins, G.P., and C. -Y. Kuo (1978), "On Measuring the Social Opportunity Cost of Permanent and Temporary Employment", Canadian Journal of Economics, 11 (May) 220-39.

Johnson, H.G. (1965), "Optimal Trade Intervention in the Presence of Domestic Distortions" in R.E. Caves, H.G. Johnson, P.B. Kenen (eds.), Trade, Growth and the Balance of Payments, (Amsterdam: North Holland Pub. Co.).

Jones, R.W. (1965), "The Structure of Simple General Equilibrium Models" Journal of Political Economy (December).

Kovacs, Paul (1979a), "Federal Employee Compensation Policy and Practice from a Regional Viewpoint" ECC mimeo.

_____, (1979b), "Downwardly Sticky Wage Demands: Survey Measures and Analysis" ECC mimeo.

Krugman (1978), "Purchasing Power Parity and Exchange Rates: Another Look at the Evidence," Journal of International Economics, 1978.

Malinvaud, E. (1977), The Theory of Unemployment Reconsidered, Oxford, Basil Blackwell), 1977.

Martin, F., N. Swan et al. (1979), The Interregional Diffusion of Innovations in Canada (Ministry of Supply & Services).

Mohring, H. (1974), "Transportation Subsidies and the Economic Development of the Atlantic Provinces" in K.W. Studnicki-Gizbert (ed.), Issues in Canadian Transport Policy (Toronto).

Muellbauer, J., and R. Portes (1978), "Macroeconomic Models with Quantity Rationing", Economic Journal, 88 (Dec.) 788-821.

Naylor, Tom (1975), The History of Canadian Business 1867-1914, Volume I and II, (Toronto: James Lorimer and Co.).

Officer, L.H. (1976), "The Purchasing Power Parity Theory of Exchange Rates: A Review Article", International Monetary Fund Staff Papers, (March).

Samuelson, P.A. (1964), "Theoretical Notes on Trade Problems", Review of Economics and Statistics, (May).

Scott, A.D. (1965), "Policy for Declining Regions: A Theoretical Approach" in W.D. Wood and R'S' Thoman (eds.), Procedings of a Conference at Queen's University on Areas of Economic Stress in Canada (Kingston: Queen's University Industrial Relations Centre, 1965).

Sen, A.K. (1972), "Control Areas and Accounting Prices: An Approach to Economic Evaluation", Economic Journal, 82 (March) 486-501.

Srinivasan, T.N., and J.N. Bhagwati (1978), "Shadow Prices for Project Selection in the Presence of Distortions: Effective Rates of Protection and Domestic Resource Costs"' Journal of Political Economy, 86 (Feb.) 97-116.

Swan, N. (1978), "Growth and Unemployment in Eastern Canada" ECC Discussion Paper #105.

Thirwall, A.P. (1979), "Regional Problems are Balance of Payments Porblems", mimeo, (January).

Thirsk, Wayne (1978), Regional Dimensions of Inflation and Employment (Ottawa: Minister of Supply & Services Canada, Prices & Incomes Commission).

Todaro, M.P. (1969), "A Model of Labour Migration and Urban Unemployment in Less Developed Countries", American Economic Review, 59 (March) 138-48.

Usher, D. (1977), "Comments on John Evans' Paper", in Queen's University and Department of Regional Economic Expansion, Canadian Regional Planning and Development in Transition, (Procedings of Colloquium held on February 16, 1977).

Zuker, Dick (1979), "The Implications of the Pattern of Inter-regional Trade for Fiscal Policy in Canada" ECC mimeo.