

THE UNIVERSITY OF MANITOBA

EVALUATION OF MANPOWER TRAINING PROGRAMS:
THE INTERLAKE MANPOWER CORPS

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ABSTRACT

This thesis deals with the ex-post economic evaluation of the Interlake Manpower Corps, an institutional training program designed for individuals of Indian and Metis origin in the Province of Manitoba. The program started operations in 1967 as part of the FRED Agreement between that province and the Federal Government. The main objective of this thesis is to provide measurements of program success from individual's, government's and society's standpoints.

The thesis commences with a description of the characteristics of trainees enrolled in the program since 1968, in terms of age, education, labour status and racial status. It is shown that, as predicted by models based on the theory of human capital, trainees are less educated and younger than the population in the Interlake region, and their pre-training earnings are lower than the Manitoba provincial average.

The theoretical rationale for government-sponsored manpower training is discussed. The theory of human capital is introduced and the efficiency and distributional implications of these types of programs is examined. A new methodological framework for evaluating the program is presented. This framework consists in the calculation of marginal benefits of an additional week of training, using earnings functions estimated from information about former trainees (the experimental group). The value of weekly allowances are also included as individual benefits. Opportunity costs are defined as the average value of expected earnings for those individuals without training (the norm group).

It is estimated that the present value of individual benefits, in 1975 dollars, exceeds the present value of individual costs for alternative rates of discount (personal time preference).

From a government's viewpoint, gains/outlay ratios larger than one are obtained. Gains are estimated by simulating the value of transfers savings and additional tax collection induced by the program. Outlay consists in operating costs per capita during 1968-1975. These costs are adjusted in order to consider the fact that some of the projects within the program not only provide training to individuals but also produce a physical output (ladders, park furniture, housing). Consequently, not all government expenditures correspond to training proper. Learning curves estimated by foremen's reports are introduced in order to approximate the proportion of total costs attributable to the training activity.

From a social viewpoint, social earnings functions are estimated for the experimental group in order to calculate productivity gains due to training. These benefits are reduced by mobility costs paid to trainees, by the social opportunity cost of labour and by the value of real resources diverted from other activities to the program. Social net present values are positive but lower than individual net present values.

It is concluded that it is socially and individually worthwhile to continue the program, and that the duration of training projects be extended beyond the 1968-1975 average duration (13 weeks), emphasizing the general aspects of training instead of the specific aspects.

A pattern of interoccupational mobility discovered in the thesis, and not explainable by the human capital framework, is discussed

and some of the possible reasons for its existence are presented. In addition, the issue of racial discrimination in wage determination is briefly examined, with special reference to the evidence gathered from program trainees.

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CHAPTER 1

INTRODUCTION

This study is concerned with the economic effects of the Interlake Manpower Corps (IMC). The IMC is an investment program which is designed to provide on-the-job training to low-income, low-education people, especially of Indian and Metis origin, in the Interlake Area of Manitoba. This program is part of a public investment package in the area, the FRED-Interlake Agreement, financed by the Federal Government of Canada and the Province of Manitoba for the period May 1967 to May 1977.

By January 1976, 1307 different individuals had been registered in the various projects covered by the Manpower Corps since its beginnings in 1968. The total expenditure by the Provincial and Federal Governments up to the fiscal year 1975-1976 was close to 4.8 million dollars. The Provincial share of the total FRED expenditure is 56%, while in the Manpower Corps Program it is 10%. The total estimated cost of the Program for the ten year period is 5.6 million dollars.

The rest of this chapter discusses the nature of the problem which frames the present evaluation, summarizes the objectives of this study and the methodology used in order to achieve them. A brief presentation of the sources of information is made, and followed by an overview of the thesis.

A. Nature of the Problem

Public expenditures in a depressed area provide a higher level of demand in monetary terms to the region, and following Keynesian

implications, a possible cure for the problem of unemployment. These expenditures may also increase the potential capacity of production in the region, creating supply effects sometimes overlooked in the literature. When investments in human beings are included in regional development programs, these supply effects, namely, increases in the productive capacity of the region, are significant.

Demand effects are usually studied in the context of the production structure existing in a region, by simulating the change in the absorption of income by sectors which is created by the initial change in investment in one particular activity.¹ It is assumed that each productive sector output reacts to changes in nominal demand, increasing product and income, and also employment according to some static marginal labour-output ratio. The key issue is that real production might not change at all when money demand rises because supply constraints in some sectors might exist, preventing output from increasing. One of these constraints is an imperfection in the labour market arising from inequality between the structure of the demand for labour and the structure of the supply of labour, together with a wage rigidity produced by non-economic factors. Investments in human beings, such as education and training, might correct this distortion by increasing total monetary demand and by helping to increase real output through elimination of labour market imperfection. The former effect would result with any type of investment, while the latter impact is a characteristic of this

¹For a study of this type in the area in which the present study will concentrate, see: Fu-Lai Tung, "A Dynamic Model for Simulating Resource Development Impacts in the Interlake Area of Manitoba," unpublished Ph.D. Dissertation, (Winnipeg: Department of Agricultural Economics, University of Manitoba, 1975).

particular type of investment. This study will not discuss either the demand impact of training programs in the area or the spillover of training benefits to other regions of the country. It will concentrate on the analysis of the effect of training on individuals' earnings and employability, on Government finance, and on the productive capacity of the region. The central hypothesis underlying this study is that manpower training has significant positive supply effects as measured by net social and individual benefits. These positive effects result in an improvement in both economic efficiency and regional labour productivity.

B. Objectives of the Study

Specific objectives of the study are:

- (1) To examine and identify the relative importance of the variables that determine the actual levels of earnings of trainees after training.
- (2) To analyze the extent to which characteristics of the Manpower Corps Program, such as duration of projects, trainee success in courses, etc., determine earnings differentials among trainees.
- (3) To develop a methodology for evaluating program effectiveness taking into consideration not only the characteristics of trainees, but also the timing of projects and the distribution of benefits and costs through time.
- (4) To introduce in the evaluation of training programs the differentiation between production costs and human development costs. Usually these two elements are separated in the appraisal of manpower training.

- (5) To show the pattern of occupational mobility of trainees and its possible effects on the efficiency of Manpower Corps Program.
- (6) To examine the hypothesis that racial discrimination exists in the determination of trainee's wages after training.

In the process of developing these points, the Manpower Corps Program will be described in a manner which has not been attempted before; that is, in terms of the characteristics of the individuals who have attended any project. Three approaches will be taken in studying the economic effects of the Program:

- (1) the trainee's point of view, in which benefits received and costs borne by direct participants in the Program are compared;
- (2) the Government's point of view, in which a simulation of the effects of the Program on the Government's ledger is made, and finally,
- (3) the evaluation of the impact of the Program from a general efficiency standpoint.

Contributions that can be derived from the present study include the following:

- (1) Individual trainees increase their earnings and employability after attending any Manpower Corps project. These increases are related to the length of the project and to the level of education prior to training.
- (2) Training programs for the disadvantaged can be economically efficient. Consequently, programming and planning of this kind of public investment should employ efficiency criteria for the determination of the level of that investment.

(3) The labour market information system for the Manpower Corps Program should be modified in order to include characteristics of trainees and their occupational mobility prior to training. This inclusion will facilitate the acquisition of reliable information about the individual labour market situation in the absence of training. The main limitations of this thesis are related to the poor quality of information about pre-training earnings.

(4) The separation of operating costs of the Program into production costs and human development costs influences the measure of efficiency of manpower training. Consequently, this separation should be attempted in the evaluation of the effects of the program on the government finance and on the general efficiency of the economy. A detailed methodology devised to consider this dichotomy is not proposed, but considerations based on technical reports from the project supervisors are used to illustrate this dichotomy and its impact on program effects measurements.

C. Methodology and Data

Methodology

The basic method used in this study for assessing the economic impact of the manpower training project is benefit-cost analysis. Its foundations lie in the theory of welfare economics, and although some of its postulates are widely accepted by most economists, some other are still the subject of dispute. Specifically, controversy exists over the separation of efficiency and distributional effects of any investment project, particularly in programs such as training for the disadvantaged

in which equity considerations are usually assigned a high priority.²

Some of the proponents for including redistributinal effects vis-a-vis efficiency considerations when regarding any public investment are Arthur Maas³ and Stephen Marglin⁴ while Burton Weisbrod⁵ feels they should be included especially in manpower training program. The basic tenet of their argument is that efficiency-oriented evaluations are not relevant for public decisions, and that this is the reason why economists have been unable in the past to predict political behaviour and develop normative rules.

The separation of the two effects in this study is the result of two considerations. First, investment under the FRED Agreement, although directed towards backward regions produces monetary leakages to more developed areas due to the nature of the multiple effect.⁶ If a correct appraisal of the redistribution of money income is to be done, these

²The non-separability of these two components in the provision of public goods has been demonstrated by M.C. McGuire and H. Aaron, "Efficiency and Equity in the Optional Supply of a Public Good," Review of Economics and Statistics, LI (February, 1969), pp. 31-39.

³Arthur Maas, "Benefit-Cost Analysis: Its Relevance to Public Investment Decisions," Quarterly Journal of Economics, 80:208, May 1966.

⁴Stephen A. Marglin, Public Investment Criteria, (Cambridge, Massachusetts: M.I.T. Press, 1967), p. 209.

⁵Burton Weisbrod, "Concepts of Costs and Benefits," in Problems in Public Expenditure Analysis, ed. S.B. Chase, Jr. (Washington: The Brookings Institution, 1968), pp. 257-292; and "Benefits of Manpower Programs: Theoretical and Methodological Issues," in Cost-Benefit Analysis of Manpower Policies, Proceedings of a North American Conference, eds. G. G. Somers and W. D. Wood (Kingston, Ontario: Industrial Relations Centre, 1969).

⁶James A. MacMillan, Chang-Mei Lu and Charles F. Framingham, Manitoba Interlake Area: A Regional Development Evaluation, (Ames: Centre for Agricultural and Rural Development, 1975), pp. 56-57 .

secondary effects should be taken into account. The information available for the Manpower Corps Program, however, is not sufficient to provide a complete measurement of this effect. On the other hand, unless we have a specification of the utility function of the Government or a social welfare function, there is little room for weighing the efficiency and distributional effects of the Program so as to provide a unique index to rank the projects. Ralph E. Smith suggested evaluating the efficiency of the Program for several income groups and explaining differences in rates of return between high-income and low-income groups in terms of the explicit intention of Government to sacrifice efficient allocation of resources in return for a better income distribution.⁷ His assumption implies that the Government, in deciding the scale, timing, and the ratio of disadvantaged to total number of trainees accepted in the Program, knows beforehand the rates of returns for both groups for several combinations of the aforementioned elements. Apart from the questionable validity of the assumption that rate of return information is known beforehand, the trade-off cannot be measured where only disadvantaged are receiving training.

The estimation of benefits and costs from an individual viewpoint requires the comparison of earnings and employability of two groups; the norm group, formed by individuals without any previous experience in institutional training programs, and the experimental group, formed by individuals who have previously participated in a Manpower Corps Project. The characteristics of these groups are shown in

⁷Ralph E. Smith, "An Analysis of the Efficiency and Equity of Manpower Programs," unpublished Ph.D. Dissertation (Washington: Department of Economics, Georgetown University, 1970), pp. 120-121.

Appendix B.

The appropriate comparison between these two groups is on a with-and-without-training basis as it is demonstrated in Chapter 3. However, a variation of a before-after training basis is used here for reasons of limited data.

Regression analysis is used to separate the effect of training from the effect of other variables such as deduction, experience or age on earnings. Opportunity costs of the trainee's participation in the Program are calculated utilizing data from the norm group. Discounting procedures are used to compare benefits and costs for the year 1975.

The impact of the Program on Government finance is estimated by simulating the increase in direct taxes due to higher average wages after training, and the reduction in unemployment payment produced by a higher employment rate induced by training. These gains are compared to the money resources invested in the Program by all levels of Government.

From a social point of view, a benefit function is estimated for the experimental group which determines the increase in productivity associated with additional training. These benefits are reduced by the social opportunity cost of the labour moving to the Program and by the cost of operating the Program. Transfer payments are not included in this analysis, because only real resource costs affect the efficiency of the economy.

Data

Information regarding the 396 trainees in the norm group was obtained from Interlake Manpower Corps Forms A03FBI-526J.⁸ These are computer printouts of demographic and economic characteristics of trainees before starting any project based on information recorded in the application forms. Each individual has a different entry in these printouts for every project he has participated in. No information exists in the forms, however, with regard to earnings and employment changes of trainees for the month prior to entrance. Only the labour situation at the time he or she applies is recorded. This lack of historical information limits the comparability between the experimental and norm group. This limitation is partially overcome by using regression analysis.

Data for 116 trainees in the experimental group (8.9% of the 1967-75 total 1307 trainee population) was obtained from questionnaires prepared and distributed by Manpower Corps during the summer of 1976. Questionnaires received by September 1, 1976 formed the sample used in this thesis. (See Appendix B). Information obtained from foreman in training plants and from officials at Manpower Corps in Winnipeg was used in estimating the production cost component of allowances vis-a-vis the training component. The separation of these components is very important in determining the efficiency effect of the Program.

⁸The norm group earnings and employment characteristics are calculated from data on individuals who applied to the Program in 1967-75 but who had no previous training. Rejections are included.

D. Overview of the Study

Chapter 2 describes the peculiarities of the Manpower Corps Program in terms of the nature of the projects and basic socio-economic characteristics of the trainees who have attended different projects. The program and the characteristics of trainees are described and a review of some studies in the area is presented.

Chapter 3 discusses in detail the theoretical framework of the present evaluation. The human capital approach is introduced and its relevance and shortcomings in relation to training is emphasized. The macroeconomic and microeconomic implications of manpower training are also discussed. The microeconomic analysis is divided into allocative and distributional effects of manpower training. Allocative effects refer to the impact of training on the improvement in the general efficiency of the economy. Distributional effects deal with the change in real private income between groups caused by the training program. The macroeconomic implications of manpower training are analyzed in the context of the trade-off between unemployment and inflation. Finally, a review is done of the results of previous evaluations of training programs in other parts of the world and in the area.

Chapter 4 presents the methodology followed in this study to compare real training benefits and costs from the individual, government and societal viewpoints. A review of critical issues of benefit-cost analysis in relation to manpower training is presented. Special reference is made to the particular features of the information available for this study.

In Chapter 5 the evaluation of the Program from an individual viewpoint is made, emphasizing the nature of benefits and costs not only after but also during the project. Chapter 6 presents the evaluation from a Government's viewpoint and Chapter 7 from an economy-wide perspective. In Chapter 8, the principal limitations of the study are discussed. These limitations are of two types; those relating to the data deficiencies and those related to the methodology used. Chapter 9 presents the conclusions of the study and suggestions for further research.

This thesis contains five appendixes. Appendix A shows the characteristics of trainees enrolled in the Program since its creation. Age, education, earnings, racial status and occupational structure are described. Appendix B presents the characteristics of members of the norm and the experimental group used in this study. Statistical tests on differences between these two groups and trainees in general are performed in order to assess the validity of generalizing the sample results to the total trainee population. Appendix C discusses the hypothesis that racial discrimination in wage determination exists. The discussion is based on evidence provided by questionnaires prepared for Carl Wall's practicum.⁹ Appendix D shows the pattern of intersectorial mobility of trainees and suggests some possible effects this pattern may have on the program's impact. Appendix E analyzes the dichotomy between production costs and training costs in the case of the Interlake Manpower Corps. Finally, Appendix F presents a model to calculate the

⁹Carl L. Wall, "The Socio-Economic Evaluation of Training Benefits to Trainees of the Manpower Corps Training Plant--Selkirk," A Practicum submitted to the Natural Resource Institute for the Degree Masters of Natural Resource Management, (Winnipeg: Natural Resource Institute, University of Manitoba, 1974).

optimal duration of training from an individual and from a social perspective based on the findings of this thesis.

CHAPTER 2

DESCRIPTION OF THE INTERLAKE MANPOWER CORPS PROGRAM

This chapter contains a brief history of the Manpower Corps Program, emphasizing the nature of the training projects. A presentation of the objectives of the program is also made. Characteristics of trainee in terms of age, education, sex, race, earnings and labour status before training are discussed. Finally, a review of previous studies of economic effects of several investment projects in the Interlake area of Manitoba is presented.

A. Description of the Program

On May 16, 1967, the Government of Canada and the Province of Manitoba signed a 10-year agreement for developing the Interlake Area in that province. Resources for the plan have been provided under the Fund for Rural Economic Development (FRED), created in May, 1967 by the Federal Government. A total of \$85,124.10 is allocated to the plan, with 56 percent provided by the Government of Canada and 44 percent by the Province of Manitoba.

Manpower Corps represent 6.6% of the total cost and 10.6% of the Federal participation in the FRED Agreement for the ten year period. The Federal Government share in each program varies considerably, ranging from 10.8% in education to 95.6% in manpower services such as community affairs, resource management, training-in-industry, etc. (See Table 2.1).

TABLE 2.1
 SUMMARY OF EXPENDITURES UNDER THE FRED AGREEMENT
 FOR THE INTERLAKE AREA OF MANITOBA
 1967-1968 to 1976-1977
 (\$000)

Type of Expenditure	Total Expenditure	Provincial Expenditure	Federal Expenditure	Federal Share in the Program %
Education	27,700.0	24,700.0	3,000.0	10.8
Interlake Manpower Corps	5,630.0	563.0	5,067.0	90.0
Other Manpower Services	20,712.5	900.5	19,812.0	95.6
Agriculture	14,868.7	4,834.7	10,034.0	67.5
Fisheries	568.0	142.0	426.0	75.0
Roads	8,850.0	3,540.0	5,310.0	60.0
Recreation	4,260.0	1,704.0	2,556.0	60.0
Industrial Park	800.0	400.0	400.0	50.0
Research and Administration	<u>1,734.9</u>	<u>577.9</u>	<u>1,157.0</u>	<u>66.7</u>
Total	85,124.1	37,362.1	47,762.0	56.1

Source: Manitoba Department of Agriculture, Progress Report for Year Nine, 1976.

The requisite for development program approval is that the target area is a rural zone

" . . . where roots of economic and social stagnation go so deep that the normal programs of government for rural areas and rural people cannot be expected to bring about a rapid improvement."¹

The main objective of the FRED Agreement is

" . . . to increase the level of income and the standard of living of the people presently residing in the area."²

Implicit in the agreement is the objective of income redistribution. In fact, any public investment in the Interlake Area is likely to produce a redistributive effect. If the funds for financing that investment come from a budget mainly based on taxes with a progressive rate structure, the transfer from that budget to a relative depressed zone will cause an income redistribution. The Government of the Province of Manitoba has included this objective as one of the most important principles of its economic policy:

" . . . (it is necessary to achieve) . . . a greater equality of the human condition for all Manitobans through a more equitable distribution of the benefits of development."³

With respect to how a manpower policy may help in achieving this goal, the same document states:

" . . . Greater equality of the human condition will be achieved through efforts . . . to bring the disadvantaged into self-supporting employment."⁴

¹Canada Department of Forestry and Rural Development, Federal Provincial Rural Agreement, Interlake Area of Manitoba. (Ottawa: Queen's Printer, 1967), p. 3.

²Ibid., p. 25.

³Province of Manitoba, Guidelines for the Seventies, Vol. 1 (Winnipeg: Information Canada, 1973), p. 13.

⁴Ibid., p. 33.

Several programs were created under the Agreement. One of them, Manpower Corps, was devised to advance on-the-job training projects in the Area in order to enroll disadvantaged individuals and people with difficulties in previous jobs, especially of Indian and Metis origin. The target group for Manpower Corps activities numbers about 30,000 people located in over 100 communities in the rural regions of Manitoba.⁵ Members of this target group do not qualify for regular manpower training programs under the auspices of Canada Manpower because of their low educational level and their unsteady history of participation in the Labour market.

The specific objective of the Manpower Corps Program is:

"To provide training and work orientation to low income high-risk but employable people, particularly people of Indian ancestry in order to improve their opportunity for meaningful employment and increased incomes."⁶

The mechanism to achieve this objective is the creation of projects in which trainees have the opportunity to receive classroom instruction combined with on-the-job occupational skills. These projects are of two types, temporary and permanent. Temporary projects vary in duration and nature according to the demand for short-term construction work by different public and community groups. These groups provide construction materials, tools, etc., and Manpower Corps provides the labour input. Skating rinks, community centres and housing construction

⁵Ian B. Anderson, "Location of a Park Equipment Manufacturing Plant in the Parkland Region of Manitoba," Practicum submitted to the Natural Resource Institute for the Degree of Masters of Natural Resource Management, (Winnipeg: University of Manitoba, 1976), p. 3.

⁶Interlake FRED Plan, Performance Report for Year Eight, 1975, p. 17.

are examples of the kinds of projects undertaken.

There have been only two permanent projects under the Program. These are the Furniture Manpower Corps Plant at Selkirk and the Louis Riel ladder factory at St. Laurent, Manitoba. The Selkirk Plant is the biggest training project in terms of the total number of trainees per year (see Table 2.2). Park benches and furniture for Manitoba provincial parks are produced at the Plant, where trainees are initiated in metal and woodwork crafts. Construction of the plant began on September 15, 1968 and was completed on May 30, 1969. Production commenced in June of 1969 and the plant was officially opened in October of 1969. Expansion of facilities occurred during 1973. The St. Laurent factory produces ladders of diverse types which compete in the market with ladders produced by private firms. Table 2.2 summarizes the characteristics of projects undertaken during the fiscal year 1975-76.

B. Characteristics of Trainees

In this study the characterization of the Program is done by analyzing the socio-economic structure of trainees, not the peculiarities of projects. The main reason for this is that information on specific projects, although available, does not throw light on why people decide to enter the Program. On the one hand, very few projects are in operation at a given time, so there is little choice for the individual between projects. On the other, no significant difference was found between groups entering one project or another in a given year. Therefore, it will be assumed that the efficiency of the Program does not depend on the project selected by the trainee, but on his or her

Table 2.2
Progress Summary--Manpower Corps Program
1975-1976

Project Name	Location	Work Description Associated with Training	Total Length in Weeks	No. of Trainees	Totals 1975-1976
MPC Plant Housing Painting	Selkirk	Painting (Exterior)	10	8	\$ 1,250.49
Reserve Projects	Lake Manitoba	Store Construction	34	6	22,522.85
	Lake Manitoba	Store Cabinet-Making		3	
	Lake Manitoba	Laundromat Construction		3	
Youth Projects	Anama Bay	Recreation Hall	8	12	15,444.45
	Fisher Branch (Mantagao Lake)	Recreation Facilities		5	
	Selkirk	Recreation Facilities		9	
Credit Union Management	St. Laurent	Management Training	22	2	1,450.33
Livestock Facility Construction	Various	Livestock Facility Construction	6	17	39,723.86
Louis Riel Manufacturing	St. Laurent	Ladder & Furniture Manufacturing	Ongoing	24	307,967.69*
Manpower Corps Training Plant	Selkirk	Metal & Woodwork Manufacture	Ongoing	74	261,135.13
Carpentry Training	Hecla Island	Construction of Buildings & Structures	31	10	30,206.90
Winnipeg Beach Towers Restaurant	Winnipeg Beach	Restaurant Work	10	25	24,092.58
Friendship Centre	Selkirk	Construction of Building	40	17	38,075.90
Community Projects	Vogar Vogar	Parks Washroom Buildings Siglunes Community Hall	16	16	48,013.36
Fairford Band Service	Fairford Reserve	Construction of Service Station	5	7	2,264.75
Ashern Housing	Ashern	Landscaping	3	4	1,699.50
TOTAL				242	\$793,847.79*

* The central office administration costs are not included.

Source: Interlake FRED Plan, Performance Report for Year Nine, 1976.

characteristics before entering the Program and on the length of the Program.

From the objectives of the FRED Agreement and of the Program it is clear that Manpower training in the area has been designed with the disadvantaged in mind. Disadvantaged in this study is a static concept. It reflects the situation of trainees in terms of their education, labour status and income. In a few cases the information available permitted a follow-down of trainees several years before entering the Program. Unfortunately, in the majority of cases, it was not possible to do so. Tables A.1 to A.12 in Appendix A summarize the most important characteristics of trainees who had enrolled in the Manpower Corps Program since its beginnings in 1967-1968 to January 1976, the last date for which information was available at the time this thesis was undertaken. This information is contained in computer forms produced by Manpower Corps. Trainees who had enrolled in the Program form the "basic group" of this study.

Based on Manpower Corps records, Interlake Area has recruited about 24% of the total number of participants in all provincial manpower services. Some trainees had received several manpower services provided by the Province, such as farm management courses, training-in-industry, resource management or manpower on-the-job training outside the Interlake Area in places like The Pas and Churchill. Of 5,380 individuals that participated in any service by January 1976, 1,307 had been registered at least once in Manpower Corps. In 49 cases the information was not sufficient to include them in the present analysis. Of the 1,258 remaining, 290 individuals took more than one course, raising the number

of registration to 1,705. Out of 1,258 individuals, 968 (76.9%) had taken only one course. (See Table A.1).

A distinction is made between Treaty Indians and non-treaty Indians in the presentation of the information in Appendix A. There is some concern about the effect of racial status on the performance of individuals in the labour market. Kuo has shown that the differentiation of Metis, Indians and Whites in relation to the variables that determine future earnings is important.⁷ Information exists about the racial status of Manpower Corps trainees namely, registered or Treaty Indians and non-registered Indians.⁸

A non-Treaty Indian in this study may be a Metis or an individual of Indian origin who does not have a registration number. Indians have numbers which identify them as members of a band. Consequently the separation of these groups may be more of a legislative feature than a racial difference in itself. The division is maintained throughout this study for descriptive and analytical purposes. Some of the important characteristics of the trainees forming the basic group are discussed below.

(1) Female participation in Manpower Corps Program is a recent phenomenon. Mainly young women (students and non-participants) have registered in the Program since 1970. Sex difference, however, is not

⁷Chun-Yan Kuo, "The Effect of Education to the Earnings of Indian, Eskimo, Metis and White Workers in the MacKenzie District of Northern Canada," Economic Development and Cultural Change, 24:287-398 (January 1976).

⁸Who is to be considered Indian in Canada, and by the same token in this study, is a matter of administrative procedure as well as ethnic origin. For a detailed definition, see Indian Act, R.S.C. 1970, C.I-6, 5.2.

a statistically significant reason for completing or failing to complete the courses or projects. This can be seen from the fact that the percentage of women graduating from and failing the program, 9.5% and 8% respectively, very closely reflects the 9% female participation in the program. (Tables A.2, A.6, A.7, A.8).

(2) The average education attained just before entering a course must be considered to be very low: 7.2 years for men and 8.4 years for women. If functional illiteracy is defined as an education level below grade two, 8 percent of men and 16.7 percent of women belong in this category. This is one of the indicators of the disadvantaged condition of the trainees population. (Table A.4).

(3) Sixty percent of the male population and 30 percent of women were unemployed just before entering the Program (Table A.6). It was not possible in all cases to separate the "unemployed" category into "seeking job for the first time" and "ceased working." This separation would have given a better description of labour status structure. On-the-job experience, immediate involvement in the industrial sector, especially in carpentry and construction related activities, are important labor status variables. However, approximately one third of the employed trainees came from the agriculture sector where, in 45 percent of the cases, they were receiving income below the minimum wage in the cities (Table A.5). Information about in-kind income was not available, however, making comparisons difficult. The rest of the trainees with experience came mainly from the primary sector (31.9 percent), with a few coming from the tertiary sector (5.2 percent).

These proportions contrast with the occupational structure for the Interlake region as a whole, as estimated by MacMillan and Lu.⁹ They conclude that 33.4 percent of the total labour force in the area were engaged in primary sector activities and 22.8 percent in secondary sectors in 1970.¹⁰ This divergence between trainees and the regional labour force is expected. Also, MacMillan and Lu did not include in their work the labour force in Indian Reserves and unorganized areas. The registration forms do not permit an unambiguous separation between Indians living on reserves or out of the reserves. However, even considering occupations of Indian people, 48.4 percent were engaged in structural work and 22.2 percent in agricultural occupations. This difference may provide a good argument for not considering trainees a representative group of the target population in the area. It seems the Program receives more urban-oriented people instead of rural-oriented and this fact should be taken into account when generalizations to the Interlake Area about the efficiency of the Manpower Corps Program are made.

(5) The age structure of the trainees differs, as expected, from the area's total population. A total of 21.1 percent of Interlake male inhabitants not attending school were under 21 years of age and 45.2 percent were under 29 in 1968.¹¹ In the Program, in that particular year,

⁹James A. Macmillan and Chang-mei Lu, "Projection and Impact Models: Area Manpower Planning in the Interlake Region, Manitoba," Research Bulletin No. 72-5 (Winnipeg: Department of Agricultural Economics, The University of Manitoba, 1972).

¹⁰Ibid., Table 16, p. 73.

¹¹Charles F. Framingham, James A. MacMillan and David J. Sandell, The Interlake Fact. (Winnipeg: Hignell Printing Ltd., 1970), pp. 645-693.

year, 36.2 percent were under 21 and 61.7 percent under 29 years of age (Table A.3). This distribution reflects the fact that investment in human capital, such as education and on-the-job training (institutional or otherwise), tend to be concentrated at the beginning of the active life cycle. This is because the benefits of these investments declines as the pay-off period is reduced and, as Mincer puts it, "because opportunity costs are likely to rise with experience."¹²

(6) Educational levels, however, are lower for the trainee group than for the Interlake Area as a whole. Considering only the out of school male population again, the average education in the Interlake Area in 1968 was close to 8 years, while for the same period the average education for trainees was just above 7 years (Table A.4). This difference might reflect the fact that education and experience on-the-job are somewhat substitutes, but also reflects the disadvantaged condition of those attending the program.

(7) Income patterns, as shown in Tables A.11 and A.12, behave as predicted by some human capital models. For a given level of education, male non-agricultural income tends to rise with age, presumably due to on-the-job experience, up to a point where additional experience does not contribute to additional acquisition of income.¹³ Agricultural income was consistently lower than non-agricultural income, but as noted before in-kind income is not registered.

¹²Jacob Mincer, Schooling, Experience and Earnings (New York: National Bureau of Economic Research, 1974), p. 129.

¹³Jacob Mincer, op. cit., p. 67

Average hourly earnings reported by trainees before the initiation of the program were consistently lower than average hourly earnings in the province of Manitoba for the period 1968-1973 for the construction sector as well as for the manufacturing sector (Table A.12). Average earnings before training for male would-be trainees engaged in non-agricultural activities were between 63 percent and 82 percent of average earnings in the manufacturing sector and only between 48 percent and 59 percent for the construction sector during that period. The reason for this difference may be that agricultural activities, in contrast with urban-oriented activities, are not subject to direct labour union influences.

C. Previous Studies and Evaluations in the Area

Basic data for most of the studies dealing with the Interlake Area are recorded in the "Interlake Fact", a compendium of geographical and socio-economic information presented in a census-like style.¹⁴ A demographic analysis of the area, is in "Projection and Impact Models: Area Manpower Planning in the Interlake Region, Manitoba."¹⁵

A framework for evaluating the impact on demand of FRED expenditures appears in "Manitoba Interlake Area: A Regional Development

¹⁴Framingham, et al., op. cit.

¹⁵MacMillan and Lu, op. cit.

Evaluation."¹⁶ In this study changes in nominal income and employment for the Area are estimated using a 17 sector input-output matrix. FRED expenditures on selected programs, Manpower Corps included, during the fiscal year 1968-1969 were allocated to every sector and the direct, indirect and induced effects on other sector's demand and employment were calculated. It was estimated that one dollar in allowances paid to trainees provides the region with \$1.57 of money demand, including secondary effects.¹⁷ This figure does not reflect the fact that once trainees previously unemployed enter the Program, unemployment transfers are not received. Consequently, the level of monetary demand is reduced, and the true demand impact is likely to be much lower.

The long-run impacts of agricultural resource development programs on the economic structure of the region are estimated by Tung¹⁸ using a dynamic model to simulate the economic inputs. Manpower Corps' investments were not included in the analysis, but another training program, farm management training, is included. The farm management program impact on area household income was found to be \$582.7 thousand per one million dollar investment during the period 1969-1977. The impact of this program was found to be second to the drainage program impact. In job-creation terms, farm management ranked first among the agriculture projects with 195.3 man-years of employment created per year per million

¹⁶MacMillan, Framingham and Lu, op. cit.

¹⁷Ibid., Table 6.3, p. 81.

¹⁸Fu-Lai Tung, op. cit.

dollars of expenditures during the period.

James A. MacMillan, Leo A. Bernat and John J. Flager estimated benefit-cost ratios for manpower services in the Area. They found negative figures for Manpower Corps (-4.71) completions, and figures for non-completions which were positive but less than one (0.76).¹⁹

The negative benefit-cost ratio is produced by the definition of benefits used in the study. Benefits were divided into two categories:

1. those due to change in employment weeks, and
2. those due to change in weekly income.

In both categories, based on a sample of 51 trainees, it was found that after training wages and hours worked were lower than the norm group levels. The present study will not deal with participation (hours worked), but as far as earnings are concerned, benefits defined here, based on a sample of 116 trainees (8.9% of the total 1967-1976 Manpower Corps trainees), differ from MacMillan, Bernat and Flager's results which were based on different norm and experimental groups. The objective of their study was to calculate income improvement from training expenditures relative to the target population who did not receive training. The norm group in their study covered individuals living in the area, but without any relation to the program, while in the present study the norm group includes individuals who applied to the program. Another source of divergence in the results is the inclusion in the present study of training allowances as individual benefits from the program.²⁰ It is demonstrated in this thesis that training

¹⁹Op. cit., Column (8), Table 37, p. 116.

²⁰Ibid., p. 74, presents the definition of benefits from training.

allowances are one of the most important variables in determining individual benefits from training.

MacMillan, Nickel and Clark proposed a different framework for evaluating on-the-job training for the disadvantaged, which placed greater emphasis on social indicators.²¹ Carl Wall,²² using the MacMillan, Bernat and Flager framework concluded that trainees at the Manpower Corps Selkirk Plant increased their earnings and standard of living after the training period. This study, which was based on a sample size of 24 included no treatment, however, of labour status changes for trainees, and no consideration of individual characteristics in the calculation of economic benefits. The cost side of the Program was not considered, and the basic emphasis was put on four socio-economic indicators: material possessions, income effects, housing standards and trainee satisfaction. The conclusions, nevertheless, are very general and of a descriptive nature.

²¹James A. MacMillan, P. E. Nickel and L.J. Clark, A New Approach for Evaluating Northern Training Programs: the Churchill Prefab Housing Manpower Corps Project, Occasional Paper No. 8, Center for Settlement Studies, University of Manitoba, 1975

²²Wall, op. cit.

CHAPTER 3

THEORETICAL RATIONALE FOR MANPOWER

TRAINING PROGRAMS

The objective of this chapter is to review some of the most relevant theoretical issues in relation to the evaluation of manpower training programs. The chapter is divided into five sections. In the first, a brief presentation of the human capital approach in relation to training is made. Sections two and three extend this approach to include allocative and distributional effects of institutional training programs for the disadvantaged. Section four discusses the macroeconomic importance of manpower training as a policy to eliminate labour market distortions and, consequently, as a way to ease the trade-off between unemployment and inflation. Finally, section five presents a review of the results of other evaluations of training programs in the U.S.A., England and Canada. Findings of previous studies of manpower training for the disadvantaged show that training improves individual earnings as well as the general efficiency of the economy.

A. The Human Capital Approach

The theoretical basis upon which this thesis rests may be termed the human capital approach. Although this approach has been prominent in recent economic literature, it has its roots in early economists. Around 1691 William Petty recognized that individuals generate a flow of productive services similar to those produced by physical capital, and that in this particular sense human beings could be treated as capital. Walras

included human beings in the concept of capital with the value of their services being determined in a manner similar to that of any other capital good.¹ The analysis of human capital declined, however, after the famous quotation by Alfred Marshall in which he denigrated Irvin Fisher's suggestion² that human beings be included in the definition of capital:

" . . . (Prof. Fisher) . . . seems to take little account of the necessity for keeping realistic discussions in touch with the language of the market-place . . ."³

This reference to a methodological shortcoming might not have been the cause of the declining interest in human capital. Instead a shift from what is today called macroeconomics to the theory of the determination of relative prices, may have been responsible. It is not surprising then, that the discussion of human capital reappeared after the 1950's, when macroeconomics gained momentum again. At that time, it appeared under the heading of Economics of Education, a reference that proved to be too narrow in view of actual developments.

One source of renewed interest in the field was the need for explaining movements in aggregate magnitudes for the U.S. economy, especially its capital-output ratio. This ratio decreased during the

¹For a more extensive review of the treatment of individuals as physical capital up to the first third of this century, see: B.F. Kiker, "The Historical Roots of the Concept of Human Capital," Journal of Political Economy, 74: 481-499 (Oct. 1966).

²Irving Fisher, The Nature of Capital and Income. (London: MacMillan & Co., 1927), p. 5 and p. 17.

³Alfred Marshall, Principles of Economics. (London: MacMillan and Co., 8th edition, 1968), p. 649.

period 1929-1957, provided that the value of human capital was not included in the numerator of the fraction. However, if it were included, the argument followed, capital and national income each showed a steady growth of 3 percent during the period, leaving the relation fairly constant through time.⁴

In addition to this, estimates of aggregate data for the U.S.A. challenged the traditional interpretation of the stable Keynesian-type consumption function in which positive autonomous consumption produces a difference between average and marginal propensities to consume in the long run. A new hypothesis about aggregate consumption behaviour was needed to explain why this difference was not significant.⁵ The new versions had the common feature of relating currently observable consumption not only to current income, but also to future or past incomes.⁶ The concepts of permanent income and life-cycle income consider lifetime earnings as the "independent" variable in explaining real consumption. Any theory intending to consider these earnings as a "dependent" variable was welcomed and the human capital approach satisfied this requirement.

Explaining earnings differences throughout the lifetime of an individual requires the basic assumption that individuals knowingly invest in themselves by improving their educational level and quality,

⁴Theodore W. Schultz, "Human Capital" International Encyclopedia of Social Sciences (1968), 2, 278-287.

⁵Milton Friedman, A Theory of the Consumption Function, (Princeton, National Bureau of Economic Research, 1957, pp. 25-37.

⁶Ibid., p. 26.

their working skills, health conditions, and by migrating to a place where higher economic opportunities are available. This is the basic assumption of the human capital approach.⁷ These are investments in the sense that individuals sacrifice income and time to enhance their employment opportunities in the hope of adding to their future productivity and future earnings, and thereby to add to the availability of commodities entering their own utility function.⁸ In this sense, the decision of an individual to enter a training program could be considered as an investment, made by him or by somebody else on his behalf. If the rate of return to the investment in training from an individual's standpoint is lower than for a similar risk-class investment, the decision to spend time and income in training is not privately profitable.

Individual decisions do affect others through changes in real as well as in monetary magnitudes. In real terms, for example, individuals with a high level of investment in human capital may displace others with low levels; and thus the unemployment rate of those in the latter group may rise due to the additional investment of the first group. The result, however, may be the opposite if the jobs are complementary, i.e., a larger investment by one group can increase the absorption of manpower from another group.

The point is that individuals, in deciding on their investment in training, do not include in the list of benefits and costs external

⁷For a compilation of articles about the effect of these activities upon the accumulation of human capital, see a supplement of the Journal of Political Economy, 70: No. 5, October 1962.

⁸Gary Becker, "A Theory of Allocation of Time," Economic Journal, LXXV (September 1965), p. 495.

effects that their decisions produce on society. The social rate of return might be larger or smaller than the individual rate of return, and the inclusion of these external effects creates a divergence between individual and social profitability, causing a non-optimal level of social investment. Figure 3.1 compares the level of investment when only individual benefits and costs are taken into account (L_0), and the level when all benefits and costs are included (L_1). L_1 may be larger or smaller than L_0 , however, depending on how social benefits differ from private ones.⁹

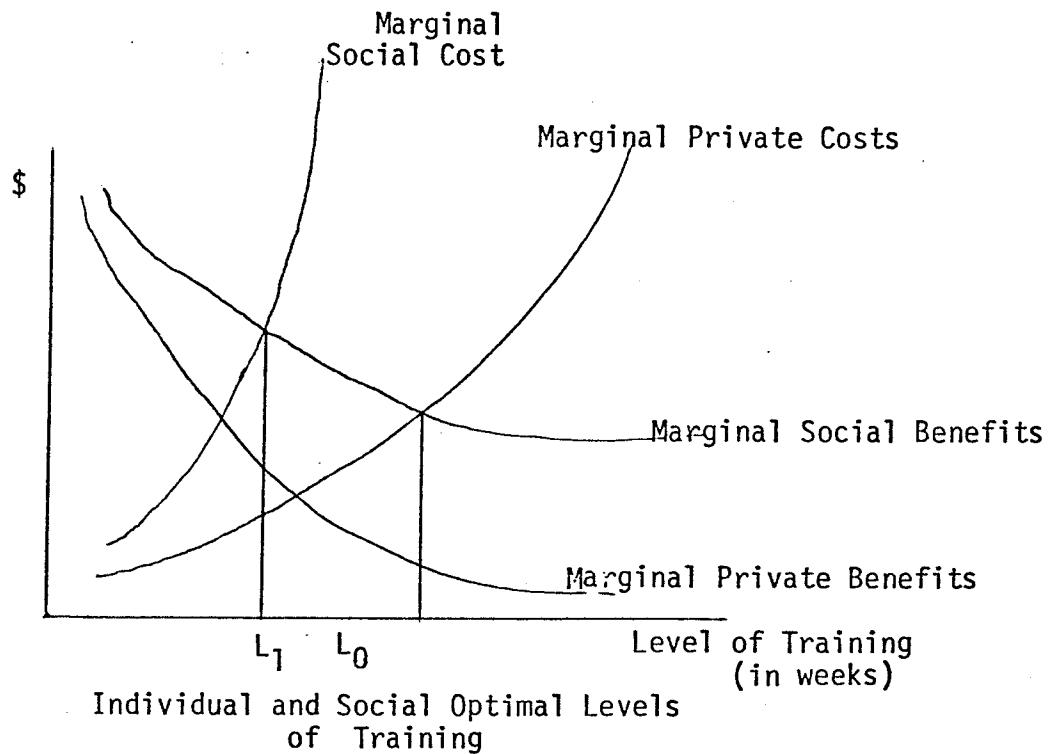


Figure 3.1

⁹The nature of differences between social and private costs is discussed in Ralph Turvey, "On Divergences between Social Costs and Private Costs," *Economica*, n.s., XXX (August 1963), pp. 309-313.

In monetary terms, relative prices of commodities and of different types of labour skills do change, affecting different groups according to the structure of production (substitutability of factors) and the nature of consumption of the commodities affected (consumption shares and price elasticities of the demands). These changes in relative prices, however, do not affect the efficient allocation of resources, but only create pecuniary effects, namely, a shift of purchasing power between groups, influencing the distribution of income.¹⁰

The human capital approach, however, has some important shortcomings in relation to investments in training which are of particular interest for the present evaluation:

1. Human capital models fail to include non-monetary benefits of alternative occupations. This thesis presents evidence that individuals with before-training experience in fishing and farming tend to return to these activities after the industrial oriented training is over. This pattern tends to reduce the numerical value of the rate of return to the program because earnings in these activities are lower than earnings in industrial activities. However, if the pattern is produced by individual choice, then the individual welfare is not reduced, but rather increased when it is followed. This implication should be kept in mind when the results of this thesis are interpreted.

2. The human capital treatment of on-the-job training assumes that individuals invest in themselves in order to improve their skills.

¹⁰D. N. Winch, Analytical Welfare Economics, (Harmondsworth: Penguin Modern Economic Texts, 1971), pp. 101-104.

However, individuals may also acquire in training programs, information about the operation of some segments of the labour market, or about working conditions they had not experienced before.¹¹ This is especially true for institutional training for disadvantaged like the Manpower Corps. As an official of the program put it, some of the trainees learn that they do not like the working routine at all. The separation of training benefits into those due to new skills and those due to new information is difficult to assess and will not be attempted in this study. Calculated benefits in this study, therefore, include both components.

An early caveat is required at this point. If the "displacement effect" is not zero, the social rate of return to training would be lower than the one estimated here. The rate of return can be zero or even negative if the employment increase induced by the program is achieved at someone else's expense. Several explanations for this possibility appear in the literature. One of the most important is known as the "screening hypothesis."¹²

According to this hypothesis, the Interlake Manpower Corps program acts as a screening device that labels individuals as "more productive" than those without training, *ceteris paribus*. The observed social return to the investment in training would present a return to the obtainment of scarce information rather than a return to the

¹¹MacMillan, Bernat and Flager, *op. cit.*, p. 116 provide evidence to support this observation: benefits to trainee non-completions were higher than for completions.

¹²The economic effects of investment in the obtainment of information is presented in Joseph E. Stiglitz, "The Theory of Screening, Education, and the Distribution of Income," American Economics Review, No. 3, June 1975, p. 283. He argues that screening has positive returns but tends to increase inequality.

obtainment of scarce skills. The allocative effects of the findings of these thesis would not be altered by this consideration. The implications for the future operation of the program are more important. The optimal composition of general and specific training (measured, for example, as the ratio of classroom time to on-the-job training), would be larger the more important the acquisition of information is, with respect to the acquisition of skills.

In terms of the distributional impact of the program, the "screening" cost represents a hidden subsidy paid by taxpayers to hiring firms in the form of reduced recruitment costs. Although the distributional effects of the Manpower Corps are not studied in detail in this thesis, the abovementioned consideration should be borne in mind in the discussion of the economic effects of the program.

B. Allocative Aspects of Institutional Training

The human capital approach provides a framework for analyzing efficiency implications of on-the-job industrial training. This framework, however, has to be expanded in order to include the characteristics of institutional training for the disadvantaged.

On-the-job training is defined as a process that raises future productivity while working is performed. The training costs depend on direct outlays incurred in moving from the pre-training situation to the training situation and on indirect costs determined by alternative market opportunities for the would-be trainee. Two distinct types of on-the-job training may be conceived. One type may be considered general training, for which individuals pay the cost of training by receiving a

wage below their productivity in the hope of increasing their future productivity and, consequently, their future earnings. On the other hand, training may be of the specific variety if the hiring firm pays for the training costs (not necessarily for all of them, but at least for the indirect component) expecting to receive larger profits in the future resulting from higher labour productivity.¹³ The key issue in this interpretation is the recognition that these cases differ according to who pays for training costs. Whether the training is general or specific would depend on how much of these costs are paid by trainees and how much by firms or some "third party."

The main reason for the existence of this division is to provide a comprehensive framework for analyzing efficiency effects of investment in training. Clearly, if it is recognized that trainees paying for training, in conditions of competition, receive all the benefits of it, then a benefit-cost analysis including only effects on trainees provides a good index of profitability. On the other hand, if training is paid by the enterprise, public or private, providing it, the benefit-cost analysis must include an accounting of the cost to the firm and of the benefits the firm gets from it.

Becker's dichotomy concentrates on what may be called a one stage training pattern in which both costs and benefits of training occur in the same activity. Institution training such as the type in the Interlake

¹³Gary Becker, "Investment in Human Capital: A Theoretical Analysis," Journal of Political Economy, 70: 12-25, October 1962, (Supplement).

Area of Manitoba, is a two stage program. In the first stage, training, considered to be a "black box" converts a "raw product" (unskilled labour) into a "final product" (skilled labour). The worker subject to training does not pay directly for the training and firms willing to hire the "final product" do not pay directly for it either. In the second stage, the graduated trainee having no relation whatsoever with any particular firm, leaves the program and faces the labour market. From the social point of view it is necessary to separate those who pay the costs of training from those who receive its benefits.

In the case of Manpower Corps, training costs are paid by trainees (opportunity costs) and by taxpayers (financial resources to run the program). Taxpayers include non-trainees as well as firms, whether or not they benefit from training. Benefits are received by trainees (an increase in future earnings) and may be received by firms (in the form of lower recruitment or screening costs, for example). Therefore, it is not possible to identify institutional training programs with either general or specific training. No attempt is made in this study to include hiring firms in the framework of the evaluation. Costs are calculated for the trainee and for the taxpayers, but benefits only for trainees. This limitation has to be taken into account when results are interpreted.

External effects of training are not considered in this study. There is no evidence that net external effects arising from training exist.¹⁴ Higher educational levels for children of Manpower Corps trainees

¹⁴Treasury Board Secretariat and Department of Manpower and Immigration, "A Model for the Benefit-Cost Evaluation of Canada Manpower Training Program: Technical Report" (Ottawa: Information Canada, June, 1973), p. 5.

are sometimes mentioned by program officials as positive externalities created by the program. It was not possible to verify this hypothesis, but even if this particular benefit appears, there is no reason to believe that some negative effect such as the "displacement effect", previously mentioned, might not exist. Externalities, therefore, are excluded from the present analysis. Within this general framework, this thesis will show that the Manpower Corps training program improves the allocative efficiency of the economy.

C. Distributional Aspects of Institutional Training

The study of income distribution requires the analysis of who pays for (and how much) and who receives (and how much) the money payments generated by investment projects. Manpower Corps is financed by monies provided by the Federal and the Manitoba provincial government; that is, by Canadian taxpayers (or by Canadians in general if inflationary effects of this financing are accounted for).

Chapter 6 shows that trainees pay little, if any, taxes given their taxable income levels before and during the program. They receive training allowances, part of which, as will be discussed in Chapter 6, represent transfer payments from taxpayers to them. From this information alone it is not possible, however, to produce a complete picture of the program's distributional effects.

The principal problem with a study such as the present one, however, is that it is not possible to analyze what Kuznets has called ". . . the demographic aspects of the size distribution of

income . . ."¹⁵ This statement refers mainly to two issues of particular importance for this type of program. The first is the definition of the recipient unit, while the second is the phase in the unit's lifetime span in which the analysis is done.

Kuznets suggests that the unit used as basis for distribution analysis should be the family or the household rather than the person. This is because the observed income for a person, affected by the choice between income earnings and non-earning activities in a given moment of time, is influenced by decisions made by the family. Even if the unit of analysis is clearly defined, a problem of comparison appears due to differences in family sizes.¹⁶

It is not reasonable to compare, for example, the effect of training on income distribution when looking at the earnings of a former trainee aged 35 and the earnings of a non-trainee aged 18, because the decision to work (or not to work) made by an 18-year old individual is influenced by the level of family earnings, family size, etc. Also, the number of dependants the trainee has determines the level of family income per-capita for the individual with training, and this is the relevant income measure to be used for comparison.

With respect to the phase of the family lifetime in which information is collected, there seems to exist, according to Kuznets, a

¹⁵ Simon Kuznets, "Demographic Aspects of the Size Distribution of Income: An Explanatory Essay," Economic Development and Cultural Change, XXV, 1 (1976), p. 1.

¹⁶ Ibid., p. 7.

relation between age of household and size of the family. The number of family members rises until the age of the head is 35-44 and then starts to decline. Observed income per family also changes in a similar way.¹⁷ Differentials in income between groups with different average ages may not be lifetime income differentials at all, but just a reflection of these phases. Therefore, no conclusive inference about changes in money income induced by the program can be made without reference to the family structure of trainees and non-trainees and age differentials between them.

In spite of these conceptual limitations, it is demonstrated in this thesis that low-income people benefit from the Government transfer of resources to the program. Their money income level after training is higher than before training, and it will be shown that part of this increase can be attributed to the existence of Manpower Corps.¹⁸

In addition to changes in money income, relative prices of goods and factors also may be altered, giving rise to variations in private real income (the incidence of the program), Manpower Corps projects produce a physical output, such as ladders at St. Laurent, and also better workers who increase the supply of other products, such as tables, after the project finishes. Relative prices of both ladders and tables may decrease depending on the share of labour costs relative to total

¹⁷Kuznets, op. cit., pp. 53-57.

¹⁸It is interesting to note that the problems mentioned by Kuznets do not distort the interpretation of the results in this case. Differences in average family members per household between non-trainees, 3.6, and non-trainees, 3.3, was not significant at the 1% level of confidence. Differences in age were significant between the two groups, but age did not determine earnings differentials (see equation 5.3).

production costs. This change in relative prices increases the real income of both ladder and table users. The direction of the real income redistribution depends on the income level of those benefited by lower relative prices. The magnitude of the redistribution is determined by the share of consumers' expenditures on the affected goods (including complementary and substitutes goods) and by the price-elasticity of their demands. No attempt will be made in this study to analyze the issue of real income redistribution caused by changes in relative prices. It can be considered that this effect is negligible due to the small coverage of the program in terms of total supply of goods.

Figure 3.2 shows how efficiency and incidence can be measured in the context of manpower training. Solid lines describe real resource movements between activities and dotted lines describe monetary movements. Of all the alternatives presented, those which will be estimated in this study together with the chapters in which the estimations appear, are presented below;

- (1) Opportunity costs and subsidies (Chapter 5),
- (2) Future employment and earnings (Chapter 5),
- (3) Reduction in unemployment insurance payments (Chapter 6),
- (4) Capital and operating costs (Chapter 6),
- (5) Labour productivity after training (Chapter 7).

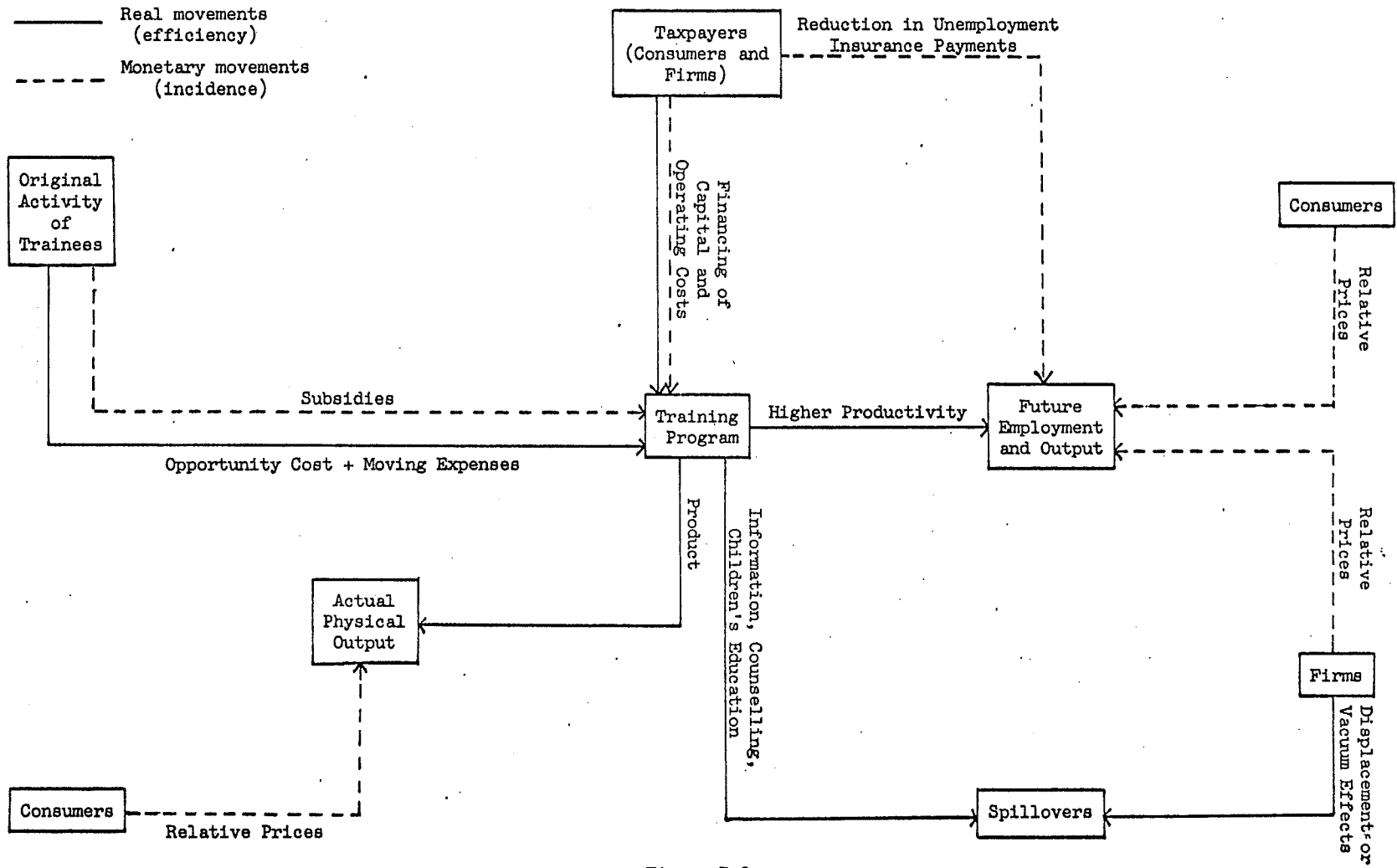
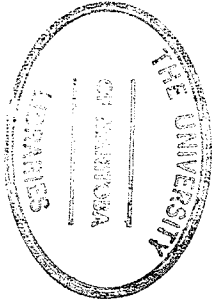


Figure 3.2

Flow of Real and Monetary Costs and Benefits from Training Programs



D. Macroeconomic Effects of Training Programs

One of the reasons for the emergence of theoretical and empirical studies of training programs is the importance these programs may have in the solution of the trade-off between unemployment and inflation. This question has been the topic of recent discussions,¹⁹ and although this thesis does not deal explicitly with the macroeconomics of training, the implications are so important as to justify a brief review of them.

The macroeconomic effects of manpower training on inflation can be visualized better by making use of the relation between unemployment and the rate of change in prices first observed by A.W. Phillips in Great Britain, and identified as the Phillips curve.²⁰ In its original form, this curve depicts an inverse time series relation between the percentage change in money wage rates and the unemployment rate, suggesting that the relation had been remarkably steady through time. If a leap from money wages to prices is made, based on the evidence that wages are a major component of total costs and that the two tend to move simultaneously, it is deduced that a trade-off between the rate of unemployment and the rate of inflation exists and that the reduction of one can only be achieved by increasing the other.

¹⁹For a review of the main implications of the controversy, see: Franco Modigliani, "The Monetarist Controversy or, Should We Forsake Stabilization Policies?" American Economic Review, 67, No. 2, March 1977, especially p. 3.

²⁰A.W. Phillips, "The Relation Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861-1957," Economica, n.s., XXV (November 1968), p. 290.

The theoretical meaning of this relation and its stability is, however, one of the most controversial topics of discussion in the present period when the existence of increasing unemployment and inflation provide evidence that the original version of the model is not valid. One of its shortcomings seems to be the specification of the true relation between prices and unemployment changes. In this regard two questions have to be answered. First, which variable acts as "dependent" and which as "independent" in the chain of causation, and second, what is the correct numerical magnitude of the relation and how stable is it through time?

In answering the first question, Milton Friedman contrasts Irving Fisher's approach to the problem with Phillips'. Fisher starts his analysis with changes in prices and concludes it with changes in unemployment, provided a lag exists in the reaction to unanticipated inflation by producers and workers. Phillips starts from the existence of disequilibrium in the labour market and ends with its effect on prices through increases or decreases in the money wage rate.²¹ Friedman correctly argues that the main error in Phillips' analysis is the confusion between a change in nominal wages and a change in real wages, because Phillips follows the Keynesian assumption that prices are rather slow in reacting, so that they might be considered as fixed. Friedman concludes that a substitution of real wages for nominal wages leaves the

²¹ Milton Friedman, Unemployment versus Inflation? An Evaluation of the Phillips Curve, Occasional Paper 44. London: The Institute of Economic Affairs, 1975, pp. 11-16.

Phillips relation with

" . . . not even any prima facie presumption that it has anything to say . . . because the real wage can remain constant with (nominal wage) and (prices) each rising . . . or falling . . . provided both change at the same rate."²²

A skillful way of reintroducing the "trade-off" formulation between inflation and unemployment is by using as a deflator of wages a price index which incorporates expectations about changes in price levels. This link is provided by the use of the anticipated rate of price change. Anticipated means that both workers and firms include in their current claims a provision for expected changes in their purchasing power so no monetary illusion could have any real effects in the long-run. Monetary illusion could occur in the short-run, however, where a lag in information may induce temporary employment creation with a rate of inflation above the previous anticipated level and vice versa. If this is so, the argument follows, the only way of reducing temporary unemployment is by accelerating the rate of growth in prices so that the race between non-anticipation and full anticipation of inflation could always be won by the former.

There is, however, a proportion of the total unemployment rate that does not react to monetary changes, but is caused by various distortions in the labour market, the so-called "natural" unemployment rate. What has been left out in this classical analysis is that there are real resource costs of the job search, additional information, location

²²Ibid., pp. 15-16.

changes, etc. necessary to eliminate those distortions. A negatively sloped Phillips curve is produced by price increases induced by these costs. In order to determine the real costs of these distortions, a dynamic theory of market frictions is needed, but very little has been done in this area thus far.²³

The second question posed in the specification of the relationship between inflation and unemployment is the stability of the relation and its numerical magnitude. In this case, the consensus points to the differentiation between short-run and long-run Phillips curves. These curves are less elastic in the long-run than the short-run because money illusions tend to disappear in the long-run. This is due to the fact that any changes above the previous anticipated price levels tend to be at least partially anticipated in the future.

The difference in diagnosis leads, of course, to some differences in policy recommendations, but as will be shown, a basic common feature exists in both cases. If the long-run trade-off between inflation and unemployment is accepted, then the existence of both higher inflation and higher unemployment is produced by an upwards shift of the Phillips curve. A policy measure to avoid this displacement, or better yet, to shift it downwards instead, is proposed by James Tobin:

²³ Charles C. Holt, et al., The Unemployment Inflation Dilemma: A Manpower Solution (Washington, D.C.: The Urban Institute, 1971), p. 29.

The first . . . (strategy) . . . is to try to shift the Phillips curve down--so that less inflation is associated with low unemployment. This strategy has both long-run and short-run aspects. One fairly uncontroversial set of long-run measures concerns the improvement of the labor market and of labor mobility. The better the labor force is adapted in advance to geographical and industrial shifts in the composition of demand, the smaller the wage and price increases needed to accomplish such adaptations . . . By manpower and labor-market policies we need to reduce the number of unfilled vacancies associated with any given rate of unemployment.²⁴

If the Phillips curve is believed to be vertical (the "natural rate" version of the problem) the policy recommendation does not differ substantially from the previous one:

An unemployment rate lower than the natural rate cannot be achieved, except at intolerable cost, with orthodox fiscal and monetary policy; but . . . the natural unemployment rate can be lowered by removing the educational attainments of the labour force, and so on.²⁵

Although differing on the importance of fiscal and monetary policy in reducing unemployment, both approaches coincide in giving manpower policies, including training, a major significance in reducing the magnitude of the trade-off between unemployment and inflation.²⁶

²⁴James Tobin, "The Cruel Dilemma" in The Battle Against Unemployment, ed. by Arthur M. Okun (New York: W.N. Norton & Co., Inc., 1972), p. 50.

²⁵David E.W. Laidler, "The End of 'Demand Management': How to Reduce Unemployment in the 1970's," addendum to Milton Friedman, Unemployment Versus Inflation? An Evaluation of the Phillips Curve, op. cit., pp. 46-47.

²⁶See also: Martin Feldstein, "The Economics of the New Unemployment," The Public Interest, No. 33, (Fall 1973), pp. 23-25.

E. Review of Previous Studies

The passing by the U.S. Congress of the Manpower Development and Training Act (MDTA) in 1962, which envisioned retraining unemployed and underemployed workers all over the country, has provided sufficient time series and cross-section information for several studies on the economic effects of manpower training. Some of the results based on this information are presented below in order to illustrate some of the general conclusions obtained thus far. A discussion of some of the methodological pitfalls which lead to differences, sometimes very large, in the results is also presented at the end of the section.

Michael Borus, using a sample of MDTA trainees from Connecticut, found benefit-cost ratios for individuals, government, and society as a whole much larger than unity in every case. Specifically, he found the ratios to be between 3.2 and 6.2 for individuals, between 15.0 and 21.2 for the government and between 73.3 and 103.8 for the society.²⁷ He used a similar approach to the one presented in this thesis, except for the fact that he included a multiplier of two in the calculation of social benefits which produced proportionally higher benefit-cost ratios than would have been the case had no multiplier effects been included.²⁸

Hardin and Borus also calculated B-C ratios for training programs at three levels: individuals, society, and government. They showed that

²⁷Michael E. Borus, "A Benefit-Cost Analysis of the Economic Effectiveness of Retraining the Unemployed," Yale Economic Essays, XIV, 4 (Winter 1974), p. 424.

²⁸No multiplier effect is included in the present study for reasons discussed in Chapter 7, Section C.

at all levels, with the exception of government, benefits exceeded costs, but that the employment created had been substantially low in comparison to the total unemployment in the country.²⁹ Cain and Stromsdorfer calculated social rates of return in the order of 109 percent for male trainees in West Virginia in 1961 and 1962 within the pay-back period of only 13 months.³⁰ D.O. Sewell estimated social benefit-cost ratios of 3.3 for men and 6.8 for women in on-the-job training and 1.7 for institutional training for men under the Manpower Improvement through Community Effort (MITCE) Program in the period 1965-1966.³¹

Ralph E. Smith found that in 1967 classroom training programs under MDTA had an internal rate of return of 26 percent for those whose income was considered above the "poverty line," but only 12 percent for the disadvantaged.³² Page calculated a social net present value, computed at 10%, of \$3,400 per trainee, using a sample of 907 retrainees

²⁹ Einar Hardin and Michael Borus, "An Economic Evaluation of the Retraining Program in Michigan: Methodological Problems of Research," Proceedings of the 1966 Social Statistics Section Meetings (Washington: American Statistical Association, 1966), pp. 133-137.

³⁰ Glen G. Cain and Ernest W. Stromsdorfer, "An Economic Evaluation of Government Retraining Programs in West Virginia," Retraining the Unemployed, ed. Gerald Somers (Madison: University of Wisconsin Press, 1968), pp. 320-324.

³¹ D.O. Sewell, Training the Poor--A Benefit-Cost Analysis of Manpower Programs in the U.S. Antipoverty Program, Research Series No. 12 (Kingston, Ontario: Industrial Relations Centre, Queen's University, 1971), p. 98 and the review of previous results in pp. 5-10.

³² R. Smith, *op. cit.*, p. 114.

assisted in Massachusetts between 1958 and 1961. He assumed that benefits from training last during the average working life of trainees.³³ Hardin reviews other evaluations in the U.S.A. and presents the result in a comparative way.³⁴

The experience in England with the Government Training Centres (GTC) has also been useful in providing information and several evaluations of manpower training. Ziderman and Driver found that the individual benefit-cost ratio of participating in GTC training in Scotland during 1968-1971 was between 1.4 and 4.7 if the duration of benefits was assumed to be three years or ten years, respectively.³⁵ Ziderman calculated a social rate of return of 30% for GTC, which is very high when compared with the 8% the government required as the minimum return for nationalized industries.³⁶

In Canada, where government expenditures on training per labour force member and the number of individuals undergoing training in proportion to the total labour force are twice that in the U.S.A.,³⁷ the

³³David A. Page, "Retraining under the MTDA: A Cost-Benefit Analysis," Public Policy, XIII, 2 (1964), p.262

³⁴Einar Hardin, "Benefit-Cost Analyses of Occupational Training Programs : A Comparison of Recent Studies" in Cost-Benefit Analysis of Manpower Policies, eds. Somers and Wood, (Kingston, Ontario: Industrial Relation Centre, Queen's University, 1969).

³⁵Adrian Ziderman and C. Driver, "A Markov Chain Model of the Benefits of Participating in Government Training Schemes," The Manchester School of Economic and Social Studies, XIII, 2 (1975), p. 411.

³⁶Adrian Ziderman, "Costs and Benefits of Adult Retraining in the United Kingdom," Economica, N.S., XXXVI (November 1969), p. 372.

³⁷Economic Council of Canada, Eight Annual Review, (Ottawa: Information Canada, 1971), p. 103.

evaluations of manpower training are very scarce. These evaluations are mainly done by federal government divisions, such as the Department of Manpower and Immigration³⁸ and the Treasury Board.³⁹ Benefit-cost ratios of 6:1 are calculated for institutional training sponsored by Canada Manpower,⁴⁰ but in spite of these high benefit-cost ratios, opinion exists that the economy as a whole loses efficiency when public investments in training for the disadvantaged are undertaken. Burton Weisbrod suggests that

" . . . any evaluation of a manpower program should begin, therefore, with the presumption that the program is not economically efficient in the sense that benefits in the form of increased worker productivity (as measured by earnings) exceed the real cost of the program . . ."41

The dilemma persists because the results of different evaluations, unfortunately, are not strictly comparable. Two of the most important reasons for the divergence in results are presented below.

The first reason lies in the selection of norm groups.⁴² These groups are used to assess the labour status of individuals without

³⁸Canada Department of Manpower and Immigration, Manpower Training: Summary Highlights, (Ottawa: Queen's Printer, 1975).

³⁹Canada, Treasury Board Secretariat, Benefit-Cost Analysis Guide, (Ottawa: Queen's Printer, 1976).

⁴⁰Reported by Morley Gunderson, "Governmental-Industrial Training in Canada," (Toronto: Centre for Industrial Relations, University of Toronto, 1975) Mimeograph, p. 33.

⁴¹Burton Weisbrod, "Benefits of Manpower Programs: Theoretical and Methodological Issues," Cost-Benefit Analysis of Manpower Policies, eds. G.G. Somers and W.D. Wood (Kingston, Ontario: Industrial Relations Centre, Queen's University, 1969), p. 15.

⁴²See: Robert S. Goldfarb, "The Evaluation of Government Programs: The Case of New Haven's Manpower Training Activities," Yale Economic Essays, IX, 2 (Fall, 1969), p. 59.

training in order to compare their status with the status of trainees. Borus used as a norm group both those who entered the program but withdrew before completion, plus workers who qualified to enter the program, but chose not to enter.⁴³ Ziderman questions, on methodological grounds, the use of norm groups and proposes a simulation of the labour status of trainees had they not taken any training program.⁴⁴

MacMillan, Bernat and Flager use a random sample from the Interlake Manpower Corps target clientele to define a norm group.⁴⁵ Page's method of isolating this effect by considering individuals of similar characteristics as trainees was not subject to statistical tests.⁴⁶

The second source of difference in the results is the variation in the length of benefits assumed by different authors. The evaluation of investment projects requires the knowledge of how long the benefits attributed to that investment will last. In engineering projects the economic life is usually given by technical considerations, and the economist has little to argue about. In manpower training investments, there are no technical criteria to consider. A follow-up of the particular groups under consideration is required to establish the time-effect of this investment on human capital. Sometimes because the information available does not permit time-effect analysis, and sometimes because the follow-up period has been very short, the analyst's only

⁴³Michael E. Borus, op. cit., p. 374.

⁴⁴Ziderman and Diver, op. cit., pp. 402-403.

⁴⁵MacMillan, Bernat and Flager, op. cit., p. 10.

⁴⁶Page, op. cit., p. 263.

recourse is to assume the length of the period during which the differential in real income due to training lasts.

Page and Sewell for MTDA and MacMillan, Bernat and Flager for the Manpower Corps assumed that training benefits last for the remainder of the working life of the subject under consideration. Ziderman and Diver considered several time horizons, with the maximum being ten years. From information available on the program,⁴⁷ a three-year follow-up on Selkirk Plant trainees showed a tendency of wages differentials to decrease in the third year after the completion of the program. As shown in Appendix D, however, this pattern was affected by the pooling of male agricultural and industrial workers, for which the earnings trends are completely different. However, the trainee group described in this thesis is comprised mainly of industrial workers (Table A.5) for whom the period of benefits is longer than 3 years.

Goldstein concludes that the assumption about the length of benefits is critical for the results. He shows that if the benefits were assumed to last five rather than ten years, then the Sewell and Smith analyses would have produced unacceptably low rates of return, and in the case of Hardin and Borus even a negative one.⁴⁸

The review of the results of evaluations of training programs presented here demonstrates what economists are familiar with: that

⁴⁷C. Wall, op. cit., analysis of questionnaires.

⁴⁸Jon H. Goldstein, "The Effectiveness of Manpower Training Programs: A Review of the Impact on the Poor," Benefit-Cost and Policy Analysis, eds. William A. Nikkasen et al. (Chicago: Aldine Publishing Co., 1973), p. 342.

assumptions are crucial in determining the results of any evaluation. In order to determine the effects of the assumptions on the final results, it would be necessary to perform sensitivity analysis on the value of the parameters subject to these assumptions in order to determine ranges of variations in the results. However, given the limitations of the individual evaluations of training programs for the disadvantaged, some conclusions can be extracted from the last five years from the U.S.A., England and Canada:

1. From a private individual point of view, training courses seem to be profitable for the trainees, males in particular. Both the level of wages and the rate of employment increase after training. In some cases, in the U.S.A. as well as in England, training allowances are higher than the opportunity cost for the trainee, which produces a positive net present value even if future income is not substantially increased.

2. From a social point of view, training for the disadvantaged has proved to be a sound investment, if benefits last more than 5 years. The results of diverse evaluations, although differing in terms of the characteristics of trainees, norm groups, sample sizes and length of benefits, are too consistent to overlook their implications.

3. The effect of the programs on the financial situation of the government has not been studied extensively. The main reason is that in some programs, especially in the U.S.A., the financial transfer between different agencies, with regard to the programs, are not clear cut. The evidence suggests that the Government's potential to recover the investment is small, particularly in long-term projects, but that

this potential increases when low income people receive the training. The empirical results of this thesis confirm the findings of other researchers for different training programs, although the characteristics of the training program in the Interlake Area, the quality of data and the methodology used here, differ substantially from what has been reported in the literature.

CHAPTER 4

METHOD OF ANALYSIS AND DATA SOURCES

Improvements in and detrimental effects on trainees, government finance and the society as a whole, which are due to the existence of the program are compared by means of benefit-cost analysis. The general approach used to calculate benefits and costs for any project is a subject of controversy,¹ as is the evaluation of crucial parameters involved in the measurement of benefits and costs through time. These parameters include the rate of discount, the length of time economic benefits accrue, and the evaluation criteria used for comparing benefits and costs.

A discussion of the nature of benefits and costs due to manpower training is presented in the first section of this chapter. Section Two discusses the duration of training benefits assumed in this thesis. Section Three concentrates on the analysis of differences between the time preference of individuals and society. Emphasis is placed on the nature of the clientele of the program and its possible effects on discount rates. Section Four demonstrates that the net present value criteria is preferable to the internal rate of return or to the benefit-cost ratio criteria. Section Five presents the specification of the regression models used to estimate training benefits for individuals and society. Also, a derivation of the present value formulae is presented. Finally, Section Six discusses

¹See Arnold Harberger, "Three Basic Postulates for Applied Welfare Economics," Journal of Economic Literature, IX, No. 3 (September 1971), pp. 785-797.

the sources of data for this study and analyses their limitations.

A. Benefits and Costs Profile

A general consideration which should precede any attempt to compute the benefits and costs of a program is to determine from whose perspective the evaluation is made. That is, the group or groups to be considered the subject of the benefits and costs of an investment should be clearly defined. In the present case, three separate groups are studied. These include trainees directly affected by the training program, the governments involved (Provincial and Federal), and the Interlake region. What affects one of these groups does not necessarily affect the others, so a specification of the boundaries of the evaluation is needed.

Another important consideration relates to the separation of real benefits (and costs) from pecuniary benefits (and costs). Benefit-cost analysis, as a tool for evaluating efficiency improvements, normally considers only the first type of benefits and costs. For example, consider training programs where allowances are paid to trainees who would otherwise receive welfare payments during the training period. If their productivity increases above the previous level, a real benefit appears; but the reduction in welfare payments due to the new labour force status is just a pecuniary transfer from the new workers to the pocketbooks of taxpayers with no efficiency effects whatsoever to the economy as a whole.

Another problem which needs to be resolved when completing a benefit-cost project profile is the treatment of inflation. The simplest rule is to avoid the problem by considering constant dollars over the

length of the project for every item to be evaluated. Inflation, as an increase in the general price index, must be removed in the evaluation, due to the assumption that no money illusion exists. Real forces react to changes in relative prices, but not to change in absolute prices. Adjustment should be made to current wages, then, to include this consideration.

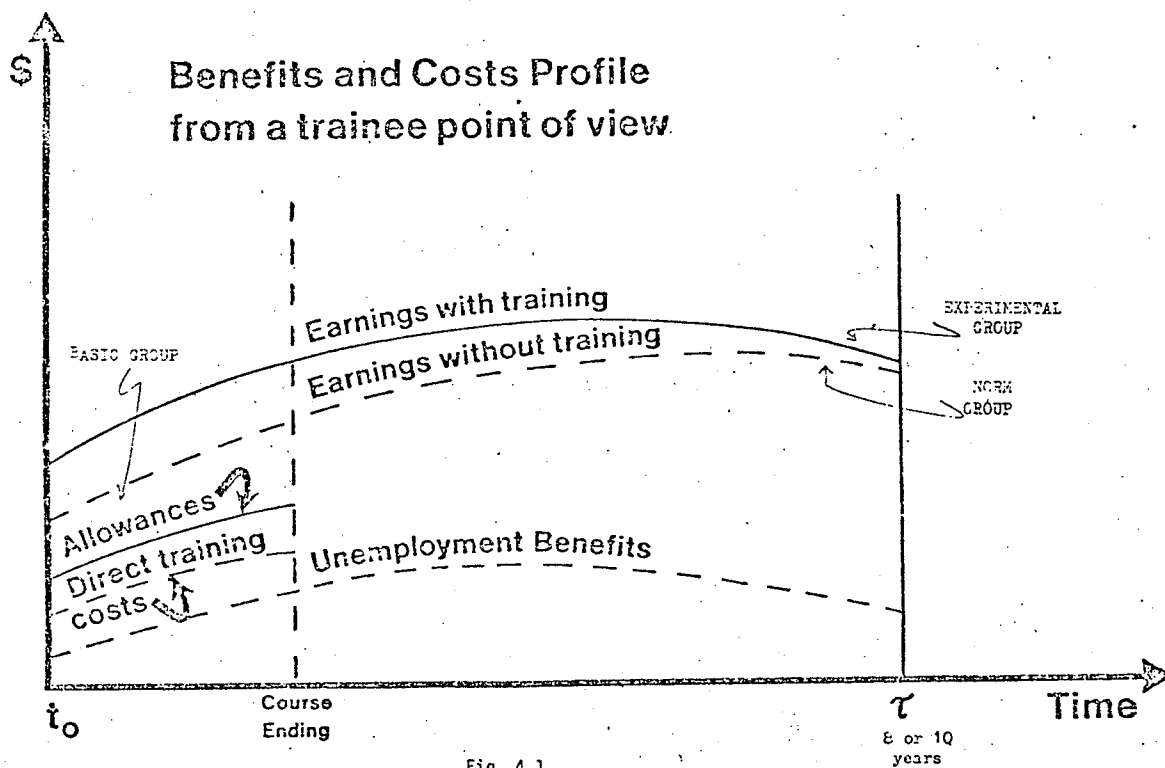
Although from a personal point of view, the benefit of larger productivity are the additional net-of-taxes receipts, from a social point of view, taxes represent just a monetary transfer from the worker to the government and should not be deducted. However, taxes may have allocative effects, especially in relation to how the amount of labour supplied can be modified by taxation and subsidies. This influence is not analyzed here.²

Figure 4.1 shows the pattern of benefit and costs from the trainee's point of view. In entering the program (t_0), the trainee sacrifices any unemployment benefits he or she was getting or the wage previously earned were he or she working. During the rest of the economic life of the investment, the sacrifice is any expected unemployment transfer or the wage he or she would have obtained in the absence of training.³ On the benefit side, the trainee expects to increase his or

²See: M. Koster, "Effect of an Income Tax on Labour Supply", in Taxation of Income from Capital, eds. Arnold Harberger and Martin Bailey (Washington: The Brookings Institution, 1969), pp. 301-324.

³This figure is adapted from: Ziderman and Driver, op. cit., p. 402.

her disposable income over and above the amount that would have been earned in the absence of training.⁴



In order to calculate the magnitude of these elements, two groups are employed in this thesis. The first, a norm group, is formed by

⁴From a social viewpoint, the pattern of evaluation is similar. The differences include the consideration of the resource cost of running the program during its duration, and the exclusion of transfer payments from the evaluation.

individuals living in the Interlake Area of Manitoba, who qualify for training under the Manpower Corps, and who do not have any previous institutional training experience. The second group, the experimental group, is composed of former Manpower Corps trainees who answered a questionnaire sent to them in the summer of 1976. The questionnaire provided information on their post-training earnings pattern. The norm group comprises 396 male individuals whose average age was 31 years and whose average education was 6.8 years. The experimental group includes 116 male trainees whose average age and education were 33 and 7.8 years respectively. Age difference between the two groups was found to be not significant at the 1% level of confidence. Educational differences, however, were significant, and this fact will play a major role in the estimation of individual and social net benefits. (See Appendix B for a detailed description of these groups).

The experimental group, then, provides information about those who have training, and the norm group about those who have no training. The "with-without" approach is one of two ways of estimating individual gains from training. The other is the "before-after" approach in which the labour status and earnings of a group of individuals before entering a training program is compared with their status and earnings after they finish the program.

The "before-after" approach to estimating net benefits is criticized mainly on the ground that it is possible that some of the observed differences between the "after" and "before" situation are not due to the program, but rather to other circumstances, such as cyclical variations in the labour market, or the contention that the improvements

(or impairments) could have happened anyway. The "with-without" approach overcomes this problem by comparing the two groups at the same period of time.

The "with and without" method, however, has two major weaknesses which can be summarized as follows:

1. It is very difficult to select two similar groups in the sense that every relevant characteristic of one is matched to the other. Even though the effects of variables such as age, education and experience can be adjusted by means of an earnings function of the type used in this study, it explains just a fraction of the variation in earnings. Although the non-explained variance is assumed to be of a random nature, it is possible that some variables are not included in the specification of the function, and that the values of these variables differ between the two groups.

2. Especially in cases where training programs involve disadvantaged people, minority groups, etc., it might be argued that those who register in the program have a special motivation or interest, which makes the program more successful than if it were provided to unmotivated trainees.⁵ This fact does not invalidate the measures of success of the program, but prevents these measures from being applied to the whole target population.

In addition to the estimation of benefits produced by training, the calculation of individual benefits during the training program is

⁵Job performance and retention depend predominantly on the work environment, according to Frank Friedlander and Stuart Greenberg, "Effects of Job Attitudes, Training and Organization Climate on Performance of the Hard Core Unemployed," Journal of Applied Psychology, 55:4287-4295, 1971.

required. These benefits, which are of two types, include training allowances and housing subsidies. Training allowances are calculated from Manpower Corps forms on a weekly basis and are paid, in most of the cases, directly by the program. Housing subsidies are not directly linked to the Manpower Corps. However, it was suggested by program officials that the probability of receiving the subsidy increases if an individual is accepted into the Program. The hypothesis that the amount of subsidy, if granted, is very small is discussed in the next chapter.

B. Duration of the Benefits of the Program

In Chapter Three it was argued that differences in assumptions about the length of benefits have produced significant variations in the results of previous studies. Although the results of this thesis are also subject to this same weakness some empirical considerations were taken into account when assumptions about the duration of benefits were made.

The influence of experience on earnings has been shown to increase at a decreasing rate.⁶ It is reasonable to assume, then, that the additional earnings produced by on-the-job experience in the program will not last indefinitely, but will disappear before the end of the active life of trainees.

An eight year period is assumed in this thesis to be the lower limit for the duration of benefits. This assumption is based on the

⁶Jacob Mincer, *op. cit.*, p. 67.

fact that eight years was the longest experience period recorded for members of the experimental group in this study (1868-1975), and no statistical evidence was found to indicate that additional earnings due to experience disappeared during these eight years. In order to provide a sensitivity analysis for the variation in the duration of benefits, a ten-year period is also included in the calculations. This inclusion does not change the nature of the results. In addition, a "waiting period" in which no effects of the program are realized was also introduced. This period was selected to be six months after the program ended based upon information provided by Carl Wall in 1974. This waiting period is characterized by a labour situation identical to the one for the trainee before his entrance into the program.

C. The Discount Rate

The discount rate measures the value individuals (or society) place on the diversion of resources from one period of time to another. Controversy exists as to what is the correct rate of discount for public investment. A discussion of the details of the controversy and of the efficiency effects associated with the selection of one particular rate instead of another is beyond the objectives of this thesis.⁷ Not only the efficiency of the economy is affected by using an "incorrect" rate, but also the composition of the projects tends to be biased in terms of

⁷See: Richard A. Musgrave, "Cost-Benefit Analysis and the Theory of Public Finance," Journal of Economic Literature, VII, 3 (1969), pp. 802-803.

the time horizon of the projects selected. That is, long-life projects tend to be selected instead of short-life ones when the rate of discount is lower than the "true" one, and vice versa.

In the present study, no single rate of discount is chosen but rather a sensitivity analysis is performed to show how results are affected when different rates are used. The values selected depend on the perspective of the evaluation. From a personal point of view, it is necessary to recall that the target group in this study is not composed of white people raised in the tradition of monetary savings and appraisal of the future, and that the values of white people in regard to these matters do not necessarily coincide with those of the group under consideration.

In view of this, it seems legitimate to ask the question: is the personal time preference of an Indian, registered or not, different from the one of the average white man, and if so, by how much? Economic theory suggests that, in general equilibrium people equate the marginal rate of time preference with the net-of-taxes return to savings. Any difference between these values is unstable and will disappear in the long-run. It is suggested here that this pattern is not true in the case of the group under study. Although there exists no evidence on how much Indians or Metis save at different income levels, it is considered that they systematically save less than the rest of economy at the same interest rates. Consequently, discount rates of 6%, 12%, 18%, 24%, and 30% which are in general higher than the net-of-tax savings rate, are used here.

From a social point of view, the selection of a discount rate is more complicated. Two lines of thought can be recognized in the literature. One asserts that market indicators provide enough information for the calculation of a social rate of discount. The other denies the importance of these indicators and concludes that this rate is lower than those shown by the market.

Those in the first group interpret the government activity as a reduction of private investment, a reduction of private consumption or a combination of both. They conclude that the social rate of discount depends on the value which affected groups put on the reduction of each activity.⁸ Those in favour of the second approach either consider that it is ethically indefensible to discount future utilities, and that the discounting process

" . . . arises merely from the weakness of the imagination . . ."⁹ of that individuals discount higher than society because of their relatively short life compared to society's. The range of rates of discount used in this study tends to comply with the first approach, with 8 percent being used as the lower limit and 12 percent as the upper limit in the calculation of present values. No change in these rates through time is considered.¹⁰

⁸Richard A. Musgrave, op. cit., p. 802.

⁹Frank P. Ramsey, "A Mathematical Theory of Savings," The Economic Journal, XXXVII (December 1928), p. 543.

¹⁰However, the rates used here are somewhat lower than those suggested for public investment in Canada (See: Canada, Treasury Board, op. cit., p. 26). These lower rates reflect the judgment of the author in regards to these matters.

D. Evaluation Criteria

A great deal of literature has been devoted to the topic of selecting the best criterion for comparing benefits and costs throughout the lifespan of a project. It will not be attempted here to provide another review, but just to establish the advantages of the net present value (NPV) approach over two of the most common measurements of the goodness of a project, the internal rate of return (IRR) and the benefit-cost ratio (B/C). The important issue to note at the outset is that, in the quest for efficiency improvement, the analyst should look for those projects in which the value of benefits exceeds the value of costs by the largest amount. The discussion here concentrates on the extent to which these three criteria satisfy this requirement.

Assuming that $t = 0$ is the period in which the first value of benefits (B) or costs (C) appear, the following definitions hold:

1. NPV is the figure obtained after all benefits (B_t) and costs (C_t) are discounted at a rate r for $t = 0$ to n , where n is the life of the project.

$$NPV = \sum_{t=0}^n \frac{B_t - C_t}{(1+r)^t} \quad (4.1)$$

2. IRR is the value of r , namely r^* , for which the NPV of a project's profile is zero.

$$0 = \sum_{t=0}^n \frac{B_t - C_t}{(1+r^*)^t} \quad (4.2)$$

3. B/C ratio is the quotient of the present value of benefits (B^*) to the present value of costs (C^*), $\frac{B^*}{C^*}$, both discounted at rate r .

The decision rules to be examined are two. One is related to the measurement of the efficiency improvement of a given project in isolation, and the other is related to the comparison of the efficiency improvement of two mutually exclusive investments.

1. Single project.

Accept a given project, if:

- (i) $NPV > 0$
- (ii) $IRR > r$, where r is the rate of discount previously discussed.
- (iii) $\frac{B^*}{C^*} > 1$

2. Comparison of projects.

Accept projects A over B, if:

- (i) $NPV_A > NPV_B$
- (ii) $IRR_A > IRR_B$
- (iii) $\left(\frac{B^*}{C^*}\right)_A > \left(\frac{B^*}{C^*}\right)_B$

A criterion is said to be consistent if it provides unambiguous selection for (1) and (2).

NPV is a consistent criterion, because $NPV > 0$ guarantees that the general efficiency of the economy is improved, and $NPV_A > NPV_B$ assures that project A adds to net benefits more than project B in all cases, irrespective of the nature of the project.

IRR is not consistent because it does not satisfy (1) and (2)

as a general rule. It satisfies (1) only if the profile of the project is such that before a period $t = \bar{t}$, $(B_t - C_t) < 0$, and thereafter, $(B_t - C_t) > 0$. These conditions are the only situations for which only one positive real root to equation (4.2) exists. When multiple roots appear, or when only imaginary roots exist, IRR does not provide a guide for project selection. Additionally, IRR does not satisfy (2), because, although $IRR_A > IRR_B$, NPV_B might be larger than NPV_A discounted at r .

B/C ratio satisfies (1), but does not satisfy (2). If $B^*/C^* > 1$, it necessarily follows that the efficiency of the economy is improved, but if $(\frac{B^*}{C^*})_A > (\frac{B^*}{C^*})_B$ it does not follow that A should be selected. This is true for two reasons:

1. The $\frac{B}{C}$ ratio ranks projects according to how much efficiency is increased per unit of cost, and not according to how much the absolute value is increased (the issue that was emphasized at the beginning of this section). In general, it is the maximum difference of totals (equality of marginals) which is sought in the project appraisals, not the maximum average magnitudes.

2. In addition the ratio of benefits to costs changes according to the way in which net benefits are calculated. At least two benefit-cost ratios could be deduced from the very same profile. One could be obtained by subtracting each year's cost from the corresponding benefits, and the other by discounting benefits and costs independently (as it is done in this thesis). Numerical values in each case are different, as any example would show, and so the ranking of projects is sensitive to the procedure of calculation. Condition (i) is satisfied, however, because if one method produces a benefit-cost ratio larger than one, the

other does also.

Only NPV satisfies (i) and (ii) and it is the only criterion which in general provides an unambiguous measurement of the increase in the efficiency in the economy. The alleged disadvantage of NPV is that in its calculation a particular value for r must be selected, making the numerical result sensitive to this selection.¹¹ This is not, however, a valid reason for using a criterion other than NPV. With B/C ratios, a discount rate must also be used. In the IRR the discount rate has to be used as a cut-off rate at the time of project selection. A calculation of several NPV's with different rates can be made to provide a range of sensitivity to changes in the value of r .

A greater than zero value for the NPV is necessary but not sufficient for the selection of a project, though. A different project scale and timing may provide a greater NPV than the calculated one. However, in the case of the Manpower Corps, scale and timing are not under the control of the analyst, because the present evaluation is made on an ex-post basis. Consequently, changes in these two elements are not considered.

E. Model Specification

In this section, a presentation of the model used to calculate the effects of the program on individuals, government and society is made. It is not based on any previous study, mainly because the nature of the information available prevents a simple comparison between individuals with training and without training.

¹¹ Ralph Turvey, "Present Value versus Internal Rate of Return-- An Essay in the Theory of the Third Best," The Economic Journal, LXXIII (March 1963), p. 96.

A general model which considers all possible links between the sectors affected by manpower training, as suggested by Figure 3.1, is impossible to calculate with the limited amount of information concerning training effects on private firms. More specific models, restricted to trainees and government finance are discussed below.

Training Benefits and Costs From an Individual Viewpoint

The model assumes that individuals receiving training behave as if they were trying to maximize the NPV of the stream of their future money earnings. This assumption enables the analyst to apply benefit-cost criteria to information related to the economic status of individuals with and without training and facilitates the explanation of the observed behaviour of the groups. A discussion of the validity of this assumption is presented in Appendix D. In this Appendix an examination of the pattern of intersectoral mobility of a sub-sample of trainees reveals a tendency for some individuals to remain in their original occupations in spite of the fact these jobs provide lower income but presumably, other non-economic satisfactions relative to other occupations.

The value of money income for the experimental group, namely, those individuals with experience in Manpower Corps, is obtained in a different format than the income level for members of the norm group, or those without training. For the first group, the income level is expressed in 1975 dollars, the year for which the questionnaire (which will be discussed in more detail in the next section) required employment and earnings information. For the norm group, income was obtained in dollars of the year in which each member asked for admission to the program. Members of the experimental group reported the history of a

complete year of participation in the labour force, whereas for members of the norm group, the labour situation registered was the one existing at the time of registration.

If comparable information existed for both groups, a common way of assessing the impact of training on earnings, would have been to pool them together and to add a dummy variable (or a set of dummy variables) to indicate whether the individual belongs to the norm group or to the experimental group. The regression coefficient for this dummy variable, if it were statistically significant, would have shown the increment in the value of the dependent variable, money earnings, due to the individual's participation in the program.

Because the information available for Manpower Corps trainees is not strictly comparable with the one for the norm group, a different methodology is required to calculate benefits and costs. This methodology requires the following steps:

1. Estimation of an earning function for the experimental group. This function must include as one of its arguments, a variable closely related to the structure of the program.
2. Adjustment of the norm group's real labour earnings in order to include differences between averages of the relevant variables which determine experimental group's earnings (according to step 1) and the norm group's averages for the same variables. The individual opportunity costs of entering the program are made equal to the adjusted norm group's average expected earnings.
3. Estimation of other benefits and costs incurred by individuals when entering the program. These include movement costs, training allowances and housing subsidies. A comparison of all benefits and costs is made by means of a discount function.

Earnings Functions

It is known that earnings functions are reduced forms of simultaneous supply and demand equations systems and that the use of ordinary

least squares in their estimation produces biased estimators of the regression coefficients. The magnitude of the bias depends on specific cases and is not easy to determine a priori.¹²

It may be hypothesized, for example, that the supply of human capital (S) is of the form:

$$(4.3) \quad S = a_0 + a_1 Y + a_2 A + a_3 X + a_4 X^2 + a_5 E + u_1$$

Where:

Y is the level of individual earnings in dollars per week;

A represents age in years;

X is the working experience of the individual in years;

E is the highest educational level of the individual in years;

u is the random term, and

a_i are the coefficients to be estimated

The demand for investment in human capital (M) is of the form:

$$(4.4) \quad M = b_0 + b_1 Y + b_2 A + b_3 X + b_4 E + b_5 D + u_2$$

Where:

Y, A, X and E are defined as above.

D is the duration of the courses, in weeks,

b_i are the coefficients to be estimated, and

u_2 is the random term

Equations (4.3) and (4.4), together with the condition $S = M$, produce a system of three equations that can be estimated by indirect

¹²See: Mark Blaug, "Human Capital Theory: A Slightly Jaundiced Survey," Journal of Economic Literature, XIV, 3 (1976), p. 843.

least squares.

The reduced form of the system, called the earnings functions, is:

$$(4.5) \quad Y = c_0 + c_1 A + c_2 S + c_3 X^2 + c_4 E + c_5 D + v$$

Where:

$$c_0 = \frac{a_0 - b_0}{b_1 - a_1}$$

$$c_4 = \frac{a_5 - b_4}{b_1 - a_1}$$

$$c_1 = \frac{a_2 - b_2}{b_1 - a_1}$$

$$c_5 = \frac{-b_5}{b_1 - a_1}$$

$$c_2 = \frac{a_3 - b_3}{b_1 - a_1}$$

$$v = \frac{u_1 - u_2}{b_1 - a_1}$$

$$c_3 = \frac{a_4}{b_1 - a_1}$$

The parameters of the reduced form (4.5) measure the combined effect of supply and demand forces and they take into account the interdependence among the endogenous variables of each equation.

The inclusion of A in the earnings equation has been suggested by Lazear.¹³ Mincer found X and X² to be the most significant variables in determining Y,¹⁴ although neither Y nor X are defined here quite as Mincer defined them. According to Mincer, Y represents labour incomes and X is the true experience of the individual.¹⁵ In the model to be estimated here, Y includes unemployment transfers and X is a proxy for experience, namely, the number of years elapsed between the end of the

¹³Edward Lazear, "Age, Experience and Wage Growth," American Economic Review, 66:549, September 1976.

¹⁴Jacob Mincer, op. cit., p. 92.

¹⁵Ibid., p. 84.

course and 1975, the year for which earnings information was available. The inclusion of variable D in the equation permits the calculation of the marginal individual benefits per week produced by an additional week of training, $\frac{\delta Y}{\delta D}$. The value of real allowances payments, A, is also included as individual benefits derived from Interlake Manpower Corps training.

Individual Opportunity Cost

Average earnings of members of the norm group, namely, average earnings of individuals without training, are used in this study as a measure of the income foregone by trainees when enrolling in the program. Two adjustments to these figures are required:

1. Adjustment for increases in real wage rates not related to the success of the program. Because information about the norm group's earnings covers eight years (1968-1975), it is necessary to correct yearly earnings in order to consider real wage increases which would have occurred in the absence of training. This is done by calculating the rate of growth of nominal weekly income for members of the norm group (Table 5.2) and comparing it with the rate of price increases during the same period. It is shown in this thesis that increases in money income for the group are roughly equal to increases in the price level for 1968-1975, and therefore real income for the group would have not changed without training. The average of nominal earnings for the group is considered a good approximation for the average of real earnings.

2. Adjustment for differences in characteristics between the experimental and the norm group. If Z_e^i represents the average value of characteristic i (age, education, . . .) for the experimental group,

Z_n^i the average value of the same characteristic for the norm group, and I_e the average real income for the norm group, then:

$$(4.6) \quad \frac{\delta I_e}{\delta Z^i} (Z_n^i - Z_e^i), \text{ for every } i$$

is the adjustment to the value of the norm group's earnings required to make earnings levels of the two groups strictly comparable. Because

$\frac{\delta I_e}{\delta Z^i}$ can not be calculated from actual data, $\frac{\delta Y}{\delta Z^i}$ is used as a proxy for

it. This means that the increase in real income for the experimental group when Z^i changes is made equal to the increase in the norm group's earnings that would have occurred if $Z_n^i = Z_e^i$.

Therefore, for individuals who were employed before entering training in year t , the average opportunity cost of enrolling in the program (e_t^e) is:

$$(4.7) \quad e_t^e = I_e^t + \frac{\delta Y}{\delta Z^i} (Z_n^i - Z_n^e)^t$$

However, only a few would-be trainees are employed when applying for admission to a project. Most of them are unemployed, and thus their opportunity cost is equal to the average real unemployment compensation, e_t^u . If in a given year, u_t percent of members of the norm group are unemployed and $(1 - u_t)$ are employed, the opportunity cost from a trainee viewpoint of enrolling in training in that year is defined by:

$$(4.8) \quad OC^t = e_t^u u_t + e_t^e (1 - u_t)$$

The weekly average opportunity cost for the individual trainee over the eight years (OC) is defined as the average of weekly individual costs (OC^t) weighted by the number of individuals who had taken training in each year during 1968-1975.

$$(4.9) \quad OC = \frac{\sum_{t=1}^8 OC^t \cdot n^t}{\sum_{t=1}^8 n^t}$$

Where:

n^t is the total number of male trainees in the basic group for each year, and $\sum n^t = 1550$ (See Table A.7).

Discounting Function

With all magnitudes calculated at 1975 prices, the present value of marginal benefits per week (PVMB) and of marginal costs per week (PVMC) can be calculated by extending formulae (4.1) to include the fact that real benefits are assumed constant throughout the life of the project. The PVMB is then equal to:

$$(4.10) \quad PVMB = MB \left[\frac{(1+r)^n - 1}{r(1+r)^n} \right]$$

Where:

MB represents the value of real benefits per week due to the program estimated by the regression coefficient of D in equation 4.5.

r is the discount rate, and

n is the time length of benefits.¹⁶

The inclusion of a "waiting period" of six months (26 weeks)

¹⁶Because marginal costs and benefits are expressed in weekly values, n and r are also magnitudes expressed in weeks. However, for the sake of simplicity, values for these two variables are given in the text as their year equivalents.

for the commencement of benefits for which marginal benefits are zero, transforms (4.6) to:

$$(4.11) \quad PVMB = MB \left[\frac{(1+r)^n - 1}{r(1+r)^n} \right] - MB \left[\frac{(1+r)^{26} - 1}{r(1+r)^{26}} \right]$$

$$(4.12) \quad PVMB = MB \left[\frac{(1+r)^n - 1}{r(1+r)^n} \right] - \left[\frac{(1+r)^n - 1}{r(1+r)^{26}} \right]$$

$$(4.13) \quad PVMB = MB \left[\frac{(1+r)^{n-26} - 1}{r(1+r)^n} \right]$$

All costs are calculated at 1975 prices and dollars, and consequently, they do not need to be discounted. The net present value (NPV), becomes:

$$(4.14) \quad NPV = PVMB - PVMC$$

$$(4.15) \quad NPV = MB \left[\frac{(1+r)^{n-26} - 1}{r(1+r)^n} \right] - OC + A$$

Where: OC is the value of marginal costs (opportunity cost per week of training), defined in equation 4.9, and A is the training allowance.

Expression (4.15) is used here instead of expression (4.1) in order to perform more directly the sensitivity analysis for some of the parameters involved in the calculation of the net present values (see Chapter 5).

Benefits and Costs from Government Viewpoint

Sources of benefits to the government induced by the existence of the program are two. The first is a reduction in future transfer payments to unemployed individuals produced by a reduction in the unemployment rate due to training together with an increase in the personal income tax collection due to an increase in the level of real earnings

produced by the program. The second is the reduction in transfers payment (plus any additional tax collection) produced during the duration of training.

The earnings function derived in Chapter 5, and explained in the previous section, allows the calculation of how much of the increase in earnings and employability, as shown by differences between norm and experimental groups, is due to training. A simulation of changes in tax payments induced by the program is performed which required a number of assumptions about some of the characteristics such as age of dependents, racial status, etc. which determine the amount of tax exemptions.

Costs to the government are represented by the operation and capital costs of the programs. These costs, however, have to be adjusted in consideration of the fact that the Manpower Corps Program not only provides training for the disadvantaged, but also produces a physical output in most of the projects (see Chapter 2). Operating costs are divided between "production costs" and "training costs" based on technical reports about the training plant at Selkirk.

Benefits and Costs From a Society Viewpoint

It was noted in Chapter 3 that the evaluation from a social perspective does not cover all relevant aspects in the present study. The reason is that at least two important impacts of the program are not calculated here.

1. The effect on private firm's profits of a potential reduction in recruiting and screening costs not internalized by the price mechanism.

2. The "vacuum" effect (or its opposite, the "displacement" effect) produced when a newly employed individual induces additional employment (or replaces other workers) in the economy.

The calculation in this study of the real benefits to society produced by the program reduces to the increase in real wages for the individuals after training, which is a proxy to the increase in real productivity. The calculation of this value is made by regressing real employment earnings for the experimental group on a set of variables similar to the ones used for calculating a trainee's benefits from the program. The regression coefficient of the variable D, duration of the program, represents the social gain due to additional training.

Social costs are of two types, real resource costs of operating the program, and the social valuation of the labour used during the training period. Real operating costs are equal to total operating costs minus transfer payments, because these transfers do not represent a resource cost to society. The valuation of labour from a social point of view will follow the approach proposed by Harberger,¹⁸ in which the social opportunity cost of labour is considered equal to the supply price of the labour involved in the training program. Mobility costs, represented by expenditures made by government agencies on the relocation of trainees, are also estimated.

F. Sources of Data

One of the crucial limitations of this thesis is the poor quality of earnings and employment data for applicants to the program. This limitation is the principal reason for the methodological framework used

¹⁸Arnold Harberger, Project Evaluation (Chicago: Markham Pub. Co., 1972), p. 164.

in the present study. Figure 4.2 summarizes the sources of information for this study and the chapters and appendices where this information is mainly used.

General information about every applicant to the program is reproduced in computer printouts designed by Manpower Corps and obtained from registration forms. For the purpose of this study the applicants were initially divided into two categories, those who were accepted and the projects to which individuals were assigned, location of the projects being too far from the applicants residence, and non-appearance of the would-be-trainee at the initiation of the project. The rejection, then, does not include any screening process which may bias the comparison between groups.

The first of these two groups, the accepted applicants, comprises the "basic group" used to characterize the program in Chapter 2. Several limitations appear in the information concerning this particular group:

1. For those who reported that they were unemployed when applying, the figure under the heading "amount of last earnings received" sometimes showed the value of the last labour earnings and sometimes the value of unemployment earnings, making the separation of these two sources a very difficult task.

2. For those who reported to be studying when applying, this figure sometimes shows the value of summer jobs earnings and sometimes the value of student aid, etc.

3. No records exist for the length of time of a given individual's labour status (employed, unemployed) when he applied to the program. This information would permit inquiry into the behaviour of individuals engaged in seasonal activities to determine whether they attend the program looking for future benefits or whether they enter for an income supplement.

The second group, those rejected from the program, initially formed the norm group. A total of 75 individuals, 62 of them males, were divided according to the year in which they asked for admission to

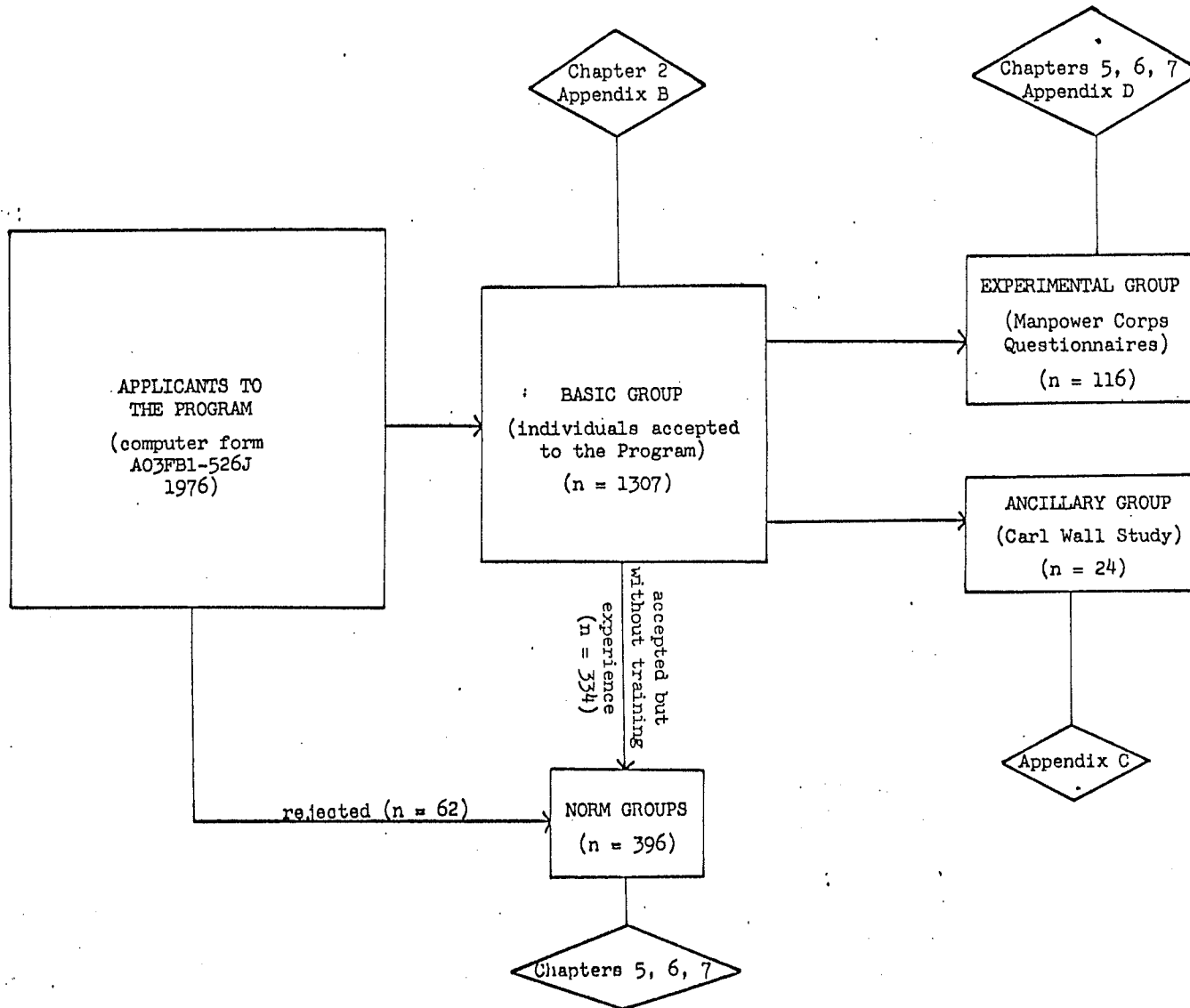


Figure 4.2

Information Flow for Different Groups used in this Study

any project. The average education was 6.1 years for males and 6.4 years for women. However, out of this initial norm group, only 14 individuals were employed at the time of application and none of them were employed in 1968, 1970 or 1973. Because no reliable figure for average earnings "without" training would have been found using this group, this original norm group of 62 was expanded to 396 with the addition of those individuals who were eventually admitted to the program, but, who, at the time of admission had had no previous experience in any other manpower service in the area.

This addition does not compromise the main objective of the norm group: the estimation of average earnings in the absence of training. Limitations in relation to the norm group are the same as those for the basic group because the source of information for both is the same. Characteristics of the norm group are shown in Appendix B. It should be noted that neither of these groups were obtained by sampling techniques. They represent the total population in every case.

In order to evaluate the effects of the training program, it is necessary to obtain information about individuals already trained in the program. They form the experimental group. Manpower Corps designed a questionnaire to be mailed in the summer of 1976 to all former Manpower Corps trainees and on a yearly basis thereon. Completed questionnaires started to be received by mid-July, 1976 and the total number received by mid-August, 1976, formed the experimental group. Time limitations prevented the drawing of a larger sample. Characteristics of this experimental group are shown in Appendix B, where their situation before training is summarized. In Table 5.1, Chapter 5, their

situation after training is presented. It is important to note that the present study is made on an ex-post basis, i.e., it evaluates the effects of the program during the period 1968-1975. In order to do so, the norm group is devised to estimate those magnitudes which depend on earnings without training, such as individual and social opportunity costs. When the average during the period of any of these magnitudes is calculated, the total number of trainees in each year, obtained from the basic group, is used.

Finally, an ancillary group formed by those former trainees of the Selkirk Manpower Corps Plant surveyed by Carl Wall in 1974 was used for investigating the possible existence of racial discrimination (Appendix C). Wall's questionnaires were used because they provide the most recent follow-up available for Manpower Corps trainees.

Another set of information exists regarding the separation of total costs of the program into training costs and production costs. The technical details of this information are discussed in Chapter 6. The methodology for differentiating these elements was presented to Manpower Corps in 1974 by a consultant group with the purpose of applying them to those projects where a physical output such as ladders, houses, park equipment, etc., was produced.

Appendix E shows the format for recording improvements in individual trainees, mainly based on the judgement of foremen and the "learning curves" suggested in a memorandum by G. T. Boychuk and R. W. Wilay dated September, 1974 for the projects in the program. These "learning curves", which relate training improvements with time spent in training, are used in this study as a guide for separating production costs from human development costs (or training proper).

CHAPTER 5

ECONOMIC EFFECTS OF THE PROGRAM ON INDIVIDUAL TRAINEES

This chapter presents some empirical results concerning the effects of the Interlake Manpower Corps Program on trainees' total earnings and employability. The theoretical concepts used in this chapter have been discussed previously in the present study. Therefore, the presentation which follows concentrates on model specification, analysis and discussion of the results.

The chapter is divided into four parts. In the first, individual's benefits and costs are calculated. Benefits are of two types: those appearing after training (higher earnings and employability) and those existing during training (allowances and housing subsidies). Costs incurred by trainees are: foregone earnings (from labour services as well as from transfer payments) sacrificed by trainees when attending the Program, and movement costs related to the change of living location necessary to participate in a training project.

In the second part of this chapter a comparison of benefits and costs is made using capital theory techniques. In section three, the sensitivity of the results to changes in several parameters in the model is calculated. These parameters are the rate of discount, the duration of benefits and the level of unemployment transfer. They were selected for the sensitivity analysis because their values in the initial formulation of the model were not obtained from actual data, but from assumptions explained in Chapter 3. The analysis of sensitivity will

show how the results of this chapter change with modifications of these assumptions. Finally, in section four, the analysis of the results is made.

A. Individual's Benefits and Costs

In this section, the calculation of benefits and costs of enrolling in the Manpower Corps program is presented. The norm group and the experimental group, which were introduced in the previous chapter, serve as the subjects for analysis. The small number of women found in both groups prevented the analysis of female trainee's benefits and costs.

It is assumed that individuals receiving training behave as if they were trying to maximize the net present value of the stream of their future monetary earnings. This assumption is the core of the human capital theory. Individuals allocate their time between work (or job searching), leisure and investment in themselves : education, on-the-job training, etc.

Tables 5.1 and 5.2 show the labour status and weekly receipts for the experimental and the norm groups, respectively. Monetary values for the experimental group are expressed in 1975 dollars and for the norm group they are expressed in dollars of the correspondent year listed in the table. Unemployment transfers were difficult to calculate for members of the norm group, mainly because the information available was incomplete. This problem was partially solved by computing the average 1975 unemployment receipts for the experimental group, \$78/week, and assuming that the real value of the transfers does not vary through the

Table 5.1
 Labour Status and Average Earnings
 of Experimental Group
 in 1975
 (1975 dollars)

Year Last Course Ended Labour Status during 1975																			
	1968		1969		1970		1971		1972		1973		1974		1975		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Employed all year	5	71.4	3	75.0	13	76.5	16	69.5	14	66.7	16	72.7	7	53.8	3	33.3	77	66.4	
Unemployed all year	-	-	-	-	1	5.9	-	-	-	-	2	9.1	2	15.4	3	33.3	8	6.9	
Partially Employed	2	28.6	1	25.0	3	17.6	7	30.5	7	33.3	4	18.2	4	30.8	3	33.3	31	26.7	
Total	7	100.0	4	100.0	17	100.0	23	100.0	21	100.0	22	100.0	13	100.0	9	100.0	116	100.0	
Total Weekly Receipts 1975																			
For those employed all year	151.75		204.19		182.14		184.46		161.58		196.36		189.68		205.79		182.33		
For those partially employed	147.50		76.04		111.58		189.26		135.87		201.79		94.58		105.47		147.63		
Average Labour Earnings	137.89		161.65		155.34		172.42		140.28		169.76		106.72		89.58		149.46		

Source: Interlake Manpower Corps Questionnaires, 1976.

Table 5.2
 Labour Status and Average Earnings
 Norm Group 1968-1975
 (nominal dollars)

Labour Status in Year of Application	1968		1969		1970		1971		1972		1973		1974		1975	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Unemployed	46	63.9	55	84.6	42	70.0	100	83.7	22	84.6	24	80.0	7	70.0	11	84.6
Seasonally employed	20	27.8	1	1.5	6	10.0	10	8.3	-	-	-	-	1	10.0	-	-
Employed	6	8.3	9	13.9	12	20.0	10	8.3	4	15.4	6	20.0	2	20.0	2	15.4
Total	72	100.0	65	100.0	60	100.0	120	100.0	26	100.0	30	100.0	10	100.0	13	100.0
Weekly Earnings																
Seasonally employed	61.84		65.00		62.21		88.92		-		-		90.00		-	
Employed	85.63		76.50		84.50		95.30		80.00		121.12		101.00		104.00	
Average	67.33		75.31		77.07		92.11		80.00		121.12		97.33		104.00	

Source: Interlake Manpower Corps Registrations (1968-1975).

period 1968-1975. This assumption appears to be consistent with available information for the norm group in the Manpower Corps forms.

As shown in Table 5.1, the experimental group is divided into groups of individuals who graduated in the same calendar year. For example, 22 members of the experimental group, finished their projects in 1973. Of these 16, or 72.7%, were fully employed during 1975 with average labour earnings of \$169.76 per week, while 4 were partially employed with average labour earnings of \$201.79 per week. The remaining two were totally unemployed during the same year.

The reasons for this division are twofold. First, because the norm group information was obtained with the same format, it was reasonable to think that the absolute differences in earnings between individuals in the experimental group could be explained by the "vintage" of the training program, amongst other things. Second, this group analysis was thought to be helpful in explaining the relation of the program's success to the fluctuation of the economy. Although the empirical evidence does not permit a conclusive solution to the effect of changes in the economy on trainees incomes, the presentation will be left in this form in order to establish a methodological framework which could be useful when new and more complete information becomes available.

The information about the 396 members of the norm group (Table 5.2) is presented for the year in which each member of this group applied for admission to the program. For example, in 1973, 30 individuals had the characteristics required for admission to the norm group in this study (see Chapter 3). Twenty four of these, or 80%,

were unemployed at the time of application and 6, or 20%, were employed with an average earning of \$121.12 a week, in 1973 dollars.

The rate of unemployment for members of the norm group ranges from 63.9% in 1968 to 84.6% in 1969. The average rate is 77.5% (307 out of 396). The unemployment rate for the experimental group is 6.9% if only those who were totally unemployed during 1975 are included (8 out of 116), or 19.9% if the unemployment of those temporarily unemployed is included.¹ Average earnings differentials are more difficult to calculate because the figures for the two groups are in dollars of different years. However, it is safe to state that labour earnings of former trainees are higher than labour earnings of those without training.

It is necessary to show how much of the difference total earnings is attributable to training and how much to other elements. In addition to this, the magnitudes of other individual benefits and costs of entering a training project are required to assess the impact of the program on trainees.

Three steps are required to determine benefits and costs imputable to the program from an individual viewpoint:

1. The estimation of earnings functions to detect the influence of training on earnings differentials between the norm and the experimental groups. This procedure provides a proxy for the level of benefits

¹The average unemployment period of those temporarily unemployed is 5.8 months, or 48% of the time, so the unemployment-equivalent rate is: $\frac{8 + (0.48)(31)}{116} = 0.199$

after training.

2. The estimation of training allowances in order to include in the analysis the individual benefits during training. A discussion of housing subsidies as another source of benefits is also presented.

3. The estimation of the individual's foregone earnings during the program. The earnings of norm group members are used as a proxy for this cost to trainees.

The calculation of these benefits and costs are discussed in detail below.

Individual Benefits after Training : the Earnings Function

An important issue in the human capital approach is the specification of a function which provides explanation for the effect of selected variables on individual's earnings. The search for this function has produced a great deal of literature², and, in spite of some doubts cast upon the methodology, a substantial amount of evidence exists about the importance of some of the variables entering the function³.

In the present study, the earnings function is of major importance. It provides the basis of comparison between the group which has attended any Manpower Corps project and that which has not. This function is calculated for the experimental group and the results so obtained are compared with information about the norm group.

²Jacob Mincer, "The Distribution of Labor Incomes: A Survey with special Reference to the Human Capital Approach," Journal of Economic Literature, VIII, 1 (1970), 1-24 and the references there cited.

³Some of these doubts relate to the philosophical content of the models and others to their empirical and operational relevance. For an example of the first type, see: Samuel Bowles and Herbert Gintis, "The Problem with Human Capital Theory--A Marxian Critique," American Economic Review, Papers and Proceedings, 65:76, May, 1975. For an example of the second type, see: Mark Blaug, op.cit., pp. 836-842.

The dependent variable Y in the following models represents the yearly earnings obtained by individuals in the experimental group calculated on a weekly basis for 1975. This variable includes income from employment as well as unemployment transfers during the year.

Several attempts to derive the best equation were made. Some of the most interesting results are presented here. The total number of observations for each equation is 116 (7.5% of the total number of male trainees who have ever attended any project). All equations utilize the same cross-section data.

Equation one. As discussed in the previous chapter, earnings functions are reduced forms of supply-demand systems. The reduced form equation can be described by the functional expression:

$$(5.1) \quad Y_i = f(E_i, X_i, D_i, A_i)$$

where:

Y_i represents weekly total real income for the i th member of the experimental group in 1975, as reported in the questionnaires sent during Summer 1976.

E_i represents the number of complete years of formal education for individual i .

X_i is a proxy for the experience of individual i in the labour market since completing the last week of training, measured in years. The definition of this variable is explained below.

D_i is the total duration of training courses taken in the program by individual i , measured in complete weeks.

A_i is the age of individual i in 1975.

Because no information about the time length of working experience previous to training was available for the experimental group, the number of years elapsed after the completion of the program was used instead. Age as a proxy for experience is not used here for two reasons:

1. Theoretically, the use of age and experience as separate variables in earnings functions has been suggested elsewhere in the literature.⁴ If age is used as a proxy for experience, as Mincer did,⁵ a high correlation between these two variables is expected. This correlation should be avoided in a model like the present one, in which explanation and not forecasting is the main objective.⁶

2. In practical terms, the use of age as a proxy for experience requires a preconception of a normal pattern of participation in the labour force, according to which, a probable experience level is assigned to a given age. This pattern, however, is very difficult to determine for the group under study. The participation of Indians and Metis in the labour force is irregular, and the elimination of this irregularity is precisely one of the reasons for the existence of the program.

The specific form of (5.1) is:

⁴See, for example: Edward Lazear, op. cit., and Ruth Klinov, "Is it Age or Experience that Matter?" Kiklos, XXVIII, 4(1975), pp. 866-867. Both authors found that age and experience were important in explaining wages, although their relative importance was not constant through time.

⁵Jacob Mincer, Schooling, Experience and Earnings, op. cit., p. 84. Mincer used current age minus age at completion of schooling.

⁶A. Koutsoyiannis, Theory of Econometrics, (London: MacMillan, 1973), p. 244.

$$(5.2) \quad Y_i = C_0 + C_1 E_i + C_2 X_i + C_3 X_i^2 + C_4 D_i + C_5 A_i + u_i$$

Where:

C_j ($j = 0,5$) are the regression coefficients to be estimated, and u_i represent the random term, $u_i \sim N(0, \sigma^2)$

With regard to the signs of C_j , it is hypothesized that:

1. $C_1 > 0$. This is because the influence of larger amounts of investment in education on earnings is expected to be positive.

2. $C_2 > 0, C_3 < 0$. This means that the value of the function increases at a decreasing rate and reaches a maximum (at $-C_2/2C_3$). This hypothesis is consistent with previous findings.⁷

3. $C_4 > 0$. This is due to the fact that the benefits of additional training are expected to be significantly greater than zero. In other words, it is expected that the larger the participation of the trainee in the program, the larger the total increase in earnings associated with this participation.

4. $C_5 > 0$. This is because it is expected that at higher ages (considering experience constant), the level of earnings would be greater.

Indirect least squares were used for the estimation of the parameters of equation (5.2). The result was:

$$(5.3) \quad \hat{Y} = 53.14 - 1.71X^2 + 18.12X + 0.85D + 6.65E + 0.6A$$

$$(0.59) \quad (0.93) \quad (1.10) \quad (2.68) \quad (2.42) \quad (0.21)$$

$$R^2 = 0.126 \quad \text{Durbin-Watson coefficient} = 1.86 \quad \text{F-Value} = 4.03$$

⁷J. Mincer, op. cit., p. 67.

The figure in parentheses are the calculated t-values of the regression coefficients. Multicollinearity between independent variables was not found to be a problem.

Averages for each one of the variables in equation (5.3) are:

Income (Y)	:	\$164.25
Education (E)	:	7.8 years
Age (A)	:	33 years
Experience (X)	:	4.2 years
Duration of Training (D)	:	21.7 years

The signs of the coefficients, with the exception of C_5 , which is not significantly different from zero, are consistent with the expected signs. Duration of training and education have a positive influence on Y. As the value of these variables increases, the larger is the resulting value of earnings. Experience enters in two forms as X and as X^2 . The signs obtained show that, ceteris paribus, earnings increase at a decreasing rate when experience increases, reaching a maximum when $X = 5.3$ years. The marginal benefit of an additional week of training is \$0.85 per week, and the marginal benefit of the other form of accumulation of human capital, education, is \$6.65/week per year of formal education in 1975 dollars.

Regression coefficients for D and E are accepted to be different from zero at the 5 percent significance level, using a one-tailed t-test because the t-value is 1.658. The other coefficients, including the intercept of equation, are not statistically different from zero at the 5 percent level of significance which was chosen in this study as the desired level for hypothesis testing.

The hypothesis that no autocorrelation, positive or negative, exists is accepted at the 5% level of confidence due to the fact that the Durbin-Watson coefficient is larger than $d_U = 1.78$ and smaller than $4 - d_L = 2.43$. The F value, 4.03, is statistically different from zero at the 5% level of significance since the value calculated from the F-distribution for 4 and 111 degrees of freedom is 2.43 4.03.

Equation (5.3) includes non-significant coefficients but theoretically plausible signs and magnitudes. The position taken in this study is that the importance of the earnings function in the present context is based on its ability to provide orders of magnitude for those parameters which reflect the impact of the program, rather than on its ability to explain the complete pattern of earnings for specific groups.⁸ Consequently, a new equation with only the variables from 5.3 which were found to be significant is estimated below.⁹

Equation Two. The explicit form of the equation is:

$$(5.4) \quad \hat{Y} = 91.65 + 6.69E + 0.92D$$

$$(3.08) \quad (2.44) \quad (2.95)$$

$$R^2 = 0.1145 \quad \text{Durbin-Watson Coefficient} = 1.83 \quad \text{F-value} = 3.08$$

The regression coefficients and the F-value were found to be statistically different from zero at the 5% level of confidence.

⁸James A. MacMillan and F.L. Tung, "Migration Analysis and Form Number Projection Models: A Synthesis: Reply," American Journal of Agricultural Economics, 57:371, May, 1975, discuss the implication of this argument.

⁹The inclusion of a dummy variable reflecting whether or not the trainee successfully completed the course, and modifications of equation 5.3, including cross products, were found to be of lower explanatory power.

Equation (5.4) shows that for every year of education, a trainee obtains an average of 6.69 additional dollars per week, and that for every week of attendance at a training course under the program, he receives \$0.92 in additional earnings per week. All values are expressed in 1975 dollars.

Equation Three. In order to incorporate racial origin in the earnings function, a dummy variable, R, was introduced into equation (5.4) with value one if the individual in the experimental group was a treaty-Indian and zero if he was not. The importance of this new variable in relation to the training program under evaluation is discussed in Appendix C. The numerical results are:

$$(5.5) \quad \hat{Y} = 101.97 + 6.15E + 1.06D - 28.41R$$

$$(3.78) \quad (2.25) \quad (3.34) \quad (1.8)$$

$$R^2 = 0.139 \text{ Durbin-Watson Coefficient} = 1.86 \text{ F-value} = 6.07$$

All the regression coefficients were found to be statistically different from zero at the 1 percent level of significance with the exception of the coefficient of R, which is different from zero at the 10 percent level of significance. The R^2 value is different from zero at the 15% level of confidence, and no autocorrelation exists. Since the Durbin-Watson coefficient shows no autocorrelation of the residuals, it would appear that the new variable R in (5.5) has not picked up the effect of omitted variables in (5.3) and (5.4).

It can not be concluded, however, that some form of racial discrimination, in the negative sense, exists. This is because although the value of Y should be computed on an after-tax basis, in this case income before taxes is used. The reason for this is that treaty-Indians

living on Indian Reserves do not pay direct taxes, which is in itself a form of non-market racial discrimination. The inconclusive result shown in (5.5) may stem either from the unrecorded difference between gross and disposable income or from the willingness of treaty-Indians to receive lower salaries because of this fiscal treatment in their favour. In any case, from the information obtained for this group it is not possible to accept or reject the hypothesis that racial discrimination in the labour market exists. For this reason Equation (5.5) is not used in the analysis.

It should be noted that the value of the regression coefficient of D in equation (5.4), 0.92, lies between the values of the coefficient of this variable in equations (5.5), 1.06, and (5.3), 0.85. This indicates that the coefficient is not highly sensitive to the inclusion of additional variables in the equation.

Individual Benefits during Training

Trainees receive not only monetary benefits after the completion of the program, but as Figure 4.1 suggests, some individual benefits can be assigned during the training period itself. These benefits are training allowances and housing subsidies. The values of these benefits are discussed in the next two parts.

Training allowances. Information contained in Manpower Corps computer printouts provides the weekly allowances paid to trainees during training. Table 5.3 presents average, modal and median weekly

TABLE 5.3

AVERAGE, MODAL AND MEDIAN WEEKLY
ALLOWANCES PAID TO MALE TRAINEES
IN NOMINAL AND REAL VALUES
1968-1975
(1975 prices = 100)

Year	Price Index 1975=100	Number of Cases	Average		Average		Median	
			Nominal (2)	Real (3)	Nominal (4)	Real (5)	Nominal (6)	Real (7)
1968	71.07	35	\$ 63	\$ 86.78	\$ 50	\$ 68.88	\$ 61	\$ 84.03
1969	74.62	100	64	84.65	50	67.80	71	93.91
1970	78.35	167	65	83.33	60	76.92	65	83.33
1971	82.27	244	80	101.27	80	101.27	80	101.27
1972	86.38	131	80	97.56	80	97.56	85	103.65
1973	90.70	132	95	108.92	94	107.77	100	114.65
1974	95.24	47	103	106.67	100	103.56	102	105.63
1975	100.00	24	110	110.00	106	106.00	106	106.00

Sources :

Columns (1), (2), (4) and (6): Manpower Interlake Corps Basic group (see Appendix A).
Columns (3), (5) and (7) were obtained by dividing the respective "nominal" values
by the C.P.I. for the City of Winnipeg, Statistics Canada, Prices and Price Indexes,
(62-002) 1968-1975.

allowances for male trainees from 1968 to 1975 in both nominal and real values. These allowances are set by Manpower Corps officials presumably at a level higher than unemployment benefits but lower than competitive wages for similar jobs in the private industry in order to encourage individuals in the target population to attend the program.

Rather than being across-the-board payments to every trainee, the size of the allowance received depends on the specific characteristics of the individual. Treaty-Indians, for example, receive an average of \$0.25 per hour less than non-treaty Indians and Metis because they do not pay income taxes when living on reserves. Trainees with previous labour experience or with a good record in other Manpower services receive slightly higher allowances. Also, those trainees with dependents receive weekly allowances which are around 15 percent larger than those without dependants. The figures presented in Table 5.3 represent the average of these cases.

The number of cases computed in this table is smaller than the total number of male trainees who have registered in the program. This difference appears because not all trainees are being paid directly by the program but are paid by the contracting agency using the services of Manpower Corps. According to program officials the rate of payment in this case does not differ from the rate paid directly by the program.

Table 5.4 compares average training allowances per year with average labour earnings and average unemployment receipts for the norm group, (individuals without training). A comparison of columns (1) and (2) in that Table shows that, with the exception of 1974 and 1975, allowances have effectively been set at levels lower than average earnings.

TABLE 5.4
 AVERAGE ALLOWANCES, LABOUR EARNINGS, UNEMPLOYMENT
 EARNINGS AND TOTAL EARNINGS
 FOR 1968-1975
 (Nominal Dollars Per Week)

Year	Average Training Allowances	Average Labour Earnings Norm Group	Average Unemployment Receipts Norm Group	Average Expected Income Norm Group
	(1)	(2)	(3)	(4)
1968	63.00	67.33	56.60	65.33
1969	64.00	75.31	58.95	63.15
1970	65.00	77.07	60.80	66.80
1971	80.00	92.11	61.60	67.74
1972	80.00	80.00	64.00	68.14
1973	95.00	121.12	68.00	80.88
1974	103.00	97.33	75.30	86.88
1975	110.00	104.00	78.00	83.92

Sources:

Column (1): Table 5.3, Column (2).

Column (2): Table 5.2, last row.

Column (3): Calculated from Manpower Corps computer printouts.

Column (4): Average of Columns (2) and (3), weighted by the number of individuals in each case, Table 5.2.

Columns (1) and (3) show that these allowances have been larger than average unemployment receipts for every year during the period 1968-1975.

However, if it is assumed that u_t , the unemployment rate for the norm group in year t , reflects the probability of unemployment in that year for those without training, and if X_t^e and X_t^u represent the employment earnings and unemployment receipts in year t respectively, then the average expected income in t , X_t , can be defined as:

$$(5.6) \quad X_t = X_t^u u_t + X_t^e (1 - u_t)$$

X_t shows the average income level individuals can expect to receive in year t , if the marginal probability of obtaining a job is equal to the average employment rate calculated for the norm group. The values of X_t for the period 1968-1975 are shown in Table 5.4, Column (4).¹⁰ The implications of this definition are clear from the comparison of Columns (1) and (4) in Table 5.4. The average nominal value of training allowances for each year, with the exception of 1968 and 1970, is larger than the expected value of income as defined by (5.6). If trainees include in the appraisal of their income expectations for a given year the probability of being unemployed in that year, then it is possible to conclude that training in the Manpower Corps is a profitable activity for members of the target population of the program who have not received any previous institutional training in the Area, even if the future extra income derived from training is zero.

¹⁰Note that this formulation assumes a perfect knowledge of the labour market conditions by trainees and the instantaneous consideration of these conditions in the earnings expectations. A sort of "error learning" model of earnings expectations could be used if better information becomes available.

Housing subsidies. Depending on the value of allowances, trainees may receive housing subsidies while they are working on any project. For the lowest income group, which received around \$50 a week in allowance in 1975, the housing payment was equivalent to 16 percent of these earnings. For those receiving \$125 or more a week, this payment was around 25 percent of earnings.

These subsidies, however do not apply only to trainees in the program, but also to those who qualify for this aid under the Manitoba Housing Renewal Corporation (MHRC) current operating guidelines. The determination of whether or not trainees receive any special consideration is not the task of this study, but it is believed by officials of the program that trainees pass from a "non-qualify" situation to a "qualify" situation when entering the program. However, it will be shown here that this subsidy, if received at all, is too small to be considered as a benefit derived from the program.

In order to calculate the amount of subsidy it is necessary to consider purchases of housing services by individuals in the same area and with similar incomes to trainees. A positive difference in these purchases represents an increase in consumer's surplus in favour of trainees in the program. Inhabitants of the Interlake Area were selected for the purpose of calculating the benefit which trainees derive from housing subsidies because it was thought that inhabitants of the same area were likely to have roughly the same quality of housing, although it is recognized that housing services even in the same geographical area may differ between family units. The selection of individuals

with the same income is also necessary in order to estimate the demand-price for housing services, which depends on the income level for the group.¹¹

For a given year t , the average amount spent on housing services by a family in the Interlake Area can be denoted by C_t , and the total family income by Y_t . In period $(t + 1)$, area income increases to:

$$(5.7) \quad Y_{t+1} = Y_t (1 + \dot{y})$$

Where:

$$(5.8) \quad \dot{y} = \frac{Y_{t+1} - Y_t}{Y_t} = \frac{\Delta Y}{Y_t}$$

is the annual growth in income expressed as a fraction of Y_t . On the other hand, C_t increases to:

$$(5.9) \quad C_{t+1} = C_t (1 + \dot{c})$$

where:

$$\begin{aligned} \dot{c} &= \frac{C_{t+1} - C_t}{C_t} \\ \dot{c} &= \frac{C_{t+1} - C_t}{C_t} \cdot \frac{Y_t}{Y_{t+1} - Y_t} \cdot \frac{Y_{t+1} - Y_t}{Y_t} \\ (5.10) \quad \dot{c} &= \theta_c \cdot \frac{\Delta Y}{Y_t} \end{aligned}$$

¹¹In order to be consistent with the theory in this respect, divisions by age groups are also required. This is because younger people tend to spend a larger proportion of their current income in housing than older people. Permanent income and not current income should be used in this situation because in survey-type studies such as this one, the income elasticity of demand for housing services tend to be undervalued with respect to the long-run elasticity based on permanent income.

because $\frac{C_{t+1} - C_t}{C_t} \cdot \frac{Y_t}{Y_{t+1} - Y_t} = \theta_c =$ the income elasticity of the demand for housing services.

Substituting (5.10) in (5.9) and dividing (5.9) by (5.7):

$$(5.11) \quad \frac{C_{t+1}}{Y_{t+1}} = \frac{C_t (1 + \theta \dot{y})}{Y_t (1 + \dot{y})}$$

Values for C_t and Y_t are available for 1968 from an income-expenditure study in the Interlake Area¹² and the value of \dot{y} can be obtained from Engel curves calculated in the same study for urban residents.¹³ These values are:

$$C_t = \$1258.16 \text{ (housing and room and board)}$$

$$Y_t = \$5871.87 \text{ (earned income and transfers)}$$

$$\theta = 0.5383$$

Then, for 1968, $(C_t/Y_t) = 0.2143$

The value of \dot{y} can be obtained from estimates made by Fu-Lai Tung for the Interlake area using a dynamic input-output model. The average rate of increase in real income is 2.5 percent per year during 1968-1975.¹⁴ With this information and applying equation (5.11) the values for $(\frac{C}{Y})$ for the period 1968-1975 which are shown below can be

¹²Raymond D. Bollman and James A. MacMillan, Income-Expenditure Relationships and Level of Living in the Interlake Area of Manitoba, Research Bulletin 72-2. Winnipeg: Department of Agricultural Economics, The University of Manitoba, 1972, pp. 44-45.

¹³Ibid., p. 66.

¹⁴Fu-Lai Tung, op. cit., p. 442.

obtained:

<u>Year</u>	<u>(C/Y)</u>
1968	0.2143
1969	0.2119
1970	0.2095
1971	0.2071
1972	0.2048
1973	0.2025
1974	0.2002
1975	0.1979

Consequently, around 20 percent of the total income received by people in the area has been historically spent on housing. This proportion lies within the boundaries set by MHRC for individuals who qualify for housing subsidies. As a result of the previous findings, no evidence can be furnished to show that housing subsidies are a monetary benefit derived from the program. Therefore no further analysis of this issue is carried out.

Individual Costs of Enrollment in Training Programs.

Trainees incur direct as well as indirect monetary costs when they enter any institutional training program. Direct costs are mainly composed of expenses incurred during the process of relocating in a new area, such as transportation costs. Indirect costs are represented by earnings foregone when the decision is made to enroll in the program.

Apart from these two broad categories, non-monetary costs also exist which are basically associated with the process of migration. The most important of them, according to those who are aware of the Indian condition are those Sjaastad described as ". . . psychic costs of changing living environment . . ." ¹⁵ These costs will be ignored

¹⁵Larry Sjaastad, "Costs and Returns of Human Migration," Journal of Political Economy, 70: 82-83, (Supplement), 1972.

here because they are not easily quantifiable. Indexes of success of the Manpower Corps program, therefore, will be systematically overvalued to the extent that these costs are important.

Movement costs. These are out-of-pocket costs to the individual produced by a change in job location or residential location. They represent a real resource cost, and consequently they affect the social net present value. However, in the case of the Interlake Manpower Corps, these movement costs do not affect the training decision because they are paid to most of the would-be trainees by native people's organizations and by mobility grants from the federal and the provincial government. Therefore, there will be no further discussion of these costs in this section. They will be included in the analysis of the social impact of the program (Chapter 7).

Foregone earnings. In order to calculate earnings foregone by trainees when enrolling in the program, two steps are followed in this study:

1. The weekly incomes (labour earnings and unemployment transfers) of members of the experimental group are adjusted to account for normal increases in the real wage rate for the group from 1968 to 1975.

2. After this initial step is taken, another adjustment is required in order to correct the norm group's labour earnings for differences in the level of education between the experimental and norm groups. Recall that education was, in addition to duration of training, a significant variable in explaining earnings after training (equation 5.4). This correction provides an estimate of income without training for the two groups, with the same level of education.

Adjustments in labour earnings should take into account the increase in the general price level vis-a-vis increases in nominal earnings for the group under consideration. Table 5.4, column (2) shows the observed average labour earnings for members of the norm group

and in Table 5.3 the consumer Price Index for the period 1968-1975 is presented. Disregarding the years 1971 and 1973, nominal earnings have increased at a rate of 6% per year, while the price level has increased at an average rate of 5% per year. Thus, real earnings in the absence of training have increased at a rate of 1% per year during 1968-1975. This result is, however, extremely sensitive to the values of earnings reported by the norm group, which, as was discussed before, were sometimes difficult to calculate from the registration forms.

Based on the available information it is not possible to derive a good estimate of the increase in real earnings for the norm group. This estimate would have provided the value of real earnings in the absence of training during 1968-1975. Therefore, nominal earnings are used as an approximation for real earnings.

The correction for educational differences is made by adding to the real wages calculated in each year from the norm group, the additional earnings that would have been received by members of the norm group had they had the same educational level as members of the experimental group. The average education for the experimental group is 7.87 years which is greater than the average level for the norm group. Table 4.3, column (2) shows the average education for the norm group in each year of the period 1968-1975. Because the marginal increase in earnings due to an additional year of education is statistically significant, (see equation 5.5), the earnings of those without training should be proportionately increased in order to adjust for these educational differences. Table 5.5 shows the result of this educational adjustment on labour earnings.

TABLE 5.5

NORM GROUP EARNINGS ADJUSTED BY EDUCATIONAL
DIFFERENCES WITH THE EXPERIMENTAL GROUP

Year	Unadjusted Real Labour Earnings (\$/week)	Average Education (years)	Education Adjustment (\$/week)	Adjusted Real Labour Earnings (\$/week)
	(1)	(2)	(3)	(4)
1968	67.33	5.9	13.18	80.51
1969	75.31	6.9	6.49	81.80
1970	77.07	6.8	7.16	84.23
1971	92.11	6.6	8.49	100.60
1972	80.00	8.6	-4.88	75.12
1973	121.12	8.1	-1.54	119.58
1974	97.33	6.2	11.17	108.50
1975	104.00	7.1	5.15	109.15

Sources:

Column (1): Table 5.4, Column (2).

Column (2): Computed from information about norm group (see Appendix B).

Column (3): $(E_E - E_i) \times 6.69$

where:

E_E = average level of education for the experimental group, 7.87 years.

E_i = values in Column (2) for $i = 1968$ to 1975.

6.69 is the regression coefficient for the variable E in equation (5.5).

Column (4): Column (1) + Column (3).

TABLE 5.6
 FOREGONE EARNINGS FOR INDIVIDUAL
 TRAINEES
 (\$1975)

Year	Adjusted Real Labour Earnings (\$/week)	Real Unemployment Transfers (\$/week)	Unemployment Rate (%)	Real Foregone Earnings (\$/week)
	(1)	(2)	(3)	(4)
1968	80.51	78.00	63.9	78.90
1969	81.80	78.00	84.6	78.59
1970	84.23	78.00	70.0	79.87
1971	100.60	78.00	83.7	81.69
1972	75.12	78.00	84.6	77.71
1973	119.58	78.00	80.0	86.32
1974	108.50	78.00	70.0	87.15
1975	109.15	78.00	84.6	82.80

Sources:

Column (1): Table 5.5, Column (4).

Column (2): Estimated from Manpower Corps Forms.

Column (3): Table 5.2, top row.

Column (4): $((2) \times (3)) + ((1) \times (100 - (3)))$.

Total annual earnings foregone per trainee are calculated by taking the average of adjusted real labour earnings and real unemployment transfers, weighted by the specific employment and unemployment rates the norm group in a given year. (Table 5.6 shows the results of these calculations).

Real foregone weekly earnings in each year are concentrated around the simple mean value, \$81.62, and range from \$78.59 in 1969 to \$87.15 in 1973. The weighted mean is \$81.21, calculated by multiplying the expected earnings foregone in each year by the percentage of male trainees attending the program in each year (Table A.7). This weighted mean measures the value of average earnings foregone per week (in 1975 values) by individuals who have attended the program from 1968 to 1975.

B. Comparison of Individual's Benefit and Costs

Once the real values of benefits and costs are calculated in 1975 dollars, it is necessary to compare them at the same point in time. For this study, the point of comparison is the end of 1975. This calculation provides ex-post benefit-cost estimates using average opportunity costs for the period 1968-1975, and assuming that training benefits last for eight and ten years after training.

Average allowances received by trainees are calculated as the average real payments for each year during 1968-1975 (Table 5.3) weighted by the number of males trainees attending the program in that year (Table A.3). This value is \$96.44 in 1975 dollars. The marginal cost per week of training is \$81.21 (opportunity cost), and the marginal benefit per additional week of training is \$0.92/week, also in 1975 values.

TABLE 5.7

AVERAGE COSTS, BENEFITS AND NET PRESENT VALUE
 PER WEEK OF INVESTMENT IN TRAINING
 FROM A TRAINEE'S VIEWPOINT
 ALTERNATIVE I: 8 YEARS OF BENEFITS
 (1975 DOLLARS)

	Annual Rates of Discount (r)				
	6%	12%	18%	24%	30%
(1) Present Value of Benefits	376.71	319.10	276.25	243.93	219.18
(2) Present Value of Costs	81.21	81.21	81.21	81.21	81.21
(3) Net Present Value =(1)-(2)	295.50	237.89	195.04	162.72	137.97
(4) B/C Ratio = $\frac{(1)}{(2)}$	4.64	3.93	3.40	3.00	2.70

$$\begin{aligned}
 \text{Net Present Values} &= -MC + \text{Allowances} + MB \left[\frac{(1+r/52)^{n-26} - 1}{(r/52)(1+r/52)} \right] \\
 &= -81.21 + 96.44 + 0.92 \left[\frac{(1+r/52)^{390} - 1}{(r/52)(1+r/52)^{416}} \right]
 \end{aligned}$$

TABLE 5.8

AVERAGE COSTS, BENEFITS AND NET PRESENT VALUE
PER WEEK OF INVESTMENT IN TRAINING
FROM A TRAINEE'S VIEWPOINT

ALTERNATIVE II: 10 YEARS OF BENEFITS
(1975 DOLLARS)

	Annual Rates of Discount (r)				
	6%	12%	18%	24%	30%
(1) Present Value of Benefits	432.48	351.68	295.31	255.10	225.74
(2) Present Value of Costs	81.21	81.21	81.21	81.21	81.21
(3) Net Present Value = (1)-(2)	351.27	270.47	214.10	173.89	144.53
(4) B/C Ratio = $\frac{(1)}{(2)}$	5.32	4.33	3.63	3.14	2.78

$$\text{Net Present Values} = -MC + \text{Allowances} + MB \left[\frac{(1+r/52)^{n-26} - 1}{\left(\frac{r}{52}\right)(1+r/52)^n} \right]$$

$$\text{Net Present Values} = -81.21 + 96.44 + 0.92 \left[\frac{(1+r/52)^{494} - 1}{\left(\frac{r}{52}\right)(1+r/52)^{520}} \right]$$

Expression (4.15) permits the calculation of the present value of benefits, the present value of costs and the net present value. Note that allowances and foregone earnings are already calculated in 1975 dollars, and therefore, only the marginal after-training benefits should be discounted. Tables 5.7 and 5.8 show these calculations with the assumption that the duration of benefits is eight and ten years, respectively.

Discount rates and duration of benefits are presented on an annual basis in both tables. However, for the estimation of present values they were considered on a weekly basis in order to make them consistent with the estimates of marginal benefits and costs. For example, the exponent 416 in Table 5.7 indicates the total number of weeks in eight years (8×52), and 390 indicates the effective number of weeks for which benefits are assumed. (Recall that benefits were assumed not to exist for the first six months, 26 weeks, after training). The annual rates of discount are divided by 52 in order to convert them to weekly rates.

The results presented in Tables 5.7 and 5.8 show that whatever the assumptions about the rate of personal time preference and about the duration of benefits, individuals are better off if they attend a project under the Manpower Corps Program. The net present value of benefits exceeds the net present value of costs for every set of assumptions. Net present values range from \$351.27 (ten year duration of benefits and 6% discount rate) to \$137.97 (eight years duration of benefits and 30% discount rate). Benefit-cost ratios range from 5.32 to 2.70.

C. Sensitivity Analysis on Selected Parameters

Tables 5.7 and 5.8 presented diverse net present values due to different assumptions about the rate of discount and the duration of benefits. A more general approach can be used to analyze the effect of changes in one parameter given that the others are not changed. In this section two sensitivity tests are made. The first shows the effects on net present values of changing the duration of benefits for a given discount rate, and the effects of changing the discount rates for a given duration of benefits (Tables 5.9 and 5.10). The second test shows the change in net present value when changes in real unemployment transfers are considered.

Changes in Duration of Benefits and Rates of Discount

It is possible to calculate by using equation 4.15, how the net present values are affected by changes in the duration of benefits (n), given a value for the rate of discount (T). It is also possible to determine the change in NPV due to a change in the discount rate, r , given that n is constant. From equation (4.15) it is deduced that:

$$\begin{aligned}
 \frac{\delta(\text{NPV})}{\delta n} &= \text{MB} \left[\frac{r(1+r)^n (1+r)^{n-26} \ln(1+r) - r(1+r)^{2n-26} \ln(1+r)}{r^2 (1+r)^{2n}} \right] \\
 &\quad + \left[\frac{r(1+r)^n \ln(1+r)}{r^2 (1+r)^{2n}} \right] \\
 &= \text{MB} \left[\frac{(1+r)^{n-26} \ln(1+r) - (1+r)^{n-26} \ln(1+r) + \ln(1+r)}{r(1+r)^n} \right] \\
 &= \text{MB} \left[\frac{\ln(1+r)}{r(1+r)^n} \right] \tag{5.12}
 \end{aligned}$$

Where:

MNPV is the marginal net present value,

MB is the value of marginal weekly benefits,

r is the rate of discount, expressed in terms of weeks,

n is the duration of benefits, in weeks.

Also, from the same equation (4.15):

$$\begin{aligned} \frac{\delta(\text{NPV})}{\delta r} &= \text{MB} \left[\frac{-26r(1+r)^{-1} - (1+r)^{26}}{r^2(1+r)^{26}(1+r)^{26}} + \frac{rn(1+r)^{n-1} + (1+r)^n}{r^2(1+r)^n(1+r)^n} \right] \\ &= \text{MB} \left[\frac{-26r(1+r)^{n-27} - (1+r)^{n-26} + rn(1+r)^{-1} + 1}{r^2(1+r)^n} \right] \quad (5.13) \end{aligned}$$

Equations (5.12) and (5.13) show expressions to calculate changes in NPV due to marginal changes in n and r, respectively. Consequently, it is possible to obtain the total change in present values for changes of n and r in the following way:

$$\frac{\delta(\text{NPV})}{\delta n} \cdot \Delta n = \text{MB} \cdot \frac{\ln(1+r)}{r(1+r)^n} \cdot \Delta n \quad (5.14)$$

and:

$$\frac{\delta(\text{NPV})}{\delta r} \cdot \Delta r = \text{MB} \cdot \left[\frac{-26r(1+r)^{n-27} - (1+r)^{n-26} + rn(1+r)^{-1} + 1}{r^2(1+r)^n} \right] \Delta r$$

$\Delta n = 4$ years (208 weeks) in Table 5.9, for values of $r = 6\%$, 12% , 18% , 24% , 30% .

$\Delta r = 6\%$ per year in Table 5.10, for values of $n = 8, 12, 16, 20$ and 24 years.

TABLE 5.9

SENSITIVITY ANALYSIS OF NET PRESENT VALUES
TO CHANGES IN N, FOR GIVEN
VALUES OF R
(1975 DOLLARS)

Changes in N Values of R	From 8 to 12 years	12 to 16 years	16 to 20 years	20 to 24 years	from 8 to 24 years
6%	105.22	93.13	54.97	42.41	295.73
12%	57.65	45.36	28.08	17.05	148.14
18%	31.67	21.68	10.54	5.15	69.04
24%	17.42	10.58	4.06	1.56	33.62
30%	9.58	5.27	1.59	0.46	16.90

NOTE:

Cell C_{ij} in this matrix shows the change in the net present value when a change in the assumption about length of benefits indicated at the top of column j is considered, with the given rates of discount registered in row i .

TABLE 5.10

SENSITIVITY ANALYSIS OF NET PRESENT VALUES
TO CHANGES IN R, FOR GIVEN
VALUES OF N
(1975 DOLLARS PER WEEK)

Values of N	Changes in r	From 6% to 12%	12% to 18%	18% to 24%	24% to 30%	6% to 30%
	8 years		- 57.61	- 42.85	- 32.32	- 24.75
12 years		-129.45	- 69.37	- 47.31	- 33.38	- 255.28
16 years		-151.96	- 89.85	- 56.14	- 37.25	- 334.99
20 years		-194.80	-104.27	- 61.16	- 38.98	- 399.21
24 years		-232.23	-114.35	- 63.88	- 39.73	- 450.19

NOTE:

Cell C_{ij} in this matrix shows the change in the marginal present value when a change in the assumption about the value of the discount rate indicated at the top of column j is considered, with the given duration of benefits indicated in row i .

The upper limit of 24 years for the duration of benefits was selected in order to compute the increase in net present value if it is assumed that benefits last during the entire active life of trainees. The average age of members of the norm group is 31 years, and therefore if benefits from training lasted for 24 years, individual net present values would range from \$591.23 (\$295.50 + \$295.73) at 6%, to \$154.87 (\$137.97 + \$16.90) at 30%, increases of 100.2% and 12.4%, respectively.

Cells in Table 5.9 are all positive because discounted marginal benefits increase with time, but marginal costs do not. The values in these cells decrease when additional years are considered because the rate of discount is positive, and therefore, the higher the rate, the lower the increase for additional years. On the other hand, cells in Table 5.10, are all negative, because increases in the rate of discount reduce the net present value for a given duration of benefits.

Changes in Unemployment Transfers

Another parameter whose estimation presented some difficulties due to deficiencies in information is the level of real unemployment payments, e^u . In order to investigate the impact on the results of a change in e^u , it is necessary to apply the chain rule of derivation:

$$(5.15) \quad \frac{\delta (\text{NPV})}{\delta e^u} \cdot \Delta e^u = \frac{\delta (\text{NPV})}{\delta \text{MC}} \cdot \frac{\delta \text{MC}}{\delta e^u} \cdot \Delta e^u + \frac{\delta (\text{NPV})}{\delta \text{MB}} \cdot \frac{\delta \text{MB}}{\delta e^u} \cdot \Delta e^u$$

where:

NPV is the net present value,

MC and MB are marginal costs and benefits, respectively,

e^u is the level of real unemployment payments,

Δe^u is the change in the level of real unemployment payments.

The element of the polynomial on the right side of expression (5.15) can be estimated separately:

1. According to equation (4.15):

$$(5.16) \quad \frac{\delta(\text{NPV})}{\delta \text{MC}} = -1$$

This means that the net present value changes in the same magnitude but in the opposite direction of a change in marginal costs.

2. Also from equation (4.15):

$$(5.17) \quad \frac{\delta(\text{NPV})}{\delta \text{MB}} = \frac{(1+r)^{n-26} - 1}{r(1+r)^n}$$

The highest value this expression takes is 356.26 (when $n = 10$ years, or 520 weeks, and $r = 6\%$ /year), and the lowest value is 133.42 (when $n = 8$ years, or 416 weeks, and $r = 30\%$ /year).

3. $\frac{\delta \text{MC}}{\delta e^u} \cdot \Delta e^u$ can be obtained from equation (4.8) and (4.9), where the marginal cost of enrolling in the program (the individual opportunity cost) was defined. Substituting (4.8) into (4.9):

$$(5.18) \quad \text{MC=OC} = \frac{\sum_{t=1}^8 [e_t^u u_t + e_t^e (1-u_t)] \cdot n_t}{\sum_{t=1}^8 n_t}$$

and

$$(5.19) \quad \frac{\delta \text{MC}}{\delta e_t^u} = \frac{\sum_{t=1}^8 u_t n_t}{\sum_{t=1}^8 n_t}$$

therefore:

$$(5.20) \quad \frac{\delta MC}{\delta e_t^u} \cdot \Delta e_t^u = \frac{\sum_{t=1}^8 u_t n_t}{\sum_{t=1}^8 n_t} \cdot \Delta e_t^u$$

Using the values of u_t from Table 5.6, Column (3), and the values of n_t from Table A.3, it is calculated that:

$$(5.21) \quad \frac{\sum_{t=1}^8 u_t n_t}{\sum_{t=1}^8 n_t} = 0.7748$$

For a reduction equal to \$78, or the total amount of average unemployment transfers, the following result is obtained:

$$(5.22) \quad \frac{\delta MC}{\delta e_t^u} \cdot \Delta e_t^u = (0.7748) (-\$78) = \$60.43/\text{week}$$

4. $\frac{\delta MB}{\delta e_t^u} \cdot \Delta e_t^u$ can be computed using the earning function (5.6) as a starting point. The value of MB in (5.6), \$0.92/week, is subtracted from the value of MB in a new equation, which is unlike equation (5.6) in that the dependent variable Y, includes only earnings from labour and not unemployment transfers. In effect, this requires the assumption that Δe^u equals -\$78. The new calculated value is \$1.02/week.¹⁶

¹⁶The new equation is:

$$\hat{Y} = 65.6 + 7.84E + 1.02D$$

(1.95) (2.53) (2.90)

$$R^2 = 0.12$$

$$F\text{-ratio} = 7.37$$

The regression coefficients of E and D, and the F-ratio are different from zero at the 5% level of confidence.

Replacing (5.16), (5.17), and (5.22) in (5.15) the following results are obtained:

$$(5.23) \quad \frac{\delta (NPV)}{\delta e^u} \cdot \Delta e^u = (-1)(-\$60.43) + (365.26)(\$0.10) = \$96.95$$

for a ten-year duration of benefits and a rate of discount of 6% per year, and,

$$\frac{\delta (NPV)}{\delta e^u} \cdot \Delta e^u = (-1)(-\$60.43) + 133.42(\$0.10) = 73.77$$

for an eight-year duration of benefits and a rate of discount of 30% per year. In both cases, $\Delta e^u = -\$78$, indicating a total reduction in unemployment payments, and \$0.10 is the result of subtracting \$0.92 from the new regression coefficient, \$1.02.

The positive sign in both cases implies that the net present value from an individual viewpoint increases when unemployment transfers are reduced. This result is due to the fact that opportunity costs decrease and benefits attributed to training increase when e^u is reduced.

Opportunity costs decrease because the individual would sacrifice less money income when entering a training project if he received no payments during the period before training for which he was unemployed. Benefits attributable to training increase because it was found that the marginal increment in employment earnings explained by the length of the training period, \$1.02/week, is larger than the marginal increment in total income, \$0.92 (employment plus unemployment) explained by training. This difference is produced by the fact that the unemployment payments after training in 1975 are not related to the duration of training, but are determined by other considerations.

However, employment earnings are highly related to duration of training, as is suggested by the equation presented in footnote 16. Consequently, the duration of training explains the value of employment earnings better than it explains total earnings. This is because total earnings include an exogenous component.

D. Analysis of Results

The discussion of the results of this chapter must include the analysis of the numerical results calculated on the basis of the original assumptions as well as the analysis of the sensitivity of the results to changes in these assumptions. The basic numerical assumptions of the model include eight or ten years duration of benefits, values of the discount rate ranging from 6% to 30%, and a waiting period of six months after training during which the individual's situation remains the same as before training. With these assumptions, net present values from an individual viewpoint are positive. That is, trainees are better-off in terms of earnings and employability after training. These net present values range from \$137.9 to \$351.3. The components of present value of benefits include the training allowances paid during training (\$96.44 per week in 1975 dollars), and the increase in total earnings induced by an additional week of training (\$0.92/week in 1975 dollars). The net present value of benefits range from \$432.48 to \$219.18. The present value of costs was estimated by calculating the average expected earnings trainees would have received had they not entered the program. This cost is \$81.21 per week.

Positive net present values are calculated for alternative assumptions about the duration of benefits (Table 5.9). If benefits

derived from training are assumed to last for the remainder of the trainees active life (about 24 years for the groups studied in this thesis) rather than for eight years, the net present values would increase by \$295.73 if the discount rate were 6%, by \$148.14 if it were 12%, by \$69.04 were 24% used, and by \$16.90 at a 30% rate of discount.

Present values are reduced if the rate of discount is increased (Table 5.10), but the numerical values of these reductions are lower the larger the duration of benefits. Therefore, net present values are positive for every pair of assumptions about the duration of benefits and the discount rate within the range used in this study.

Changes in the level of unemployment transfers do not modify the basic conclusions that training is worthwhile from the individual viewpoint. A total reduction in these transfers would increase the net present value of training by 24% to 44% (at 6%), or by 5% to 95% (at 30%).

If the assumption about a waiting period of six months is not introduced, and it is assumed, as it is in most of the studies in the field, that individuals can appropriate immediately the benefits of training, the net present values increase for every alternative. Using the discount function (4.10) instead of (4.15) to account for this difference, a new set of net present values are obtained. They are shown in Table 5.11.

The increase in net present value is smaller for higher rates of discount because the additional benefits appearing in the first half year are discounted to the time the project ends. These increments represent an increase of between 8% ($n = 8$ years and $r = 6\%$ /year) and 2.5% ($n = 10$ years and $r = 30\%$ /year) in the original net present values.

TABLE 5.11

NET PRESENT VALUES ASSUMING
NO WAITING TIME
AFTER TRAINING

Duration of Benefits	Annual Rates of Discount				
	6%	12%	18%	24%	30%
Eight Years	315.64	257.70	214.49	183.08	155.81
Ten Years	371.42	297.91	237.71	194.29	162.42

$$\text{Net Present Values} = -81.21 + 96.44 + 0.92 \cdot \left[\frac{(1+r)^n - 1}{r \cdot (1+r)^n} \right]$$

It should be noted that the figures for the present values of benefits depend not only on the labour market effects of the program (future additional earnings and employment) but also on the average value of allowances. These allowances are set at a level higher than unemployment transfers but lower than market wages for occupations similar to those in which the individual works during a project. However, if it is the magnitude of the expected wage, defined by equation (5.6) rather than the market wage or transfers alone, that individuals consider to be the relevant cost of entering the program, then the value of average weekly allowances happen to be larger than this expected wage. In that case receipts during training exceed costs during training.

This situation has been reported elsewhere in the literature. Borus and Ziderman found that training allowances were larger than individual opportunity costs. For Borus, workers who expected to be unemployed throughout the retraining course benefited from training in the short-run because allowance payments were approximately \$5.50 per week (in 1962 dollars) larger than their income without training. However, those who expected to be employed, lost \$166 per week when entering retraining.¹⁷ Ziderman estimated that, for Government Training Centres in the U.K., expected foregone earnings during training (£ 8/week) were lower than training allowances (£11/week) in 1966.¹⁸

¹⁷M. Borus, op. cit., p. 415.

¹⁸A. Ziderman, op. cit., p. 371.

Consideration of what would happen to Borus and Ziderman's results if allowances were set at the same level as expected earnings for individual trainees provides some evidence about the importance of differences between allowances payments and trainee's opportunity costs in the evaluation of training programs. For example, if the value of weekly allowances had been equal to the value of expected foregone earnings, benefit-cost ratios estimated by Borus would have increased by more than 100%, whereas the social rate of return calculated by Ziderman would have increased to 67% from 30%. The social pay-back period would have decreased from 22 months to 14 months and individual's net present values (discounted at 8%) would have decreased by 15.1%. In the present thesis, if allowances are set equal to the individual opportunity cost, the net present values would decrease by \$13.54 a week (in 1975 dollars), or by about 5 percent.

Although the sensitivity of the results to the introduction of the above mentioned consideration varies from study to study, the conclusion common to all of them is that training programs are attractive to individuals because in most cases allowance payments are larger than expected earnings in the absence of training. This is true even if they do not consider any long-run benefits in their appraisal of the decision to enter training.

CHAPTER 6

EFFECTS OF THE PROGRAM ON GOVERNMENT FINANCE

The evaluation of manpower training effects on the receipts and outlays of governments is a not frequent occurrence in the appraisal of training programs.¹ There may be two reasons for this. The first is the difficulty in identifying and quantifying changes in tax and transfer payments by the groups affected by these programs. These changes occur not only during the program, but also continue after the program has ended as a result of modifications to the pattern of earnings and employability induced by training.

The second reason is that government participation in this kind of program reduces to the channeling of funds from taxpayers to other economic units (trainees, firms, etc.). Project analysts are usually more concerned with the efficiency and distributional effects of this process than with the financial operation of the process itself.

This chapter presents an attempt to calculate the possible impact of the Interlake Manpower Corps on the financial ledger of the government. No separation of the two levels of government involved in the financing of the program (federal and provincial) is made. When results are interpreted, however, it must be born in mind that 90% of the public expenditure in the program comes from the federal government

¹For two exceptions see, Michael Borus, *op. cit.*, and Einar Hardin and Michael Borus, The Economic Benefits and Costs of Retraining, (Lexington, Mass.: Lexington Books, 1971).

and 10% from the provincial government.

This chapter is divided into four sections. In the first, an estimation of the total costs of operating the program is presented, emphasizing the importance of the division of total government expenditures between those outlays pertaining to the production of goods and services and those relating to manpower training proper. Figure 6.1 summarizes the elements which are discussed in detail in these two sections. Capital expenditures are not included in these estimates because they are assigned to production costs and not to training.

In the second part, a simulation of the effect of the program on tax and transfer payments during and after the completion of the program is made. This simulation is based on specific characteristics of members of the norm and experimental groups such as marital status, number of dependents, etc. It provides an estimate of changes in tax and transfers payments based on the structure of trainees' enrollment during the period 1968-1975. Therefore, the results can not be extended to the future operation of the program.

In the third part of the chapter, a comparison between government gains through higher tax receipts and lower transfer payments as well as the government outlays is shown. Because the values of gains and outlays appear at different periods of time, their comparison requires the use of a discounting process. Discount rates of 8%, 10% and 12% are used for reasons that will be discussed in the text. Assumptions about the duration of benefits due to training being either eight or ten years are maintained in this section. Finally, in the fourth section the analysis of results is made.

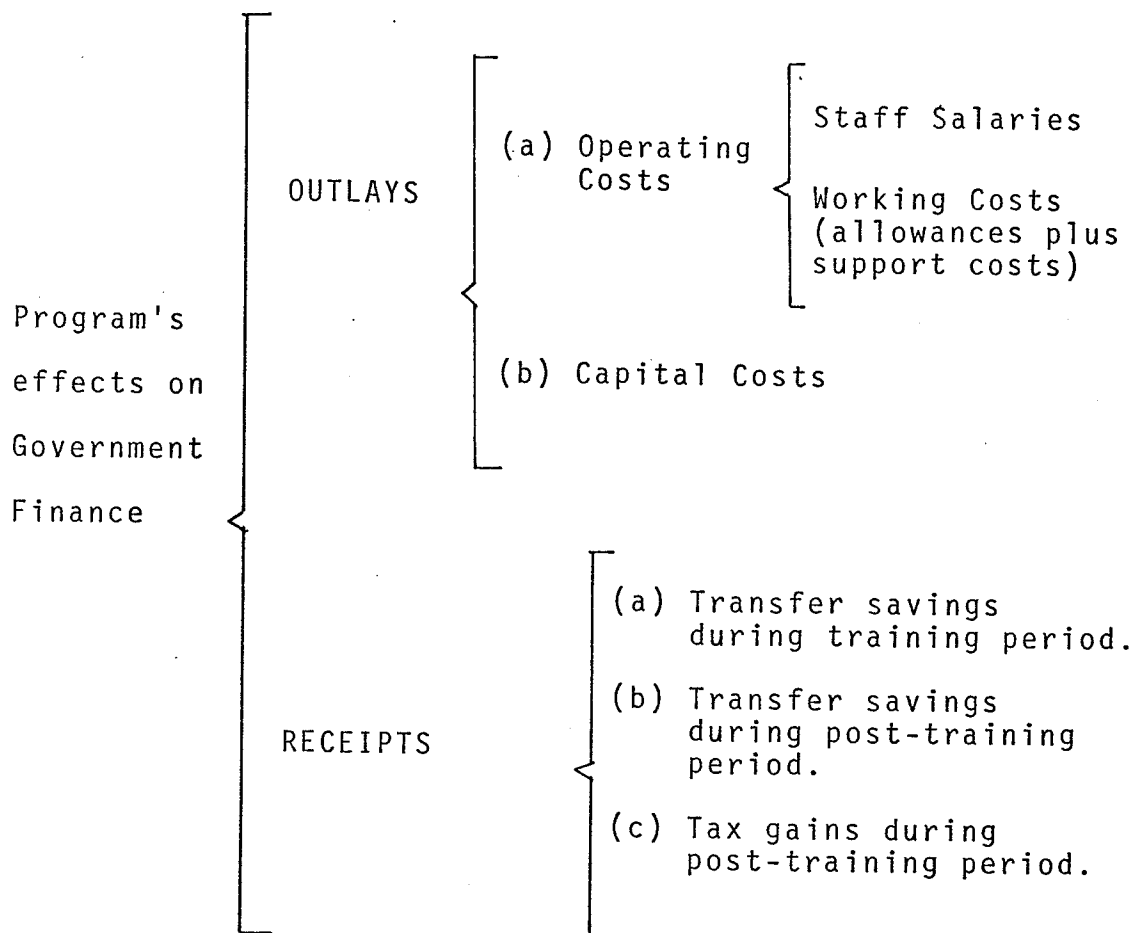


Figure 6.1

Summary of the Program's Effects
on Government Finance

A. Costs of the Program to Government

General Overview

The total amount of public expenditure on the Manpower Corps is divided into two categories. The first is made up of staff salaries, including supervisors salaries and Manpower Corps officials, and the second is a composite of training and support costs, including allowances paid by the program and material costs. Table 6.1 shows the amount of these components from the 1967-1968 fiscal year to the 1975-1976 fiscal year. For the first two fiscal years, 1967-1968 and 1968-1969, only total operation costs figures were available. Therefore, the division of this total between staff salaries and training and support costs was made by assuming that the ratio of staff salaries/total operation costs for the period 1970-1976 also prevailed during these first two years. This percentage is 20.5 for staff salaries and 79.5 for training and support. Staff salaries have increased at a yearly rate of 32.7% and training and support costs at 26.6% per year, giving rise to a combined increase of 28% per year in total operating costs during the 1967-1976 period. The fiscal period 1971-1972 shows the largest annual expenditure, 887 thousand dollars, and the largest enrollment in the history of the program (see Table A.7, Appendix A).

These cost figures have to be adjusted in order to convert them from dollars spent per fiscal year to dollars spent per calendar year in order to make them comparable with government gains. Because the fiscal year extends from April 1 to March 31, each entry in Table 6.1 was multiplied by .75 (9 months/12 months) and added to .25 of the previous year's expenditure. For example, of the \$121.68 thousand

Table 6.1
 Interlake Manpower Corps Statement
 of Expenditures, 1967-1976
 (thousands of \$)

Fiscal Year	Staff Salaries Costs	Training and Support Costs	Total Operation Costs
	(1)	(2)	(3)
1967-1968	24.94*	96.74*	121.68
1968-1969	51.69*	200.46*	252.15
1969-1970	62.99*	244.29*	307.28
1970-1971	116.22	442.81	559.03
1971-1972	176.80	690.20	887.00
1972-1973	197.63	647.62	845.25
1973-1974	220.18	493.04	713.22
1974-1975	221.40	456.49	677.89
1975-1976	241.05	637.36	878.41

* Estimated as follows: staff salaries = .205 of total operations
 training and support = .795 of total operations

Source:

This table was prepared for this study by Don N. Gulchak, Administrative Assistant of Interlake Manpower Corps on November 23, 1976.

spent by the government in the fiscal year 1967-1968, only three-quarters or \$91.26 thousand corresponds to 1967 expenditures. The rest, \$30.42 thousand, plus three-quarters of the expenditure for 1968-1969 (\$189.12 thousand), corresponds to the total expenditure during the 1968 calendar year (\$219.53 thousand).

Table 6.2 shows the annual cost per male trainee during the period 1967-1975 expressed in the current dollars of each year. Staff salaries and training and support costs are obtained from Table 6.1, while the number of male trainees is obtained from Table A.7 in Appendix A. The cost figures of 1967 and 1968 are pooled together because no trainee completed his training during 1967.

Total operation costs per trainee have increased at a rate of 28.2% per year, approximately, during 1967-1975, while staff salaries per trainee have gone up by 33.5% per year and training and support costs per trainee by 26.4% per year. This increase has been most evident during the two years 1974 and 1975. This sharp increase in costs per trainee has been caused by the steady reduction in the number of trainees served by the program after the peak year, 1971, and not by the increase in total expenditures. (Total staff salaries, for example, are lower in 1975 than in 1973).

Training Costs vis-a-vis Production Cost

A phenomenon usually neglected in the calculation of the costs of a training program is the fact that not all of the outlays of the public sector in these types of programs are strictly attributable to the training process itself. Institutional training, such as the Interlake Manpower Corps, can be visualized as a "black box" which

Table 6.2

Staff Salaries and Working Costs per Male Trainee
Interlake Manpower Corps

Year	Total Operation Costs on a Calendar Year Basis (\$000)	Staff Salaries (\$000)	Training and Support Costs (\$000)	Staff Salaries Per Male Trainee/year (\$)	Training and Support Costs per Male Trainee/year (\$)	Total Operation Costs per Male Trainee/year (\$)
	(1)	(2)	(3)	(4)	(5)	(6)
1967	91.26	18.71	72.55	-	-	-
1968	219.54	45.00	174.54	455.08	1,764.92	2,220.00
1969	293.50	60.17	233.33	369.14	1,431.47	1,800.61
1970	496.09	103.14	392.95	409.28	1,559.33	1,968.61
1971	727.07	148.25	578.82	397.45	1,551.79	1,949.25
1972	850.69	198.89	651.80	805.22	2,638.87	3,444.09
1973	746.23	230.36	515.87	1,187.43	2,659.12	3,846.55
1974	686.72	224.28	462.44	1,950.26	4,021.22	5,971.48
1975	828.28	227.28	601.00	3,443.64	9,106.06	12,549.70

Sources:

- Column (1): Table 6.1, Column (3), converted to calendar years from fiscal years.
 Columns (2) and (3): Column (1) multiplied by respective percentages deduced from Columns (1) and (2) of Table 6.1.
 Columns (4) and (5): Columns (2) and (3) divided by male trainees in each year, shown in Table A.7 (Appendix A).
 Column (6): Column (1) divided by the number of male trainees in each year, shown in Table A.7 (Appendix A).

transforms a group of inputs, including unskilled labour, into a set of multiple outputs which includes more skilled labour. The cost of the process should, therefore, be divided among the different activities which make up the program. Two activities in the Interlake Manpower Corps are manpower training and the production of goods and services in individual projects. This division is necessary for the two reasons discussed below.

On a project by project basis, this division permits officials of the program to best allocate the use of the available human and non-human resources (such as classroom time, counselling, etc.) during the training period of each trainee.

The training period for a particular trainee is defined as the time which he is not considered to be able to produce at an acceptable level without supervision in excess of normal supervision requirements.² This definition introduces some problems in that it is very difficult to determine what constitutes an "acceptable level of production and what can be considered as "excessive" supervision. The actual determination is a matter of technical judgement, generally based on reports by foremen about the improvement of individual trainees and on the knowledge of industrial standards.

Manpower Corps officials were aware of the existence of the two cost components (production and training) in the allowance payments made to trainees, and of the necessity to rely on the judgement of foremen to estimate their relative importance. Appendix E presents

²Working document prepared by G. T. Boychuk and R. W. Dilay in August, 1974 for the Interlake Manpower Corps.

the methodology adopted by the Manpower Corps in order to separate the cost components in so far as training allowances are concerned. The implementation of a new technique to deal with this separation is beyond the scope of this thesis. Preliminary results provided by the Manpower Corps are used in this section to obtain estimates of training costs.

The second reason for the division of total costs into the two mentioned categories is that the cost of producing goods and services needs to be removed because the value of the goods is not included in the calculation of program benefits. This is the most important reason for attempting a division of total costs into training and production components. Market and social values for the project's outputs are not available, with the exception of the Louis Riel factory and some housing projects. In summary, only the training activities of the program are taken into account in this thesis.

In addition to the separation of the production training components of total costs, one additional consideration is pertinent. It is that not only allowance payments to trainees are subject to this separation, support costs, such as instructor's expenses, rental of facilities for trainees, and staff salaries should also be examined in order to determine production and training components. With respect to the first cost category, support costs, it is possible that some of the items recorded as training costs, in fact correspond to production costs. Some examples of where this occurs are given below, but it is considered that, in general, support costs are assignable to training rather than production. With respect to the second category, staff

salaries, it is suggested here that a proportion of these corresponds to the production activity. Expenses related to job supervision, counselling, and management should not be fully attributed to training. Private industries, not involved in the type of training that the Manpower Corps provides, include these activities as part of their cost of production, so a provision for this fact should be made in calculating the costs of training.

A methodology for the estimation of the relative proportion of each of these two cost categories, which should be assigned to training has not been developed by the Manpower Corps. The numerical estimation of this proportion is very difficult because there exist no records of the costs of training materials used in the projects. Also, the labour input by the Manpower Corps administrative personnel is not categorized as being related to the production or training components of individual projects. Some estimates of the training cost/production cost ratio for the various cost categories are made in this study on the basis of personal interviews with foremen in some projects and with Manpower Corps officials. These estimates are subject to change when more refined methodologies are applied. The actual estimation procedure is explained in the next section.

The separation of the production and training components of total cost requires another qualification. If A and B are any two projects, the net present value of both A and B combined is not necessarily equal to the sum of net present values of A and B separately:

$$NPV (A + B) \neq NPV (A) + NPV (B),$$
 where the difference between the two terms is the degree of complementarity or substitutability

between A and B. The only case for which A and B can be individually evaluated is when the equality holds. The difference in NPV's, however, may arise from differences in net present value of benefits:

$NPV (A + B) \neq NPB (A) + NPB (B)$, or differences in net present value of costs:

$NPC (A + B) \neq NPC (A) + NPC (B)$, or both.

Ideally, the production activity of the program (P) must be analyzed in conjunction with the training activity (T), but given the absence of information about input costs and output prices for each project, a "second-best" solution is to accept:

$NPB (P + T) = NPB (P) + NPB (T)$

and that:

$NPC (P + T) = NPC (P) + NPC (T)$

That is to say, that both activities are independent on the benefits and on the cost side. The information required to calculate $NPB(T)$ is available from data about the norm and the experimental groups. Information for computing $NPC(P + T)$ exists, but unfortunately, no direct information for the calculation of $NPC(T)$ exists. Consequently, the methodology used for separating training and production costs reduces to obtaining $NPC(T)$ from $NPC(P + T)$.

The Treatment of Capital Costs

In Table 6.1 and 6.2 annual operating costs were separated into staff salaries and training and support costs. Capital costs were not included for two reasons:

1. The only two projects under the program which required capital cost expenditures were the Manpower Corps Training Plant at

Selkirk, Manitoba and the Louis Riel Manufacturing Plant at St. Laurent, Manitoba. Anderson³ estimated capital costs for the Selkirk plant to be 503.2 thousand dollars in 1969. This capital outlay was made possible through the FRED Agreement but under the training-in-industry program, and was therefore not included in the calculation of costs for Interlake Manpower Corps presented in Table 6.1. The Interlake Manpower Corps, on the other hand, allocated \$38,925.69 in January 1974 for the acquisition of machinery at the Louis Riel Plant. This cost does not appear in Table 6.1 either, although it is part of the program's costs under the FRED Agreement.

2. Because these capital costs represent the purchase of equipment for the production of goods (park furniture, ladders, etc.), it is assumed that 100% of such costs correspond to production cost and none to training.

Estimation of Training Costs per Trainee

The two different cost categories which are used in this study reflect the way in which operating costs are recorded for administrative purposes. Thus, a distribution is made between staff salaries and allowances and support costs. The former includes supervisors' and officials' remunerations, managers' and counsellors' wages, etc., while the latter encompasses payments to trainees, instructor expenses, books, etc. The division of these two cost categories into training and production components is discussed below.

³Ian Anderson, op. cit., p. 19.

Staff salaries. For each year, during the period 1968-1975, it is assumed that 80% of staff salaries are attributable to the training activity of the program. The wages of administrative personnel are considered as training costs, but a portion of supervisor and manager wages are considered production costs.

Allowances and support costs. The figures for training allowances and support costs appear together in the summary of costs provided by the Manpower Corps Administrative Director. Estimates are based on approximate values which indicate that about 80% of the total amount corresponds to training allowances and 20% to support costs.

Support costs are then sub-divided, with 90% being attributed to training and 10% to production costs. The high proportion going to training costs is based on the nature of these costs. For example, payments to classroom instructors and the cost of classroom materials, which form a large part of this item, can be clearly assigned to the training activity. However, in a few cases, such as the Winnipeg Beach Towers hotel training project, where board and room paid to trainees were recorded as support costs, the activity affected was production and not training.

Allowance payments were allocated according to a methodology proposed by G. T. Boychuk and R. W. Dilay in September 1974 in a working paper presented to the Interlake Manpower Corps (see Appendix E). Their conclusion, which was based on the previous experience of trainees in the program and in the reports of foremen at the project sites, was that the training cost-production cost ratio varies from 80%/20% at the beginning of training to 50%/50% after thirty weeks of training. This

ratio eventually reduces to 30%/70% after one year.

The average duration of training for members of the experimental group was 21.7 weeks. Therefore, if the linear learning curves proposed by Boychuk and Dilay are adopted, (see Appendix E), the average training/production ratio for this group is around 70%/30%.

Total training costs per trainee. Let S_t be the nominal "staff salary" cost per trainee in year t , and let W_t be the nominal "allowances and support" cost per trainee in year t . These values appear in Table 6.2. Based on the assumptions discussed in the two previous parts, total training cost per trainee in year t , T_t' , can be calculated as follows:

$$(6.1) \quad A_t = .8W_t$$

$$(6.2) \quad P_t = .2W_t$$

because it was estimated that 80% of W_t represented allowance payments (A_t) and 20% represented support costs (P_t).

$$(6.3) \quad A_t' = .7 A_t$$

$$(6.4) \quad P_t' = .9 P_t$$

because it was estimated that 70% of A_t and 90% of P_t are attributable to training.

Replacing (6.1) and (6.2) in (6.3) and (6.4):

$$(6.5) \quad A_t' = .56 W_t \text{ and}$$

$$(6.6) \quad P_t' = .18 W_t$$

It is also known that S_t' , the staff salary cost attributable to training, is equal to:

$$(6.7) \quad S_t' = .8 S_t$$

Replacing (6.5), (6.6) and (6.7) in the definition of T'_t :

$$(6.8) \quad T'_t = S'_t + A'_t + P'_t$$

It is thus concluded that:

$$(6.9) \quad T'_t = .8 S_t + .74 W_t$$

Therefore, for each particular year from 1968 to 1975, it is possible to calculate T'_t using data obtained from Table 6.2. However, gains accruing to the government will be calculated using 1975 as the basis for the estimations (see next section). It is therefore necessary to adjust the values of T'_t in order to obtain the average real expenditures per trainee for 1975 in order to make them comparable with the present value of gains which are to be calculated in 1975 real prices and dollars.

This adjustment requires two steps. The first is the conversion of nominal values for each year in 1975 real values. This is done by multiplying each year's nominal cost by the C.P.I. for Winnipeg for the 1968-1975 period. The second step involves the conversion of these real values into 1975 dollars by capitalizing the real cost of each year to 1975, the period of comparison for government outlays and gains. Using the compound capitalization formula, the real cost per trainee in 1975 dollars (T'_t) for each year i is:

$$T'_t (1 + r)^{1975-t}$$

where r is the opportunity cost of public funds diverted to the program from other potential uses. The values of r used in this section are 8%, 10%, and 12% which lie within the range of rates of discount suggested by the Treasury Board for the evaluation of public expenditures.⁴

⁴Canada Treasury Board, op. cit., p. 26.

The average cost of training per trainee (T') is, then, equal to:

$$T' = \frac{\sum_{t=1}^8 T_i}{8}$$

Table 6.3 presents the calculation of real training cost per capita in 1975 dollars using the numerical values discussed in this section. Table 6.4 shows cost calculations assuming that all government outlays are attributable to training. That is, it assumes that no production component exists. This new set of calculations (Table 6.4), is presented in order to analyze the sensitivity of the cost figures to changes in the assumptions about the training/production ratio for each cost category.

Columns (1) to (3) in Tables 6.3 and 6.4 show the cost per trainee in nominal values for each year during the period 1968-1975. Column (4) converts total cost per trainee in nominal values. This adjustment is accomplished by multiplying each figure in Column (3) by the C.P.I. for the city of Winnipeg for the period 1968-1975. Once real costs per year are estimated in this form it is necessary to make them equivalent to each other by converting them all to 1975 values in order to obtain the average cost per trainee during the period. Columns (5), (6) and (7) show the real costs in 1975 dollars using 8%, 10%, and 12% respectively, as the opportunity cost per year.

The average cost per trainee per year in 1975 values ranges from \$4,324.35 (\$81.16 per week) to \$4,792.49 (\$92.16 per week) under hypothesis I, which assumes that 80% of staff salaries and 75% of allowances and support costs are attributable to training. Under

Table 6.3

Interlake Manpower Corps Real Operating Costs per Male Trainee
 Hypothesis I: 80% of Staff Salaries and 75% of Allowances
 and Support Costs are Attributed to Training

Year	Staff Salaries per Trainee (current \$)	Allowances and Support Costs per Trainee (current \$)	Total Costs per Trainee (current \$)	Total Costs per Trainee (1975 price)	Real Costs per Trainee (1975 \$) 8%	Real Costs per Trainee (1975 \$) 10%	Real Costs per Trainee (1975 \$) 12%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1968	364.05	1,323.69	1,687.74	2,374.75	4,069.89	4,627.71	5,249.81
1969	295.31	1,060.10	1,355.41	1,816.42	2,882.42	3,217.90	3,585.29
1970	327.41	1,169.50	1,496.91	1,910.53	2,807.20	3,076.93	3,367.00
1971	317.96	1,163.84	1,481.80	1,801.14	2,450.43	2,637.05	2,834.13
1972	644.17	1,979.15	2,623.32	3,036.95	3,825.68	4,042.18	4,266.69
1973	949.94	1,994.34	2,944.28	3,246.18	3,786.34	3,927.88	4,072.00
1974	1,560.20	3,015.91	4,575.39	4,804.05	5,188.37	5,284.45	5,380.54
1975	2,754.91	6,829.54	9,584.45	9,584.45	9,584.45	9,584.45	9,584.45
Average					4,324.35	4,549.82	4,792.49

Sources:

Column (1): Table 6.2, Column (4) x .8
 Column (2): Table 6.2, Column (5) x .75
 Column (3): Column (1) + Column (2)
 Column (4): Column (3) x C.P.I., City of Winnipeg
 Column (5): Column (4) x (1.08)ⁿ
 Column (6): Column (4) x (1.10)ⁿ
 Column (7): Column (4) x (1.12)ⁿ
 where n = 1, 8

Table 6.4

Interlake Manpower Corps Real Operating Costs per Male Trainee
 Hypothesis II: 100% of Both Staff Salaries and Allowances
 and Support Costs are Attributed to Training

Year	Staff Salaries per Trainee (current \$)	Allowances and Support Costs per Trainee (current \$)	Total Costs per Trainee (current \$)	Total Costs per Trainee (1975 price)	Real Costs per Trainee (1975 \$) 8%	Real Costs per Trainee (1975 \$) 10%	Real Costs per Trainee (1975 \$) 12%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1968	455.08	1,764.92	2,200.00	3,095.53	5,305.18	6,032.32	6,843.23
1969	369.14	1,431.47	1,800.61	2,413.04	3,829.18	4,274.84	4,762.91
1970	409.28	1,559.33	1,968.61	2,512.57	3,691.79	4,046.52	4,428.01
1971	397.45	1,551.79	1,949.25	2,369.33	3,223.44	3,468.94	3,728.19
1972	805.22	2,638.87	3,444.09	3,987.13	5,022.63	5,306.87	5,601.63
1973	1,187.43	2,659.12	3,846.55	4,240.97	4,946.66	5,131.57	5,319.87
1974	1,950.26	4,021.22	5,971.48	6,269.91	6,771.50	6,896.90	7,022.30
1975	3,443.64	9,106.06	12,549.70	12,549.70	12,549.70	12,549.70	12,549.70
Average					5,667.51	5,963.45	6,281.98

Sources:

Column (1): Table 6.2, Column (4)
 Column (2): Table 6.2, Column (5)
 Column (3): Column (1) + Column (2)
 Column (4): Column (3) x C.P.I. City of Winnipeg
 Column (5): Column (4) x (1.08)ⁿ
 Column (6): Column (4) x (1.10)ⁿ
 Column (7): Column (4) x (1.12)ⁿ
 where n = 1, 8

hypothesis II, which assumes that all costs correspond to training and none to production, real average cost per trainee per year ranges from \$5,667.51 per year (\$108.99 per week) to \$6,281.98 per year (\$120.80 per week). Hypothesis II yields training cost estimates which are 31% higher than hypothesis I for every capitalization rate. These figures for training costs per year per trainee must be compared with the government receipts induced by training, which are estimated in the next section, in order to determine the effect of the Interlake Manpower Corps on the financial situation of the government.

B. Government's Gains from the Program

Government's financial gains from the program appear from four sources:

- (1) the savings in unemployment payments during the period of training (net of taxes lost when an employed person enrolls);
- (2) the increase in tax collections on training allowances;
- (3) the savings in unemployment payments after training due to the increase in the rate of employment produced by training, and
- (4) the increase in direct taxes paid after training due to the increase in the level of earnings induced by training.

No information exists about taxes paid by trainees and non-trainees in the Interlake Area. Payroll records for the Manpower Corps projects are available which indicate the taxes paid by trainees on a bi-weekly basis. These tax payments are subject to change at the end of the year due to tax credit adjustments by the Province of Manitoba, exemptions, etc.

A simulation of changes in tax and transfer payments induced by the program is required, such a simulation requires a number of assumptions which can be summarized as follows:

1. Every individual in the program pays taxes in accordance with the income reported in the application forms and the questionnaires. The possibility of tax evasion is ruled out.

2. Married couples file joint income-tax returns and the wife's income during the year is zero. This assumption implies that every married trainee is entitled to receive the married exemption.

3. Exemptions are those specified in the tax laws. The number of dependents declared on the program registration form for tax exemptions. One-half of these dependents are below 16 years in 1975 and one-half are over 16 years.

4. All non-treaty Indians receive unemployment transfers when unemployed and cease to receive it as soon as they are employed.

5. One-half of treaty Indians stay off the Reserves after training, and they are considered to be non-treaty Indians for tax purposes. The other half goes back to the Reserves where no direct taxes are paid. All direct taxes are retained at the source, which implies that no provision is made for the time difference between tax accrual and tax payment.

6. Indirect tax changes are excluded from the analysis. This means that no calculations are made for things like additional sales taxes collected by the government due to the higher incomes of those who were enrolled in the training program.

7. As was the case when the individual valuation of the program was carried out, two assumptions about the duration of benefits are made; 8 years and 10 years after training. The six months "waiting period" before the commencement of benefit is also assumed.

Income exemptions under the 1975 tax laws are used in this study. Average labour incomes and unemployment transfers in 1975 values are used as the basis for the calculation of personal taxes. Figure 6.2 shows the pattern followed in this section to calculate government benefits from training. Government gains during the average training period consist of: (a) savings in unemployment transfers to those who were unemployed before entering the program, plus (b) personal taxes paid on training allowances, minus (c) personal income tax paid by those who were employed before training.

Government gains after the training period include: (a) the reduction in unemployment transfers during the period when the benefits which are attributable to training are still measurable, plus (b) the increase in income tax collection produced by higher earnings due to training. These values are estimated below.

Government gains during training. The average saving in unemployment payments during training which is realized by the government is equal to the net-of-tax weekly unemployment receipts multiplied by the proportion of unemployed individuals who entered the program. Gross unemployment transfers amount to \$78/week.

It was estimated, using assumptions (1) to (5), that the average tax payment made by unemployed individuals equals - \$1.07 per week. This is in fact, a tax rebate equivalent to \$55.64 a year per individual.

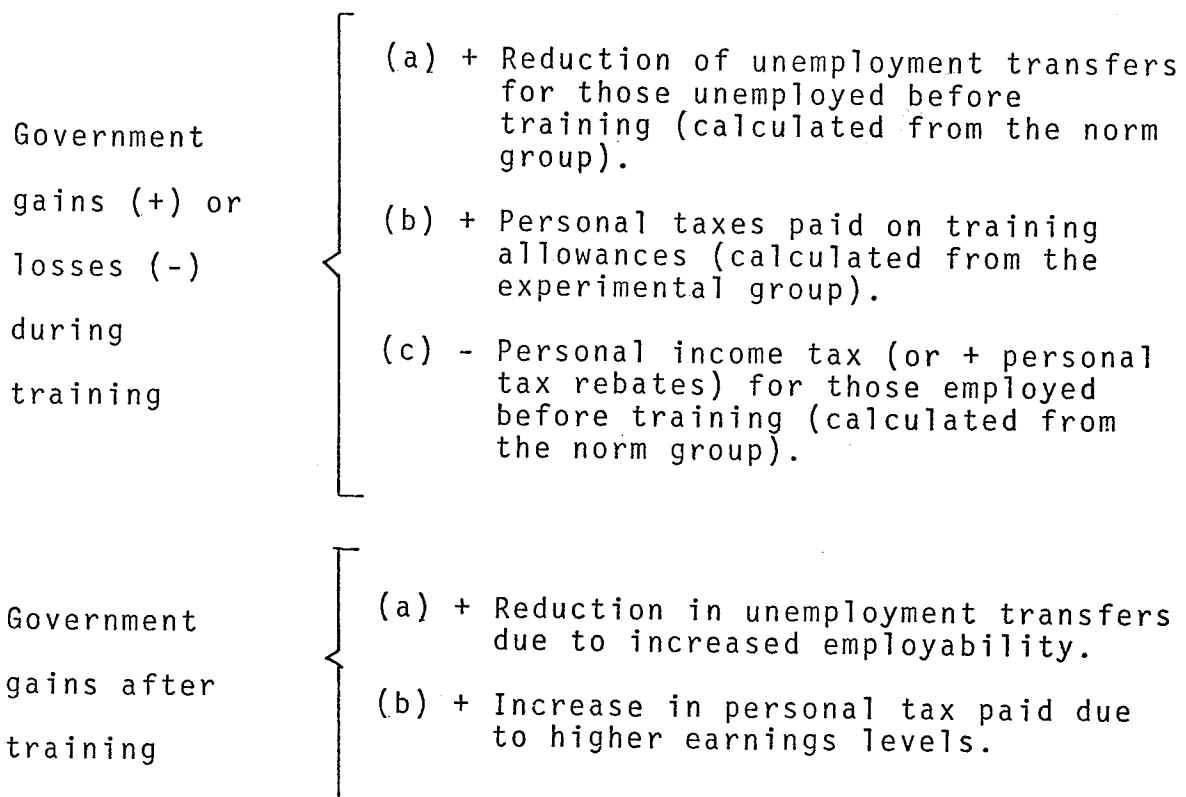


Figure 6.2

Summary of Government Gains
Imputable to Training

Net unemployment transfers are then equal to \$79.07/week ($\$78 + \1.07). However, only 77.5% of individuals in the norm group were unemployed before training, so \$61.35 per trainee per week of training is the average saving to government during training ($\$79.07 \times .775$).

To this value it is necessary to add the average per trainee reduction in tax rebates, \$2.47 per week, to individuals who were employed before training. This value was calculated by applying the set of assumptions presented at the beginning of this section to members of the norm group. Because 22.3% of the norm group were employed at the time of application a reduction in tax rebates of

$$[\$0.55 \text{ per week } (\$2.47 \times 0.223)]$$

is fully attributable to the program.

Taxes on allowance payments are estimated to be \$6.80 per week of training for those who were enrolled for the entire length of the program. Consequently, government gains a total of \$68.70 per trainee during each week of training ($\$61.35$ in transfer savings + $\$0.55$ in rebate savings + $\$6.80$ in taxes on allowances).

Savings in unemployment payments after training. The employability of trainees is increased after training and therefore unemployment transfers are reduced due to the program. The reduction in the unemployment rate, 57.7%, is calculated by subtracting the unemployment rate of the experimental group (19.9% including those temporarily unemployed) from the unemployment rate of the norm group (77.6%).

The reduction in net-of-taxes transfer payments is then equal to $\$79.07 \times 0.577 = \45.07 per week, where \$79.07 is the value of net

unemployment transfers per week paid to unemployed individuals (\$78.00 + \$1.07 tax rebates).

It should be noted, however, that the reduction in net unemployment transfers due to one additional week of training is not totally attributable to training. Only 1.1% of the additional receipts of the experimental over the norm group is explained by one additional week of training.⁵ If this percentage is applied to \$45.07, the resultant saving in unemployment transfers due to training works out to be \$0.49 per week during the duration of benefits.

Gains in direct taxes collected after training. The members of the experimental group each pay, on average, \$1,041.00 in taxes per person per year, or \$20.00 per week. Average tax rebates for members of the norm group equal \$1.38 per week (2.47 to those employed x .223 + \$1.07 to those unemployed x .777). The total government gain is equal to \$20.00 + \$1.38 = \$21.38. However, again only 1.1% of this difference (or. \$0.23) is imputable to one week of training. All these values were obtained using the simulation procedure explained previously, and consequently they are subject to errors of estimation.

Total government gains. By using the previous estimates it is possible to obtain a time profile of government gains from training which is comparable to the profile of costs estimates made in the first section of this chapter. Government gains during each week of training

⁵ Average weekly income of the experimental group is equal to \$164.25 and average weekly income of the norm group is equal to \$82.14. Of this difference, \$82.11, only 1.1% (0.92/\$82.11) is produced by one additional week of training.

amount to \$68.70. After training, government gains are equal to \$0.72 per week of training (0.49 from savings in unemployment transfers + \$0.23 from increases in direct taxes), during eight or ten years following training.

In order to make these values comparable to each other and to costs figures, it is necessary to convert them to 1975 dollars. In order to do so, real discount rates of 8%, 10%, and 12% are used here for the same reasons presented in the calculation of government training costs. The results of these calculations are shown in Table 6.5.

The present value of gains accrued to the government per week of training ranges from \$242.94 to \$307.94. The extension of the length of benefits from eight to ten years increases the gains to government by approximately 12%. Benefits during training represent between 22.3% and 28.3% of total gains.

C. Comparison of Gains and Outlays

The figures for government benefits and costs are both in 1975 values, so it is possible to compare them using gains/outlays ratios for each of the two hypotheses about training/production relations and for each of the three discount rates, 8%, 10%, and 12% per year.

Table 6.6 shows the results of these comparisons. The gains/outlay ratios vary from 2.01 to 3.7. This indicates that the government can recover more than the total expenditures per trainees per week of training in extra direct taxes and transfers savings.

Table 6.5
 Government Gains from Training
 (1975 Values)

Duration of Benefits	Annual Discount Rates		
	8%	10%	12%
Eight Years	271.45	256.49	242.94
Ten Years	307.94	286.97	268.43

Each cell was calculated using the formulae:

$$\$68.70 + 0.72 \left[\frac{(1+r)^n - 26}{r(1+r)^n} - 1 \right]$$

where r is the weekly discount rate equivalent to 8%, 10%, and 12% per year, respectively, and $n = 416$ and 520 weeks respectively.

Table 6.6
Gains/Outlay Ratios from the Point of View
of Government Finance
(1975 \$ per week of training)

		Present Value of Gains	Present Value of Outlays		Gains/Outlay	
			Hypothesis I	Hypothesis II	Hypothesis I	Hypothesis II
		(1)	(2)	(3)	(4)	(5)
Eight Years Duration of Benefits	8%	271.45	83.16	108.99	3.26	2.49
	10%	256.49	87.49	114.68	2.93	2.24
	12%	242.94	92.16	120.80	2.64	2.01
Ten Years Duration of Benefits	8%	307.94	83.16	108.99	3.70	2.82
	10%	286.97	87.49	114.68	3.28	2.50
	12%	268.43	92.16	120.80	2.91	2.22

Sources:

Column (1): Table 6.5
 Columns (2) and (3): Tables 6.3 and 6.4 respectively, converted to weekly costs.
 Column (4): Column (1) ÷ Column (2).
 Column (5): Column (1) ÷ Column (3).

D. Analysis of Results

The lack of data on taxes paid by the groups used in this study required the use of information on the number of dependents, marital status, race, etc. in order to do a simulation of tax payments. Also, a set of assumptions about tax exemptions for each individual was needed. These assumptions were made explicit at the beginning of section B.

On the cost side, an attempt was made to include in the estimation of training costs per trainee the fact that not all government outlays in the program were related to manpower training. Production costs are also included in the figures on total expenditures under the FRED Agreement and these were subtracted from total costs in order to isolate the training cost. The figures for gains and costs represent a synthesis of the historical pattern during the first nine years of the ten-year program. Real costs are based on the average values for these years (1968-1975) in 1975 dollars.

As is the case with all the estimates made in this thesis, it is not possible to project the results to future years. Training costs per trainee have fluctuated mainly because of changes in trainee enrollment through time. It is likely that after 1977 the Manpower Corps will continue to operate only two permanent projects, the Selkirk Plant and the Louis Riel factory, as well as a few housing projects. Therefore, a steadier enrollment, limited by the production capacity of the plants, is expected.

Government gains depend not only on the increase in earnings and employability of trainees, which can be predicted, but also in the highly unpredictable tax and welfare legislation. Because all the values were expressed in constant prices, the application of uniform tax rates for years beyond 1975 suggests that the price-elasticity of the income tax rates is equal to one. In Canada, both personal exemptions and tax rates are adjusted for increases in the price level. Consequently, the assumption of a tax schedule neutral to inflation is justified.

The elimination of the six-month waiting period after training used through this study, which would imply that individuals can obtain immediate benefits from training, increases gains from \$18.14 (at 12%) to \$18.33 (at 8%). The changes represent an increase between 15.0% and 21.8% in total gains.

On the other hand, all changes in taxes paid during training were calculated on the presumption that the total value of allowances was attributable to training. The assumption that only 70% of it corresponds to training costs, which was used in the calculation of costs, would reduce the total gains by \$18.40/week, and would reduce the gain/outlay ratios between 5.9% and 7.5%.

CHAPTER 7

EVALUATION OF THE INTERLAKE MANPOWER CORPS PROGRAM FROM SOCIETY'S VIEWPOINT

Benefits and costs to individuals and to government are not necessarily benefits and costs to society as a whole. An increase in the real value of production represents an economic benefit to society, and the use of real resources represents an economic cost to society. Transfers of resources between groups affect the distribution of income in the economy but do not affect the general efficiency of the economy. Therefore, they should be excluded from a social benefit-cost analysis.¹

This chapter presents an attempt to measure the net gains to society produced by the Interlake Manpower Corps Training Program. It is divided into four sections. In the first, benefits to society are calculated using a social benefit function estimated from data on the experimental group. A discussion of the existence and measurement of other social benefits related to training is also presented. In the second section, social costs of the program are estimated. These costs include the real operating costs of the program, labour opportunity costs and labour mobility costs.

¹This statement requires some qualifications. Taxes and transfers may affect the general efficiency of the economy if they create an excess burden in the economy, i.e., induced distortions in the individual's decision-making process. This excess burden or welfare cost is normally considered negligible, and will be treated as such in this thesis.

Section three compares benefits and costs using a discount function similar to the one used in Chapter 5. Section four discusses the numerical results and their implications.

A. Interlake Manpower Corps Benefits from Society's Viewpoint

The term "social benefits" has different meanings to different people. For economists, social benefits relate to improvements in the general efficiency of the economy, measured by increases in real production (including externalities that can be measured in money terms). For sociologists, psychologists and other social scientists the term refers to any favourable consequences, usually not expressed in money terms, for individuals or aggregates of changes in human or institutional behaviour.

The existence of social benefits (in non-economic terms) has been reported together with pure economic benefits² in manpower training economic evaluations. In the first part of this section, the estimation of social benefits of manpower training from an efficiency standpoint is made, by means of a social benefit function. In the second part some hypothesized positive effects of training on society are discussed. This latter part emphasizes the sociological and psychological evidence relevant to the native population.

²MacMillan, Nickel and Clark, op. cit., pp. 49.

The conclusion which stems from this discussion is that the incorporation in a benefit-cost analysis of those social benefits that can be attributed to training, even if it were possible, would not alter the main implications of the economic evaluation, i.e. that manpower training in the Interlake Area is efficient.

Economic Benefits

Manpower training improves the productive capacity of individuals and consequently increases the level of real national product. This increase in productivity represents the benefit society derives from investments in institutional training. It is hypothesized that the real level of individual labour earnings (assumed to be equal to labour productivity) depends on the duration of training in weeks (D) and on the educational level attained by the trainee before entering the program (E).

A regression equation in which D and E appear as independent variables, and Y_e (labour earnings) as the dependent variable, was estimated using ordinary least squares. Unemployment receipts were not included in the value of the dependent variable, because they represent transfers of purchasing power between taxpayers and trainees rather than increases in real productivity. Data from the experimental group was used for the estimation of the social benefit equation. The result obtained, based on a sample of 116 individuals is:

$$(7.1) \quad \hat{Y}_e = 65.5 + 7.84E + 1.02D$$

$$(1.95) \quad (2.53) \quad (2.90)$$

F-Ratio = 7.37

$R^2 = 0.12$

D.W. Ratio = 1.63

All regression coefficients are statistically greater than zero at the 5% level of confidence. The value of the t distribution for a one-tailed test, 1.658, is lower than the calculated t values for the regression coefficients (shown in parentheses under each coefficient in 7.1). The goodness of fit of the equation is statistically significant at the 5% level of confidence. Multicollinearity between independent variables of the equation is not a problem, because the partial coefficient of determination is -0.004. The value of the Durbin-Watson coefficient, 1.63, suggests that there is no positive or negative autocorrelation of residuals.

Equation 7.1 shows that, for every additional week of training, the real productivity of the economy is increased by \$1.02 per week. One additional year of education increases productivity by \$7.84 per week. Average values of the variables in 7.1 are:

Average Education: 7.87 years
 Average Duration of Training: 21.7 weeks
 Average Labour Earnings: \$149.46/week.

As was the case for the earnings functions from an individual point of view, several attempts were made to obtain the best specification of the social benefits equation consistent with the theory of human capital.³ Equation 7.1 provided the specification in which

³The inclusion of age (A) in the social benefits equation produces the following estimation:

$$Y = 19.04 + 1.0 A + 9.6 E + 1.0 D$$

$$(0.44) (1.48) (2.9) (2.9)$$

$$R^2 = .13 \quad F\text{-ratio} = 5.7 \quad D.W. = 1.64$$

Age is significantly greater than zero at the 10% level of confidence, but it is not at the 5% level. Racial origin was found not to be significant even at the 10% level in another equation.

all coefficients were significantly greater than zero at the 5% level of statistical significance.

It is concluded that the Interlake Manpower Program produces an increase in the productive capacity of the individual and consequently, of the region. This conclusion is based on the assumption that the real wage rate is equal (or positively related) to the productivity of labour. Using average values for the variables included in (7.1) it is estimated that 14.8% of average labour earnings for members of the experimental group is explained by the duration of training.

Other Social Benefits

It is important to note that increased individual productivity is considered in this study as the only source of benefits to society. Clearly there is no reason, other than a methodological one, to accept this premise. Interlake Manpower Corps officials are aware of instances where a reduction in alcoholism, time in jail, etc., with a consequent reduction in the social cost associated with these events, might have been induced by training.

It is also argued that a higher level of education for the family (and institutional training can be considered as a type of education) produces a higher level of academic achievement in depressed

areas.⁴ Other benefits assigned to manpower training programs are increased job satisfaction, improved housing standards, improved family nutrition, and improved community social structure.⁵ For some of them, such as housing and nutrition, it can be argued that their inclusion in the list of benefits would be double-counting because they are "purchased" with the higher income level obtained after training. Other benefits, however, are induced by changes in attitudes and Weltanshuung created by the program. Some of them are discussed below.

The relation between higher income and reduced alcoholism, drug addiction and delinquency is the subject of debate between sociologists, psychologists and other social scientists. The evidence is fragmentary and difficult to assess and in no way definite. Rainer asserts that the results of different studies lead to the conclusion that "...there is a large environmental role in the pathogenesis of criminal behaviour."⁶ Clearly, any attempt to improve the environment

⁴For a review of the literature on this topic, see: Paul Morgat and J.A. MacMillan, Education in Area Economic Development, Research Report No. 10 (Winnipeg: Center for Settlement Studies, University of Manitoba, 1972), pp. 38-39.

⁵MacMillan, Nickel and Clark, op. cit., pp. 49-59.

⁶John D. Rainer, "Science of Human Behaviour: Contributions to the Biological Sciences," in Comprehensive Textbook of Psychiatry, eds. Alfred Freedman, et. al. (Baltimore: The Williams and Wilkins, Co., 1975), Vol. I, p. 102.

in which an individual develops creates a benefit to society represented by a lower criminality rate. However, the problem with the evaluation of this benefit is not the discussion about its existence, but in the way it can be measured. There are serious shortcomings in the use of court referrals and incarceration as a measure of delinquency or criminality. Police dispositions tend to be related to the demographic characteristics of offenders, such as race, age, appearance, etc. Consequently, a young native person is more likely to be referred to court for a particular offense than a young white. This discrepancy in treatment would be even more pronounced when comparing the treatment received by a young native person and an older white person. The analysis of the effects of the program on the reduction of delinquency (as measured by visits to jail) requires the use of a norm group in which variables such as physical appearance, dressing habits, etc. coincide with the ones in the experimental group. This, of course, is practically impossible because norm groups (and experimental groups, for that matter) are usually selected from registration forms which do not include any information of that sort.

With respect to alcoholism and drug addiction, the interpretation of the results of various studies is still more complicated and their implications more dramatic. Alfred M. Freedman⁷ concludes that:

"...(recent evidence)...has cast doubt on any exclusive relation between addiction and socio-economic status."

⁷Alfred M. Freedman, "Drug Dependence," in Comprehensive Textbook of Psychiatry, op. cit., Vol II, p. 1300.

The implication of this conclusion is that there is no reason to believe that the better economic situation (in terms of earnings and employability), produced by manpower training would be reflected in a reduction in the social cost of drug addiction.

The problem of alcoholism seems to be more serious than the problem of drugs, though Chafetz⁸ reports that

"...the alcoholism rate of American Indians is at least twice the national average...(in U.S.A.)...about 25% to 50%..."

Although comparable information does not exist for the target group, there is evidence that the problem of alcoholism exists for the group. As in the case with delinquency, however, the structure of the norm group is crucial to the interpretation of empirical results, and again, it is almost impossible to obtain comparable groups.⁹

The influence of the economic position of parents on the educational achievement of children seems to have strong support in

⁸Morris E. Chafetz, "Alcoholism and Alcoholic Psychoses," in Comprehensive Textbook of Psychiatry, op. cit., Vol. II, p. 1331.

⁹For example, it is possible that constitutional factors may account for the high level of alcoholism among Indians and Eskimos. See, for example: D. Fenna, L. Mix, O. Schaefer and A. Giebert, "Ethanol metabolism in various racial groups," Canadian Medical Association Journal, 105:472, 1971. For other researchers, physiological theories of alcoholism are invalid and they only accept explanations based on socioeconomic reasons.

the literature.¹⁰ If the social net present value of additional education is positive, the induced increase of education produced by training is in fact a social benefit of the program.¹¹ Finally, health improvement externalities, especially those produced by a reduction in contagious diseases, have also been mentioned in the literature.¹²

This thesis does not include the effect of induced higher education on children, reduced alcoholism rates or better health environment as part of the social benefits. However, it can be hypothesized that the magnitude of these effects is positively related to the individual rate of return to the program, not independent of it. This implies that if the program is successful in providing trainees with higher employment and earnings levels, reductions in alcoholism and delinquency and improvements in both the health environment and the academic achievement of trainees' children can be expected.

If the program fails to improve the situation of individuals, these positive external effects do not appear, but most likely they

¹⁰See, for example, Patricia Cayo Sexton, Education and Income (New York: Viking Press, Inc., 1961), pp. 106-107.

¹¹Kohn, however, found little support to the hypothesis that the income level of the parents was a determinant of children's education. See: Melvin S. Kohn, Class and Conformity: A Study of Values, (Homewood, Illinois: The Dorsey Press, 1970) p. 137.

¹²Robert Goldfarb, op. cit., p. 66.

become social costs. It was demonstrated in Chapter 5 that individuals do benefit from training, and therefore it is suggested that positive social benefits over and above productivity increases may in fact exist, although they are not measured here.

It should be noted, however, that the inclusion of these social benefits which are related to the success of training, introduces a bias in the results unless some social costs which are also dependent on the success of training, are included. These social costs are represented by the "displacement effect" or the substitution of trained workers for non-trained workers in private industry. This effect has been consistently recognized by analysts as a possible negative effect of institutional training, although its relative magnitude is a subject of controversy.

Page assumed that the displacement effects do not exist.¹³ Borus suggested that although this effect may exist, it is unimportant in terms of numerical results, because there is an excess demand¹⁴ for those occupations for which training is provided under the MTDA. Goldfarb argues that even if this effect exists, its importance is very difficult to determine. He maintains that the only way to analyze the impact of training on job displacement is to compare two identical areas, one in which the training program operates and the other in

¹³David Page, op. cit., p. 266.

¹⁴Michael Borus, op. cit., p. 397.

which no program has been offered. Because the creation of two identical areas is almost impossible, he concludes that the measurement of the displacement effect is seriously constrained.¹⁵ Hamermesh, however, uses a simulation model to conclude that, unless the occupations for which individuals receive training are ones for which shortages exist, the number of displaced workers rises when placements of trainees increase.¹⁶

There is no way of measuring exactly the displacement effects of Manpower Corps trainees. This is partly because they are trained in different occupations according to the nature of the projects in which they are enrolled and partly because a portion of the training is of a general nature. Because costs (or benefits) accruing to non-trainees (displacement effect or vacuum effect) are not included here, social benefits to "third parties" are not included either.

B. Interlake Manpower Corps Costs from Society's Viewpoint

Costs to society are represented by the values of real resources used in a particular activity. Two problems usually exist in the social cost evaluation: (1) the identification of real costs vis-a-vis monetary costs, and (2) the valuation of real cost, i.e. the problem of resource pricing.

¹⁵Robert Goldfarb, op. cit., pp. 71-72.

¹⁶Daniel S. Hamermesh, Economic Aspects of Manpower Training Programs, (Lexington, Mass.: Heath Lexington Books, 1971), p. 36.

The first problem is solved by including in the list of costs only those activities which imply a sacrifice of final consumption or investment. In the case of the Interlake Manpower Corps, this would include such things as the operating cost of the program (excluding allowances to trainees which are monetary transfers from taxpayers to trainees and do not represent a net sacrifice of resources to the economy, the labour services of those trainees enrolling in the program, etc.

The valuation of resources presents a more complicated problem. When market distortions exist for any activity, market prices are not necessarily a correct indication of resource scarcity or abundance, and some adjustments are sometimes required. The most relevant case for the purpose at hand is the one of labour services used in the projects. The market wage, with respect to the private sector in some circumstances is not a good indicator of the social value of labour, especially when workers originating from urban areas are used in those projects. In most of the activities in urban areas, real wages are set above the real wage level that would produce an equilibrium in that particular segment of the labour market. A non-efficient price for the use of labour prevails and benefit-cost analysis, as a tool for measuring efficiency improvements, can not rely on this price as an indicator of the social effect of a project. However, labour used in the Interlake Manpower Corps projects is drawn from depressed areas where labour earnings are not artificially set by legislation, unions, etc.

In this case, as will be discussed below, market wages can be used as a reasonable approximation of the social price of labour.

The remainder of this section is divided into four parts. In the first, the real resource costs of operating the program are estimated. In the second, a valuation of the social cost of labour is presented. The third part deals with the calculation of real mobility costs for trainees enrolling in the program. Finally, in part four, a summary of the social costs per trainee in 1975 values is made. Social rates of discount of 8%, 10%, and 12% are used in order to account for the value, through time, of the resources which are diverted.

Interlake Manpower Corps Real Operating Costs

In Chapter 6, Section A, operating costs for the Interlake Manpower Corps Program were estimated for the period 1968-1975. These figures reflect the public expenditure in manpower training and they do not consider the costs of production which appear jointly in some program activities. Not all training outlays, however, are real resource costs to society. Training allowances are resource transfers that affect the distribution of income but that do not affect the general efficiency of the economy.

From equation (6.2) it was estimated that 20% of allowances and support costs correspond to support costs. The rest, 80%, represents training allowances which are not considered a cost to society.

Of the total value of support costs, 90% corresponds to training proper, according to equation (6.4). Column 1 in Table 7.1 shows the value of support costs per trainee attributable to training for the period 1968-1975 in nominal values for each year.

Eighty percent of the total value of staff salaries, calculated on a per trainee basis, are government outlays on manpower training which represent a use of real resources, and consequently, a cost to society. Column 2, Table 7.1, shows these values for 1968-1975. Column 3 of the same table presents the total nominal cost to society associated with training for the eight year period starting in 1968. It should be noted that capital costs are not included because it is assumed that, although they represent a diversion of real resources, they belong entirely to the production activity and not to the training activity of the Interlake Manpower Corps.

Columns 4 and 5 in Table 7.1 show the operating cost per trainee per year in 1975 prices and 1975 dollars, respectively. The price adjustment is required in order to express all values in real terms, in order to eliminate the effect of inflation on benefits and costs. The adjustment for the time spread of costs is required in order to take into account the fact that the deployment of resources into the program implies a sacrifice of investment and consumption at the time of the expenditure and in the future. The rate of discount measures the social opportunity cost of this resource use.

Table 7.1

Real Operating Costs per Trainee
of Interlake Manpower Corps.
(1968-1975)

Year	Support Costs per Trainee (nominal \$)	Staff Salaries per Trainee (nominal \$)	Total Costs per Trainee (nominal \$)	Total Real Costs per Trainee (1975 prices)	Total Real Costs per Trainee (1975 \$)	Total Real Costs per Trainee (1975 \$)	Total Real Costs per Trainee (1975 \$)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1968	317.68	364.05	681.73	959.23	1,643.95	1,869.27	2,120.55
1969	257.66	295.31	552.97	741.05	1,175.95	1,312.81	1,462.70
1970	280.68	327.41	608.09	776.11	1,140.36	1,249.93	1,367.77
1971	279.32	317.96	597.28	726.00	987.71	1,062.93	1,142.37
1972	474.99	644.17	1,119.16	1,295.62	1,632.11	1,724.47	1,820.25
1973	478.64	949.94	1,428.58	1,575.06	1,837.15	1,905.82	1,975.75
1974	723.82	1,560.20	2,284.02	2,400.16	2,592.17	2,640.17	2,688.18
1975	1,639.09	2,754.91	4,394.00	4,394.00	4,394.00	4,394.00	4,394.00
Average					1,925.42	2,019.92	2,121.45

Sources:

- Column (1): Table 6.3, Column (2), times .24.
 Column (2): Table 6.3, Column (1).
 Column (3): Column (1) + Column (2).
 Column (4): Column (3) x C.P.I. City of Winnipeg, 1968-1975.
 Column (5): Column (4) x (1.00)ⁿ.
 Column (6): Column (4) x (1.10)ⁿ.
 Column (7): Column (4) x (1.12)ⁿ.
 where n = 0, 7.

Table 7.1 shows that if 8% per year is considered to be the opportunity cost of public investment, then the average annual cost to the economy to train one individual has been \$1,925.42 per year, or \$37.02 per week of training. If the opportunity cost is 10% per year, the average cost increases to \$2,019.92 per year, or \$38.84 per week of training. Finally, if 12% is considered the opportunity cost of public funds, then \$2,121.45 per year or \$40.79 per week has been the cost to society of training one individual in the Interlake Manpower Corps Program.

It is again important to notice that these figures represent the average cost over the eight year period (1968-1975) for which information is available. It is not possible to use these values as indicators of real resource costs in the future, because their estimation would require the projection of future expenditures and enrollment, which is beyond the scope of this study.

Social Opportunity Costs of Trainee Enrollment

If only real operating outlays per trainee were considered to be the costs of the program to society, it would mean that the opportunity cost of labour is zero. A zero social cost of using labour in a given activity (in this case a training project) would imply that individual trainees can be drawn into a project with no loss in output in the activities in which these trainees were formerly engaged.

The use of a zero social cost for labour in situations in which high unemployment or underemployment prevails in the region where trainees originate has some appeal in the literature, especially in models which assign to capital the sole importance in real growth. The consideration of a zero shadow price for labour has some important implications:

1. It implies that the existence of the program has no effect on the size of the labour force but affects only the rate of employment and unemployment for a given size of the labour force in a given area.

Harberger has shown that under some circumstances the creation of new job opportunities sets in motion a process of migration that increases the size of the labour force in the area where this opportunity appears.¹⁷ There is no strong evidence to support this hypothesis in the case of the Manpower Corps Program. However, it is reasonable to consider that some of the new trainees take their dependents with them when entering a project. If any of these dependents were receiving labour income, a loss to society, in terms of foregone product, is induced by the creation of a new vacancy in a project. Therefore, a zero social cost of labour tends to underestimate the true loss to society of job creation.

2. It also implies that the individual valuation of leisure is zero. If it were not, a loss to society equal to this valuation would be a cost attributable to the creation of a new vacancy.

¹⁷Arnold C. Harberger, Project Evaluation, p. 170.

In reality individuals place a value on the leisure they have while they are unemployed. This value may be higher than, equal to, or lower than the unemployment insurance payments they receive while not working, but the sum of the two is usually positive. In competitive equilibrium, these unemployment transfers plus (minus) the additional positive (negative) value of leisure an individual receives are equal to the wage he gets if he were employed. That is, they are equal to the supply price of labour, at the margin.¹⁸ Therefore, in this thesis, the social cost of labour is made equal to the private supply price of labour in the sector where trainees originate.¹⁹

Individual supply prices, also called reservation prices, for each year during the period 1968-1975, were calculated for the norm group in Chapter 5 (see Table 5.5, Column 1). They are the average wages which individuals without training can get in the Interlake Area of Manitoba. Note that average wages are used as

¹⁸For a discussion of the logic behind this proposition, see: Glenn P. Jenkins and Chun-Yan Kuo, "The Social Cost of Filling Temporary and Permanent Jobs," document prepared for the Department of Regional Economic Expansion, April 1976, p. 7.

¹⁹Arnold C. Harberger, Project Evaluation, p. 164. Harberger considers different alternatives to measure the social cost of labour, depending on the nature of the labour markets in the original and destination areas of the migrating worker. The social cost of labour and the supply price are equal in the situation where the workers originate from a depressed region and the job opportunities are created in another depressed region.

a proxy for marginal supply prices because it is very difficult to obtain the latter from historical registrations.

Education has proved to be an important determinant of wages (equation 7.1). Therefore, an adjustment similar to the one made in Chapter 5 to account for differences in educational levels between the experimental and the norm group is necessary. It is hypothesized that the opportunity cost of labour increases with additional education.²⁰ Average education for members of the experimental group is 7.87 years (see Chapter 7, Section A) and the marginal social benefit assigned to one additional year of education is \$7.84 (regression coefficient of E in equation 7.1). Then, for every year of education that the experimental group has above the average education of the norm group, an increase in the reservation price of \$7.84 is required. Table 7.2 presents the result of this adjustment.

Column (1) shows the unadjusted labour earnings for members of the norm group during the period 1968-1975. Column (2) shows the average educational level of members of the norm group. In Column (3), the adjustment for educational differences is shown, and finally in Column (4), adjusted reservation prices are calculated. The average reservation price, weighted by the number of male trainees

²⁰This hypothesis has been tested and accepted by Paul Molgat and J. A. MacMillan, *op. cit.*, p. 82.

Table 7.2
 Educationally Adjusted Labour Reservation Price of
 Members of the Norm Group

Year	Unadjusted Real Labour Earnings (\$/week)	Average Education (years)	Education Adjustment (\$/week)	Adjusted Labour Earnings (\$/week)
	(1)	(2)	(3)	(4)
1968	67.33	5.9	15.44	82.77
1969	75.31	6.9	7.60	82.91
1970	77.07	6.8	8.39	85.46
1971	92.11	6.6	9.95	102.06
1972	80.00	8.6	-5.72	74.28
1973	121.12	8.1	-1.80	119.32
1974	97.33	6.2	3.09	110.42
1975	104.00	7.1	6.04	110.04

Sources:

Column (1): Table 5.7, Column (1)

Column (2): Table 5.7, Column (2)

Column (3): $(E_E - E_i) \times 7.84$

where: E_E = average level of education for the experimental group, 7.87 years

E_i = Column (2), for $i = 1958$ to 1975

7.84 is the regression coefficient of E , in (7.1)

Column (4): Column (1) + Column (3).

enrolled in training projects in each year during 1968-1975 (Table A.7) is equal to \$94.30 per week. This means that, on the average, the social opportunity cost of the labour entering a training project is equal to \$94.30 per week in 1975 values.

Labour Mobility Costs

Funds used to finance the relocation of would-be trainees from their original activities to the training projects represent a diversion of real resources and, consequently they affect the social appraisal of the program. It was noted in Chapter 5 that individual trainees do not usually pay for their relocation. Canada Manpower, the Department of Indian Affairs and the Department of Health and Social Development contribute in different ways to pay for the out-of-pocket expenses incurred by would-be trainees.

In 1976, Canada Manpower paid \$50 per family member to cover mobility costs. The nominal value of this payment has changed since 1969, when the program started, but it has pretty well kept pace with increases in the cost of living. The Department of Indian Affairs pays Treaty Indians \$1,000 per household for accommodation expenses, including the purchase of furniture, drapery, etc. The Department of Health and Social Development pays non-Treaty Indians up to \$1,000 per household, but the actual payment is often less than that amount. The payments made by Indian Affairs and the Health and Social Development, sometimes called relocation payments, are made only once to each trainee's family, and their nominal value

has been constant since 1969. Therefore, their real value has decreased over time. Table 7.3 shows the average annual mobility cost per trainee in nominal and real 1975 values.²¹

Real mobility payments have decreased during the period 1968-1975 at an average annual rate of 4.3%, because relocation payments have steadily dropped in real terms from \$1,407.06 in 1968 to \$1,000 in 1975. The average yearly mobility cost per trainee in 1975 values during the period, is equal to \$1,779.84/year or \$34.22/week if 8% is taken as the opportunity cost of public funds, \$1,922.23 per year or \$36.96 per week if it is 10%, and \$2,113.37/year or \$40.64/week if the opportunity cost is 12% per year.

Total Costs to Society

In this section a summary of costs from society's viewpoint is presented. They are shown on a weekly basis to make them comparable with social benefits, which were estimated at \$1.02 per week for each week of training.

Average operating costs are \$1,925.42 per year if 8% is considered to be the social rate of discount (\$37.02 per week of training). This cost is \$2,019.92 per year (\$38.84 per week of training) or \$2,121.45 per year (\$40.79 per week of training) using 10% and 12% respectively as the social opportunity cost. (Table 7.1)

²¹This information was obtained from Roy McCallum, Plant Counsellor at Selkirk.

Table 7.3
Mobility Costs per Trainee

	Real Canada Manpower Payments per year (1975 prices)	Real Relocation Payments per year (1975 prices)	Real Total Payments per year (1975 prices)	Real Total Payments in 1975 dollars 8%	Real Total Payments in 1975 dollars 10%	Real Total Payments in 1975 dollars 12%
	(1)	(2)	(3)	(4)	(5)	(6)
1968	140.70	1,407.06	1,547.76	2,652.58	3,014.91	3,513.72
1969	134.00	1,340.12	1,474.12	2,339.24	2,611.49	2,987.99
1970	127.62	1,276.32	1,403.93	2,062.83	2,261.04	2,540.82
1971	121.54	1,215.50	1,337.04	1,819.03	1,957.56	2,160.50
1972	115.76	1,157.67	1,273.43	1,604.15	1,694.93	1,789.08
1973	110.24	1,102.53	1,212.77	1,414.57	1,467.45	1,521.30
1974	105.00	1,049.98	1,154.98	1,246.32	1,270.47	1,293.57
1975	100.00	1,000.00	1,100.00	1,100.00	1,100.00	1,100.00

Sources:

- Column (1): Real values at 1975 prices of \$50.00 aid per family in 1975 (dependents per family = 2).
 Column (2): Real values at 1975 prices of \$1,000 aid per trainee in 1975.
 Column (3): Column (1) + Column (2).
 Column (4): Column (3) x (1.08)ⁿ.
 Column (5): Column (3) x (1.10)ⁿ.
 Column (6): Column (3) x (1.12)ⁿ
 where n = 0, 7.

Average labour opportunity costs are equal to \$94.30 per week of participation in a training program. Average labour mobility costs are \$34.22 at 8%, \$36.96 at 10% and \$40.64 at 12% rates of social costs of public funds. Total costs are then equal to \$ 165.54 at 8%, \$170.10 at 10% and \$175.73 at 12%, per week of training. All these costs are in 1975 values.

C. Comparison of Society's Benefits and Costs

Benefits to society due to higher labour productivity are assumed to last for eight or ten years after training. Costs are calculated in 1975 values. Therefore, it is necessary to discount future benefits to 1975 using an approach similar to the one used in Chapter 5 for the calculation of individual net present values. Tables 7.4 and 7.5 summarize society's net present values at different discount rates with the duration of benefits assumed to be eight and ten years respectively.

The present value of benefits were calculated under two assumptions. The first was real social benefits per week of training, \$1.02, remain constant for the duration of benefits and then suddenly disappear. The second assumption was that a six-month waiting period exists before society can capture the benefits of a higher productivity.

Table 7.4

Net Present Values from Society's Viewpoint
(Eight Year Duration of Benefits)

	Social Opportunity Cost of Public Funds		
	8%	10%	12%
Present Value of Benefits (PVB)	287.27	266.05	246.87
Present Value of Costs (PVC)	165.44	170.10	175.73
Net Present Value (NPV)	121.83	95.95	71.14
Benefit-Cost Ratio	1.74	1.56	1.40

$$PVB = 1.02 \times \left[\frac{(1 + r_s)^{390} - 1}{r_s (1 + r_s)^{416}} \right], \text{ where } r_s \text{ is the weekly discount rate equivalent to 8\%, 10\% and 12\% per year.}$$

PVC = reservation price + mobility costs + operating costs per week.
(Tables 7.2, 7.3 and 7.1, respectively).

Table 7.5

Net Present Values from Society's Viewpoint
(Ten Year Duration of Benefits)

	Social Opportunity Cost of Public Funds		
	8%	10%	12%
Present Value of Benefits (PVB)	338.94	309.25	282.98
Present Value of Costs (PVC)	165.44	170.10	175.73
Net Present Value (NPV)	173.50	139.15	107.25
Benefit-Cost Ratio	2.04	1.82	1.61

$$PVB = 1.02 \times \left[\frac{(1 + r_s)^{494} - 1}{r_s (1 + r_s)^{520}} \right], \text{ where } r_s \text{ is the weekly discount rate equivalent to 8\%, 10\% and 12\% per year.}$$

PVC = reservation price + mobility costs + operating costs per week.
(Tables 7.2, 7.3 and 7.1, respectively).

D. Analysis of Results

The results presented in Tables 7.4 and 7.5 suggest that the social benefits derived from manpower training in the Interlake Area exceed the value of real resources used in the program. This conclusion holds for every value for the social opportunity cost of public funds considered in this study (8%, 10% and 12%), and for both assumptions about length of benefits, eight years and ten years.²²

The social net present value of an additional week of training under the program ranges from \$71.1 to \$173.5, and the benefit-cost ratio ranges from 1.40 to 2.04, given the assumption on which the estimates were based. The relaxation of these assumptions produces no significant changes in the conclusions. The extension of the duration of benefits by one additional year (from 10 to 11 years) increases the net present value by \$30.14 at 8% (a 17.4% increase), by \$18.56 at 10% (an increase of 13.3%), and by \$15.06 at 12% (an increase of 14.0% over the net present value corresponding to a ten year duration of benefits).

The internal rate of return for the investment in training from a social point of view (i.e., the social opportunity cost at which the social net present value is zero) is approximately 19% per week of

²²For a detailed calculation of the opportunity cost of capital in Canada, see Glenn P. Jenkins, "The Measurement of Rates of Returns and Taxation from Private Capital in Canada," in Benefit Cost and Policy Analysis, ed. William Niskanen et.al. (Chicago: Aldine, 1973), pp. 211-245.

of training for a ten year duration of benefits and 17% for an eight year duration of benefits.²³

These results do not include multiplier effects induced by the additional employment created by the program. Borus concludes that because retraining usually takes place in a less than fully employed economy, secondary effects in terms of induced consumption and investment appear.²⁴ It is argued here that if multiplier effects on the benefit side of the program are considered, multiplier effects on the cost side should also be included. These cost multipliers may exist when the creation of new vacancies or new job opportunities in the program generate a migration flow larger than the number of vacancies. In this case the social labour cost is a multiple of the individual opportunity cost.²⁵ Because no dynamic analysis is done for costs in this study, no income multiplier is considered either.

Also, it is necessary to recall that the numerical results obtained here are subject to a bias in the sense that a "displacement effect" may exist due to the reduction in screening costs accrued to private firms. The nature of this screening-cost saving was introduced in Chapter 3, and its implications are discussed in Chapter 8.

²³Note that the internal rate of return is unvalued because the profile of benefits and costs satisfies the conditions established in Chapter 3, Section D.

²⁴Michael Borus, op. cit., p. 400. He uses a multiplier of 2 in his evaluation.

²⁵Jenkins and Kuo, op. cit., p. 16.

CHAPTER 8

LIMITATIONS OF THE STUDY AND SUGGESTIONS FOR FURTHER RESEARCH

The Manpower Corps training program was designed to provide better economic and social conditions for people who are disadvantaged in terms of educational level, employability, etc. in the Interlake Area of Manitoba. The fact that this thesis professes to measure the economic benefits and costs of the program in dollar terms may give a false sense of accuracy in one respect while actually neglecting the social impact of the program.

It is clear that the decision of policy-makers about whether or not to continue with manpower training in the Interlake Area can not be made exclusively on efficiency grounds. Non-measurable distributional and social effects can outweigh efficiency criteria at the time of government decision about investing in training. Unfortunately, the framework for analyzing the distributional impacts of the program covers many more economic units than those for which information was available for calculating economic efficiency improvements (see Figure 3.2).

In addition, the distributional effects of training programs must be compared with those of other anti-poverty programs in order to select the most effective option available. Although these alternatives existed under the FRED Agreement, the data deficiencies would have increased the limitations of the study and would have impaired the

reliability of the results. When the efficiency improvements of one program are studied, the alternatives are measured, although not without contention, by the social rate of discount, although there is room for argument on this point.

Recalling the objectives of this thesis, namely, the measurement of economic benefits and costs in efficiency terms, this chapter presents the limitations of this study with regards to the quality and availability of information and to the methodology chosen for analyzing this information. This chapter is divided into five parts. In the first, a review of the limitations of the approach used and of the availability of data is presented. In the three following sections, specific methodological limitations inherent in estimating the effects of the program on individuals, government and society, respectively, are presented. In the final section, some areas in which further research is required are discussed.

A. Limitations of the Evaluation Approach

General Limitations

As was noted in Chapter 3, net present values greater than zero found in this study for individuals and society, do not indicate that the program, as it is currently designed, represents the best use of resources for manpower training. There has not been any discussion in the thesis of alternative forms of training for two reasons:

1. Because the most logical alternative to evaluate the effectiveness of government sponsored training is manpower training in private enterprise, the study of firm behaviour with regard to screening, counseling, hiring practices, etc. would have been necessary. Due to time and budget limitations, this study was not undertaken (and has not been undertaken in the Area).

2. No definitive conclusion about the potential effectiveness of the Interlake Manpower Corps can be drawn after only eight years of operation. It is not possible to judge the future impact of the program on the basis of results obtained during its initial operation. Thus, it would be unreasonable to invoke a comparison of its performance from 1968-1975 with that of other older more established programs¹ as evidence for discontinuing it.

In relation to the last point, it should be noted that the framework used in this study helps to assess the impact of the program since its creation but fails to determine the prospects of the program should it continue beyond the ten-year span designated under the FRED Agreement.

If this last point is to be clarified, the emphasis in the quantitative method must be changed from an explanatory to a forecasting one the equations in Chapters 5 and 7 are not useful for projecting benefits and costs to the future because of the large standard error of the estimates. Similarly, operating costs estimates require further analysis, especially due to their sharp increase in later years. Also, the last year for which information was available,

¹This point is emphasized by Robert S. Goldfarb, *op. cit.*, p. 60 and by Kenneth Hall and Isobel Miller, Retraining and Tradition: The Skilled Worker in an Era of Change (London: George Allen Unwin Ltd., 1975), p. 164.

1975, proved to be a poor indicator of trainees' status after training due to the small number of clients available for that particular year. Therefore, a different basis for forecasting should be obtained when the projection of the trend for each of the variables included in the analysis is done, it appears that the social return of the program would be lower and the effect of the program on Government finance less favorable compared to actual estimates made in this study. The reason is the increase in cost per trainee in the last two years (Table 6.2) due to reduced enrollment.

As was mentioned previously, it is expected that the effectiveness of the program in providing manpower training will improve with time. It is the hope of the author that the conclusions derived from this study will also help the officials of the program to better shape the projects. However, some variables which influence the outcome of these projects are highly unpredictable (for example, the demographic characteristics of future trainees as well as future employment conditions).

In addition, changes in minimum wage legislation, which indirectly affect the level of training allowances, and changes in tax rates, tax exemptions and transfer payments, are not predictable. It is even impossible to predict if the program will last long enough to permit the attainment of an effective scale of operation.

A final remark with respect to the theoretical framework is required. According to the human capital approach used in this study,

the labour market is capable of continuous adjustment in order to absorb workers with higher levels of training (or at least a great part of them). What is not possible to determine is whether training programs, especially those with a general component, in fact provide the individual with new skills or whether they are simply an efficient worker selection mechanism devised by the public sector on behalf of the private sector, or both. Even if this last effect (studied under the name of the "screening hypothesis" or "theory of credentialism" when applied to education)² exists, it accounts at best for the situation of trainees immediately after training and not necessarily for earnings and employment in the long-run. Therefore, although different theories could have been used in analyzing the impact of manpower training, the human capital approach seems to have the most logically coherent framework, in spite of all the deficiencies which have been noted.

Limitations Related to the Norm Group

Undoubtedly, the greatest limitation of this thesis is the selection of the norm group. Apart from the usual problems encountered in the selection of norm groups, in the case of the Interlake Manpower Crops these problems are complicated by the fact that the information about the two groups (norm and experimental) are not strictly comparable. This is why the methodology used in this thesis relied more on the

²Mark Blaug, op. cit., p. 846. See also Chapter 3 in this thesis, p. 34-35.

information about the experimental group than on the information about the norm group.

The fact that the information for the norm group includes only the earnings and labour status at the time of admission to the program may have introduced a selection bias in its construction. This is because trainees under the program may have considered training to be a close substitute to being unemployed. The labour situation just before training would tend to be characterized by a larger unemployment rate than the overall labour situation during the year prior to application to the program. If this is true, the individual opportunity cost calculated in Chapter 5 would tend to be underestimated, but not by much, given the small differences between average labour earnings and average unemployment transfers.

In addition to this, a norm group selected from the applicants to the program and not from the target population, as MacMillan, Bernat and Flager did,³ prevents the results from being extended to the whole population in the Area. This means that it is not possible to infer that the program would improve the economic situation of any inhabitant of the Interlake Area. However, if the existence of differential motivation between residents of the area and applicants to the program is accepted, this shortcoming is not crucial. The officials of the program do not select randomly the clients for the projects, but rather rely on individual motivation to apply for admission.

³ Op. cit., p. 10.

Limitations of the Experimental Group

The most important limitation is the question of the randomness of questionnaire response. It can be argued that those who could be contacted lived in towns and villages, and even in Winnipeg, (as was generally true in most of the cases) where earning levels, including unemployment earnings, may be larger than in more remote places. In addition, perhaps those who answered the form were more motivated to do so because their situation was better than that of the average trainee, while it is precisely this latter individual that the earnings function was intended to describe.

In summary, the deficiency in the quality of information, linked, to be sure, to the nature of the clientele, reduces the confidence in the numerical results presented throughout this thesis. This is the reason why a great deal of emphasis is put on the sensitivity analysis of the estimated parameters.

B. Limitations of the Evaluation from an Individual Viewpoint

Chapter 5 presented the empirical analysis leading to the estimation of net present values for the investment in manpower training from a trainee's viewpoint. Apart from the data limitations noted in the previous section, some specific methodological pitfalls should be stated:

1. Earnings from work and unemployment receipts should have been explained independently, rather than pooled together as in equations 5.3 to 5.5. The fact that most of the unemployed members of the norm group did not report unemployment earnings, length of the unemployment period, etc. impeded a more detailed analysis of the determinants of unemployment.

The supply-demand equations in Chapter 5 were used for explaining differences in total incomes between individuals rather than differences in earned incomes alone. Clearly, the resultant differences attributed to training depend on the level of unemployment transfers,⁴ and consequently, the regression coefficients of the earnings functions reflect not only the effectiveness of training, education, etc., but also the relative extent and importance of the "welfare state" as judged by the size of welfare payments.

2. Only 11 to 12 percent of earnings variances are explained by the equations in Chapter 5 and Chapter 7. Although the difference is assumed to be randomly determined, the search for new variables still continues. However, it should be emphasized that the objective of the earnings functions in the present study is not the comprehensive explanation of the determinants of individual incomes, but the calculation of marginal benefits attributable to training. Statistically

⁴As the comparison between equations 7.1 and 5.4 shows, the value of the regression coefficient of D is sensitive to changes in the value of transfers.

significant coefficients for D satisfy this objective.⁵

3. Employability and income obtained from training were estimated by the same equation, although the real effect of training may be on only the probability of re-employment. Training can raise the employability of an individual without any increase in income (compared with non-trainee).⁶ Further study of training on both earnings and employability separately is required.

4. All the numerical results are expressed on a "per-week of training" basis. It is not possible to compute the trainee's net present value for a particular project of duration x weeks by just multiplying the figures in Tables 5.7 and 5.8 by x . This is so, because the opportunity costs of labour is not constant over the length of the training project. Because one additional week of training was shown to be sufficient to increase earnings, and because it was shown that the completion of the courses did not determine earnings differentials, it can be concluded that for every additional week of training,

⁵Cain reviews some of the misuses of a high R^2 as the criterium for accepting a particular earnings function, and refers to some specific works in the field. See: Glenn G. Cain, "The Challenge of Segmented Labor Market Theoris to Orthodox Theory: A Survey," Journal of Economic Literature, XIV, 4 (1976), pp. 1244. The presence of low R^2 when cross-section data are used is expected.

⁶Robert S. Goldfarb, op. cit., p. 64.

the individual opportunity cost of entering the program rises by \$0.92. The weekly value of the rest of the variables which determine the net present values (operating costs, allowances,...) do not change when the length of training is altered (see Appendix F for some implications of this phenomenon).

5. The adjustment made to the norm group's earnings in order to correct for differences in educational levels between this group and the experimental group has one implication which is worth mentioning. In equation 5.7 the value of additional earnings produced by additional education (the regression coefficient of D) is assumed to be the same for both the experimental and the norm group. The opportunity cost of additional education for members of the norm group is lower than the opportunity cost of additional education for members of the experimental group because the former group's earnings are lower than those of the latter. Therefore, the adjustment of the norm group earnings made in Table 5.5 would imply that the marginal rate of return to education is larger for non-trainees than for trainees. There is no evidence to support this position. Further studies should examine the alternative of adjusting norm group earnings by the marginal return to the additional education of the experimental group.

6. The results of this study are based on the assumption that the probability of survival of the group of trainees is 100% during each one of the eight years (or ten years) after training for which duration of benefits are calculated. The inclusion of specific mortality rates

(not available for the native group living in the province of Manitoba) would reduce the expected monetary benefits from training and, consequently, would reduce the calculated net present values.

7. The possible movement of trainees out of the labour force is not discussed here. The model assumes that male trainees after training will become either employed or unemployed in a predictable way. The introduction of non-participation does not modify the conclusions of the thesis, provided that the retirement from the labour force is made on a voluntary basis.

8. As was emphasized in Chapter 3, Section A. the individual profile of benefits and costs should have been constructed on an after-tax basis, although it was done on a pre-tax basis. The absence of reliable information prevented this from being done. It can be concluded, however, that accepting the existence of progressive effective tax rates, the net present values after-tax would be lower than those shown in Tables 5.7 and 5.8.

9. Finally, no monetary value has been assigned to non-economic amenities obtained by trainees in some low-paid activities such as farming, trapping or fishing. The use of earnings as the only measurement of program effectiveness tends to undervalue benefits as well as opportunity costs. The final result in terms of net present value depends on the occupational composition of the norm and experimental groups and on the valuation of these amenities.

C. Limitations of the Evaluation from a Government Viewpoint

The limitations of the analysis in Chapter 6 are of two types. The first type comprises those limitations related to the separation of the training (or human development) component and the production component of total operating and capital costs. The second type includes those limitations related to the calculation of government benefits from training.

The Separation of Training and Production Costs

The division of total government expenditures between production costs and training costs proper has seldom been made in previous studies, even though it is particularly relevant for institutional training programs that also produce goods or services. The criteria for separation are based on the judgement of supervisors. In this thesis, the division is based on technical reports based on a few projects (some housing construction and the Selkirk Plant). Appendix E presents the details of this division.

The best way to assert which portion of allowances, staff salaries, support costs, etc. corresponds to production and which to training is by "...delving into the 'black box' that turns resource costs into benefits..."⁷ In effect this means analyzing the process by which skills and information are gained. This requires the analysis of on-the-job performance of individual trainees, classroom training performance, counseling effectiveness, etc.

⁷Robert Goldfarb, op. cit., p. 60.

Some limitations to the estimates of the ratio of production cost training cost used in this thesis are:

1. As was mentioned in Chapter 2, some trainees take more than one training project and consequently their productive level at the start of a new project is higher than the level of a newcomer (see Table A.1). In aggregate terms, the appraisal of this difference is very difficult, but in specific projects an initial "statement of training experience" should be done for each individual in order to account for previous experience in other Manpower Corps projects. It is expected that the inclusion of previous training experience would modify the specific ratios for different projects.

2. The "learning curves" applied to the individuals in every project (see Appendix E) are not flexible enough to accommodate the characteristics of trainees such as age, education and sex. However, in practical terms, the task of devising one curve for each characteristic is very difficult and time consuming, and reflects the improvement for only the "average" trainee.

Finally, two additional considerations should be noted. First, the inclusion of the total value of capital costs as training costs (instead of 100% production costs as was done in Chapter 6) would not substantially affect the results.⁸ The second consideration is that movements costs per trainee paid (estimated in the next chapter) were not included here as government outlays, although in most cases government

⁸The increase in average real resource costs per trainee due to the inclusion of capital costs (assuming a 20 year life for the equipment and no salvage value), ranges between \$20 and \$25 in 1975 values approximately.

agencies pay for these costs. The inclusion of this additional outlay (of about \$36/week) would reduce the gains/outlay ratio. These ratios would vary between 1.60 and 2.63 approximately. Therefore, gains/outlay ratios estimated in Chapter 6 tend to be overvaluated.

The Calculation of Government Gains from Training

The list of working hypotheses shown in Chapter 6, Section B regarding the level of tax exemptions for each individual in both the norm and the experimental groups suggests that the results should be taken at best as a rough approximation to reality.

It is worth noting that the Interlake Manpower Corps program was not designed to recover the financial investment.⁹ Therefore, government gains and outlays were evaluated more to provide a methodological framework for analysis rather than for the implications of the results.

D. Limitations of the Evaluation from Society's Viewpoint

It has been argued throughout the study that the exclusion of external effects can be considered the main methodological limitation of this thesis in terms of the social evaluation. These external effects can be positive (health improvement, increased education, etc.) or negative (displacement of already employed workers). The direction of the bias introduced when these effects are not included depends on their relative magnitudes.

⁹Moreover, in the St. Laurent project and in the Selkirk Plant, capital costs were written-off, so the value of final product is intended to repay only operating costs.

The results of this study should be regarded with some caution because those who answered the questionnaire were in general, more industrial-oriented than those in the basic group (Appendices A and D). Since the income profiles for trainees engaged in industrial occupations after training are higher than income profiles for those engaged in primary occupations such as farming and fishing, it follows that the net present values shown in Chapters 5 and 7 are biased upwards in terms of the effect of the program on a typical trainee.

This limitation is due to the narrow view of the measure of success of the program used in the study, i.e. the increase in total earnings. It is clear that not all occupations in which trainees engage after training were related to the type of training provided by the program. The reason may be that information is also a source of benefits from the program, and it may happen that the decision of a trainee to return to farming or fishing is based on the information obtained during training (about working conditions, employability, routines, etc.). The use of earnings, as a measure of training success may understate the true importance of the program.

E. Suggestions for Further Research

In Chapter 3, some basic theoretical issues, which studies of this nature must consider, were established. The fact that this study has not covered all of them leaves some areas open to empirical investigation. A number of those are:

1. The program, as it is currently conceived, provides trainees with skills as well as with information about job opportunities. The observed increase in employability and earnings is produced by the combined effect of both elements. It would be of special interest for the future operation of the program to evaluate each one of them separately in order to establish the optimal allocation of investment between them within Manpower Corps.

2. The assessment of the social impact of the program requires the inclusion of private firms into the analytical framework. As was noted in previous chapters, the substitution effect of an individual trained in the program for an individual already working produces allocative and distributional effects worth studying. This type of study would enable the government to establish a financial scheme which would take into account all beneficiaries of the program, including private firms.

3. A new line of research, referred to as the dual labor market theory, presents the possibility of investigating the conditions of trainees after training with regard to the kind of job they perform as well as the situation of the firms which hire them in one segment of the labor market. The methodological basis of this theory is still the subject of debate, but the clientele dealt with in this study seem as though they would be an excellent source of information.

4. Only a brief mention of the existence of underemployment was made in this study. With better information about would-be trainees it would be possible to inquire into the determinants of the mobility of labour between low productivity jobs, especially relating this mobility to seasonal demand for labour in different activities.

5. The analysis of the movement of potential and former trainees in and out of the labour force might be carried out. This would entail an examination of the determinants of the target population participation rate, and the way manpower services influence it. Previous studies indicate this issue may be an important factor affecting the estimation of benefits¹⁰.

6. The study of the differential turnover and absenteeism between trainees and non-trainees in similar occupations could be undertaken. This study would provide a basis for assessing the effect of training on job stability.

7. The determination of the effects of training programs on women's earnings, employability and participation in the labour force. The actual number of women in the sample was insufficient to produce an analysis similar to the one produced for men.

¹⁰MacMillan, Bernat and Flager, op.cit., p. 20, showed that training reduced the total number of hours worked.

CHAPTER 9

CONCLUSIONS AND IMPLICATIONS OF THE RESULTS

In spite of the need for further study indicated by the limitations discussed in the previous chapter, some specific conclusions can be made regarding the effects of the Interlake Manpower Corps program. These conclusions are presented in the first section of this chapter. In the second section, the implications of the results of this thesis are discussed. Finally, in section three, some general recommendations are presented.

A. Conclusions

Table 9.1 summarizes the estimated effect of the program on individuals, government, and the economy as a whole. A discussion of the conclusions derived from these results is presented below. These conclusions deal with the effect of the program on individual trainee's earnings and employment (1 to 4), as well as its impact on government finance (5). In addition, the effect of the program on the economy as a whole (6 and 7), and its distributional impact (8), are also discussed.

1. The average annual total gross income of the trainees was approximately \$74.25 per week greater than the total adjusted income of the norm group. Of this figure, approximately 12.1% is due to

Table 9.1
 Summary of Results
 Individual's, Government's and Society's Viewpoint
 (values per week of training)

Evaluation Approach and Duration of Benefits	Rates of Discount						
	6%	12%	18%	24%	30%		
Individual's Viewpoint							
Net Present Value (8 year duration of benefits)	295.50	237.89	195.04	162.72	137.97		
Net Present Value (10 year duration of benefits)	351.27	270.47	214.10	173.89	144.53		
B/C Ratio (8 year duration of benefits)	4.64	3.93	3.40	3.00	2.70		
B/C Ratio (10 year duration of benefits)	5.32	4.33	3.63	3.14	2.78		
<hr/>							
<div style="display: flex; justify-content: space-around;"> 8% 10% 12% </div>							
		Hypothesis I	Hypothesis II	Hypothesis I	Hypothesis II	Hypothesis I	Hypothesis II
Government's Viewpoint							
Gain/Outlay Ratio (8 year duration of benefits)	3.26	2.49	2.93	2.24	2.64	2.01	
Gain/Outlay Ratio (10 year duration of benefits)	3.70	2.82	3.28	2.50	2.91	2.22	
<hr/>							
		8%	10%	12%			
Society's Viewpoint							
Net Present Value (8 year duration of benefits)		121.83	95.95	71.14			
Net Present Value (10 year duration of benefits)		173.50	139.15	107.25			
B/C Ratio (8 year duration of benefits)		1.74	1.56	1.40			
B/C Ratio (10 year duration of benefits)		2.04	1.82	1.61			

Sources: Individual's Viewpoint: Tables 5.7 and 5.8.
 Government's Viewpoint: Table 6.6.
 Society's Viewpoint: Tables 7.3 and 7.4.

training, 31.7% is due to educational differences and the rest to random variations. If personal tax considerations are included, this difference in income between the two groups is reduced, and so is the individual return from the program.

2. The individual benefit of an additional week of training, \$0.92 per week, is assumed to last for eight or ten years, after which it is assumed to disappear. The extension of the duration of benefits does not significantly alter the nature of the result, namely, that training is a worthwhile investment from a personal viewpoint.

3. Benefits from training are appropriated by individuals regardless of the nature of the occupation in which they are engaged after training. However, the level of these benefits is higher for those who engage in industrially oriented activities than for those who work in agriculturally oriented activities.

4. Benefits from training do not differ significantly between those who finish the courses and those who do not. This finding is an indication of the importance of the information and counselling which are provided by the program, in addition to skills. Also, it could indicate that the program provides a screening device for private firms.

5. The government can recover more than the total training expenditure (not including the production activity of the projects) through increased tax revenue and decreased transfer payments. This conclusion assumes the separation of total expenditures into production costs and human development costs as determined by technical reports from project foremen.

6. In contrast to transfer payments to the unemployed, manpower training increased the real aggregate output of the economy. This conclusion, of course, depends on the extent to which vacancies exist (or will exist or be created) for the newly trained workers. The analysis of future labour market conditions was not attempted in this work.

7. Although the average labour income of trainees (\$149.46/week) is substantially higher than the average income of non-trainees, it is still low when compared with average weekly earnings for the entire province of Manitoba (\$190.56/week).¹ This result, however, is not conclusive because the composition of the experimental group includes workers in the primary sector where monetary income is substantially lower than secondary and tertiary sector incomes (see Appendix C).

B. Implications of the Results

Some of the implications of the results which were derived from this study are:

1. The high benefit-cost ratios estimated for individuals trained in the program are partially produced by average allowances payments which are higher than the average individual opportunity costs to enter the program. Training seems to be a good substitute

¹Manitoba Bureau of Statistics, Manitoba Digest of Statistics, January, 1976, Table 4.5, p. 37.

for being unemployed, and in some cases for being employed. Investment in human capital is made in the case of the Interlake Manpower Corps, by taxpayers on behalf of program's trainees. If training allowances were set at the same level as average trainee's opportunity costs (\$81.21 per week), individual benefit-cost ratios would still have been larger than one, ranging from 5.14 (10 year duration of benefits and 5% discount rate), to 2.50 (8 year duration of benefits and 30% discount rate).

2. The high monetary benefits during the training period represented by training allowances create a strong incentive for trainees to participate in the program and to remain in it. In fact, it would pay for trainees to stay in the program, if it were possible, from 3 to 7 years (according to the rate of personal time preference and to the duration of benefits). The optimal duration of training from a social viewpoint is much shorter, ranging from 2.8 to 4.6 years (see Appendix F for the estimation of the optimal duration of training.²

C. Recommendations

The principal recommendation which follows from the previous analysis is that the training for the disadvantaged, especially of Indian and Metis origin, in the Interlake Area of Manitoba should continue. Some major improvements to the actual format of the program are suggested:

²The observed reduction in enrolment (Table A.3) is due to a reduction in vacancies in the various projects, and not to the trainee's unwillingness to participate in the program.

1. The general aspect of training (classroom work, counseling, etc.) should be emphasized over the specific aspects. Some people tend to return to agricultural activities after training and it is likely that the benefits from specific training would be lost but that the general aspect of training can benefit the trainees wherever they choose to go after training.

2. It appears worthwhile from an individual and from a social viewpoints to extend the average duration of training projects beyond the historical average (13 weeks for the period 1968-1975). Higher individual and social benefits would appear if this were done. This implies that permanent projects should be preferred to temporary projects.

3. A new format for recording information about the applicants to the program is required if the trainee follow-up, which the officials of the program are planning to carry out, is to be more useful. It should be emphasized that the main constraint to a better understanding of the economic effects of the program is the information about the norm group. It is required that the applicant's labour history for at least one year prior to application to the program, be available from the new form. Otherwise, improvements in the data about the labour status of former trainees would be of little value due to the absence of reliable information about the norm group.

4. It is suggested that consideration be given to reducing the program's operating costs. Training allowances can be lowered providing that the individual net present value remains larger than one. If this is done, however, it is socially desirable to increase the number of trainees.

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APPENDIX A

CHARACTERISTICS OF THE INTERLAKE MANPOWER CORPS TRAINEES

This appendix presents a summary of the characteristics of the trainees registered in the program during the period 1968-1975, which were introduced in Chapter 2. The information presented in this appendix was taken from computer printouts which summarized the information recorded in the "Client Record and Referral Form" shown below.



PROVINCE OF MANITOBA

CLIENT RECORD AND REFERRAL FORM

INTERLAKE MANPOWER TRAINING PROGRAM

INTERLAKE FRED AGREEMENT

RECORD NUMBER

PART A - TO BE COMPLETED BY FIRST CONTACT COUNSELLOR

SOCIAL INSURANCE NUMBER		SURNAME		GIVEN NAME(S)		MALE <input type="checkbox"/>		FEMALE <input type="checkbox"/>	
PERMANENT ADDRESS				TELEPHONE NUMBER		DATE OF BIRTH		MONTH DAY YEAR	
DEPENDENTS TOTAL		NUMBER ELIGIBLE		MARITAL STATUS		IF NOT CANADIAN CITIZEN		YEAR OF ENTRY	
				<input type="checkbox"/> SINGLE <input type="checkbox"/> MARRIED <input type="checkbox"/> WIDOWED <input type="checkbox"/> DIVORCED <input type="checkbox"/> SEPARATED					
CURRENT OR LAST JOB OCCUPATION			INCOME PER		LABOR FORCE STATUS				
					<input type="checkbox"/> EMPLOYED FULL TIME <input type="checkbox"/> UNEMPLOYED PART TIME No. WEEKS _____			<input type="checkbox"/> NOT IN LABOR FORCE <input type="checkbox"/> IN SCHOOL	
HIGHEST SCHOOL GRADE COMPLETED		YEAR		PREVIOUS SPONSORED TRAINING				DATE OF TERMINATION	
								MONTH YEAR	
OCCUPATIONAL GOAL				IF RETRAINING - WHY					

FOR OFFICE USE		REFERRAL AGENCY	
<input type="checkbox"/> CANADA MANPOWER	<input type="checkbox"/> VOS - HEALTH & SOCIAL DEVEL.		
<input type="checkbox"/> EXTENSION SERVICES	<input type="checkbox"/> OTHER (SPECIFY)		
Principal agent			
CITY AND NO.		RES.	
EDUCATIONAL QUALIFICATION (ANY)			
TRAINING REQUESTED & LOCATION			

I CERTIFY THAT THE INFORMATION GIVEN ON THIS FORM IS TRUE AND CORRECT AND COMPLETE.

_____ date _____ signature of client

EXTRA INFORMATION

PART B - TO BE COMPLETED BY CANADA MANPOWER OR MANPOWER CORPS.

CLASS OF TRAINEE (if other than above)		ACCOMMODATION REQUIREMENTS		TELEPHONE NUMBER	
NAME OF TRAINING INSTITUTION			ADDRESS		
TYPE OF TRAINING					
<input type="checkbox"/> FULL TIME	<input type="checkbox"/> PART TIME	<input type="checkbox"/> CORRESPONDENCE	<input type="checkbox"/> SPECIFY APPRENTICESHIP	YEAR	ALLOWANCE PER WEEK
COURSE OF TRAINING		HOURS PER WEEK	No. OF WEEKS	START DATE	
				MONTH DAY YEAR	
				FINISH DATE	
				MONTH DAY YEAR	
ADDITIONAL INFORMATION					

PART C - TO BE COMPLETED BY TRAINING INSTITUTION.

DATE CEASED TRAINING			REASON		TEACHER COMMENTS AND MARKS		
MONTH	DAY	YEAR	<input type="checkbox"/> SATISFACTORILY COMPLETED (GRADUATED / PASSED) <input type="checkbox"/> OTHER (SPECIFY)				

Master Copy — "First Contact" Counsellor complete Part A.
 Send #1 to Manpower Analyst, 7th Floor Norquay Building, Winnipeg 1, Manitoba.

Table A.1

Distribution of Trainees' Registration according
to Race and to other Manpower Services Received
(1968-1975)

Total Manpower Services and Racial Status Total Manpower Corps Projects	One		Two		Three		Four		Five or More		Total	Total
	Treaty Indians	Non-Treaty Indians	Treaty Indians	Non-Treaty Indians	Treaty Indians	Non-Treaty Indians	Treaty Indians	Non-Treaty Indians	Treaty Indians	Non-Treaty Indians	Registrations	Individuals
One	216	419	61	72	47	27	21	15	6	9	968	968
Two	-	-	76	136	50	40	34	30	28	14	404	202
Three	-	-	-	-	48	42	9	24	36	27	186	62
Four or More	-	-	-	-	-	-	16	28	66	37	147	26
Total	216	419	137	204	145	109	80	97	136	87	1,705	1,258

Source: Manpower Corps Form A03FB1-526J, 1976.

Table A.2

Duration of Training Projects according to
Labour Status prior to Training and Sex
(1968-1975)

Duration of training \ Labour Status and Sex	Employed		Unemployed		Non-participating (exclud. students)		Students		Training		Total	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
A week or less	31	1	138	6	7	1	12	8	13	-	201	16
More than one week but less than one month	28	1	160	12	22	13	32	9	21	-	263	35
More than one month but less than 6 months	178	8	503	28	16	17	147	49	58	1	902	103
More than 6 months	52	-	111	-	2	1	2	-	17	-	184	1
Total	289	10	912	46	47	32	193	66	109	1	1,550	155

Source: Manpower Corps Form A03FB1-526J, 1976.

Table A.3
Age Composition of 1968-1975 Cohorts
of Trainees According to Race

Year of Project Ending and Racial Status	1968		1969		1970		1971		1972		1973		1974		1975		Total		Total
	Treaty Indians	Non- Treaty Indians	Treaty Indians	Non- Treaty Indians	Treaty Indians	Non- Treaty Indians	Treaty Indians	Non- Treaty Indians	Treaty Indians	Non- Treaty Indians	Treaty Indians	Non- Treaty Indians	Treaty Indians	Non- Treaty Indians	Treaty Indians	Non- Treaty Indians	Treaty Indians	Non- Treaty Indians	
Less than 21	21	29	20	33	48	61	38	83	33	100	26	60	11	58	9	59	206	483	689
21 - 29	23	14	32	15	27	30	37	35	36	29	34	32	17	16	7	8	213	179	392
30 - 39	15	6	26	13	14	23	52	33	20	16	24	14	9	9	1	3	161	117	278
40 and more	14	19	11	13	25	56	33	73	25	20	8	19	13	4	5	8	134	212	346
Total	73	68	89	74	114	170	160	224	114	165	92	125	50	87	22	78	714	991	1,705

Source: Interlake Manpower Corps Form A03FB1-526J, 1976.

Table A.4
 Educational Level of Registered Trainees
 by Race and Sex
 (1968-1975)

Education \ Racial Status and Sex	Treaty Indian		Non-Treaty Indian		Totals		
	Male	Female	Male	Female	Male	Female	Total
No Education	35	1	54	23	89	24	113
1-4 years	94	0	47	2	141	2	143
5-7 years	305	4	238	7	543	11	554
8-9 years	169	14	307	27	476	41	517
10-13 years	62	27	221	48	283	75	358
More than 13 years	3	-	15	2	18	2	20
Average by Sex	6.3	9.8	7.8	7.8	7.2	8.4	7.3
Average by Racial Status	6.6		7.8		7.3		

Source: Manpower Corps Form A03FB1-526J, 1976.

Table A.5

Labour Status of Trainees Prior to Starting the
Program According to Last Occupation and Race
(1968-1975)

Occupation and Racial Status Labour Status Before Training	Agricultural Occupations		Clerical and Service Work		Structural Work		Other Activities		No Assigned Occupation*		Total		
	Treaty Indians	Non- Treaty Indians	Treaty Indians	Non- Treaty Indians	Treaty Indians	Non- Treaty Indians	Treaty Indians	Non- Treaty Indians	Treaty Indians	Non- Treaty Indians	Treaty Indians	Non- Treaty Indians	Total
Employed	39	58	3	8	84	74	-	7	15	11	141	158	299
Unemployed	111	107	15	25	237	196	-	14	100	153	463	495	958
Non-Participants (exc. students)	-	3	-	2	2	5	4	1	19	43	25	54	79
Students	1	6	-	2	3	9	-	1	37	200	41	218	259
Training in only Manpower Service	8	11	-	2	20	29	-	2	16	22	44	66	110
Total	159	185	18	39	346	313	4	25	187	429	714	991	1,705

* This category includes those who failed to report any activity and those who reported "no activity".

Source: Interlake Manpower Corps Form A03FB1-526J, 1976.

Table A.6

Labour Status of Registered Trainees
according to Race and Sex
(1968-1975)

Labour Status Before Training	Indian		Non-Indian		Totals		
	Male	Female	Male	Female	Male	Female	Total
Employed	137	4	152	6	289	10	299
Unemployed	449	18	463	28	912	46	958
Non-Participants (ex. students)	13	8	34	24	47	32	79
Students	25	6	168	50	193	66	259
Training	44	-	65	1	109	1	110
Totals	668	46	882	109	1,550	155	1,705

Source: Manpower Corps Form A03FB1-526J, 1976.

Table A.7

Duration of Individual Projects
according to Sex, per Year
(1968-1975)

Year of Project Ending \ Duration	1968		1969		1970		1971		1972		1973		1974		1975		Totals		
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Male	Female	Total
A week or less	7	-	44	-	32	2	54	4	23	-	18	4	17	-	6	6	201	16	217
More than one week but less than one month	22	-	33	-	32	4	28	-	54	11	48	9	33	2	13	9	263	35	298
More than one month but less than 6 months	98	1	74	-	147	26	237	7	149	21	98	10	55	20	44	18	902	103	1,005
More than six months	13	-	12	-	41	-	54	-	21	-	30	-	10	-	3	1	184	1	185
Totals	140	1	163	-	252	32	373	11	247	32	194	23	115	22	66	34	1,550	155	1,705

Source: Manpower Corps Form A03FB1-526J, 1976.

Table A.8

Duration of Training Projects
according to Age Groups and Sex
(1968-1975)

Age Duration	Less than 21 Years		21-29 Years		30-39 Years		40 and More		Total	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
A week or less	70	12	47	2	37	2	47	-	201	16
More than one week but less than one month	120	21	70	5	26	2	47	7	263	35
More than one month but less than 6 months	345	83	205	4	160	5	192	11	902	103
More than 6 months	37	1	59	-	46	-	42	-	184	1
Total	572	117	381	11	269	9	328	18	1,550	155

Source: Manpower Corps Form A03FB1-526J, 1976.

Table A.9

Reason for Ending the Project according to
Length of the Project and Sex
(1968-1975)

Reasons for Ending Duration	Completed the Project		Failed Due to Academic Reasons		Failed Due to Non-Academic Reasons		Total
	Male	Female	Male	Female	Male	Female	
A week or less	46	5	-	-	155	11	217
More than one week but less than one month	174	20	1	-	88	15	298
More than one month but less than 6 months	722	87	-	1	180	15	1,005
More than six months	129	-	-	-	55	1	185
Total	1,071	112	1	1	478	42	1,705

Note: Academic Reasons include: failure of one or two subjects and inability to cope academically.

Non-academic reasons include: illness or health problems (including pregnancy), chronic absenteeism, alcoholism, jail, transportation problems and financial difficulties.

Source: Manpower Corps Form A03FB1-526J, 1976.

Table A.10

Reason for Ending the Project
according to Age and Sex
(1968-1975)

Reason for Ending the Project	Age Less than 21 Years		21-29 Years		30-39 Years		40 and More		Total	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Completed Satisfactorily	377	79	265	9	189	8	240	16	1,071	112
Failed for Academic Reasons	1	1	-	-	-	-	-	-	1	1
Failed for Non-academic Reasons	194	37	116	2	80	1	88	2	478	42
Total	572	117	381	11	269	9	328	18	1,550	155

Source: Manpower Corps Form A03FB1-526J, 1976.

Table A.11

Nominal and Real Average Wage Rate by Age before Training
(males employed in non-agricultural activities before training)
(1968-1973)

Total observations = 188

Year and Age	Nominal Earnings (\$/hour)	Deflator 1968=100	Real Earnings (\$/hour)	Year and Age	Nominal Earnings (\$/hour)	Deflator 1968=100	Real Earnings (\$/hour)
<u>1968</u>				<u>1971</u>			
<21	1.10	100.0	1.10	<21	1.85	111.1	1.66
21-29	1.40		1.40	21-29	2.83		2.14
30-39	1.65		1.65	30-39	2.50		2.25
40-+	1.75		1.75	40-+	2.40		2.16
<u>1969</u>				<u>1972</u>			
<21	1.83	104.6	1.75	<21	1.88	115.4	1.63
21-29	2.13		2.03	21-29	2.50		2.17
30-39	1.90		1.82	30-39	2.50		2.17
40-+	2.00		1.91	40-+	2.60		2.25
<u>1970</u>				<u>1973</u>			
<21	1.67	108.0	1.55	<21	1.80	124.2	1.45
21-29	2.08		1.92	21-29	2.70		2.17
30-39	2.19		2.03	30-39	2.70		2.17
40-+	2.09		1.93	40-+	2.70		2.17

Note: Nominal earnings were obtained from Manpower Corps Form A03FB1-526J, 1976. The Canadian Consumer Price Index was used as deflator. See: Statistics Canada, Prices and Price Indexes, Monthly.

Table A.12

Average Hourly Earnings of Trainees before Training compared with Average Earnings
in the Construction and Manufacturing Sectors, Manitoba
(1968-1973)

(Number of Observations = 188)

Year	Trainee's Average Earnings Before Training (1)	Average Earnings Construction Sector-Manitoba (2)	Average Earnings Manufacturing Sector-Manitoba (\$/hour) (3)	$\frac{(1)}{(2)} \times 100$ (4)	$\frac{(1)}{(3)} \times 100$ (5)
1968	1.40	2.91	2.22	48.1	63.1
1969	1.96	3.30	2.37	59.4	82.7
1970	2.00	3.58	2.61	55.9	76.6
1971	2.23	3.90	2.84	57.2	78.5
1972	2.28	4.26	3.03	53.2	75.2
1973	2.56	4.88	3.27	52.4	78.3

Notes: Information under column (1) was obtained from Manpower Corps Form A03FB1-526J, 1976.
Columns (2) and (3) were obtained from, Statistics Canada, "Employment Earnings and Hours,
Catalogue 72-002, published monthly.

APPENDIX B

CHARACTERISTICS OF THE NORM AND EXPERIMENTAL GROUPS AND TESTS OF RESPONSE BIAS

In this Appendix, the principal characteristics of the norm and experimental groups are presented. Statistical tests are performed in order to show the bias in questionnaire response and to indicate its possible effects on the estimated results.

Bias in Questionnaire Response

Questionnaires used for determining the after-training situation were sent to all members of the basic group but only 136 out of 1,550 males had answered it by the time the information was collected for use in this study (8.8% of the total). Of the 136 questionnaires, only 116 (7.5%) were selected for the experimental group. The difference is due partly to insufficient information in some cases and partly to the fact that in other cases individuals who responded had received additional manpower services after the Manpower Corps program. The questionnaire is shown below.

In order to investigate whether any response bias exists between the basic and experimental groups in terms of specific characteristics, tests related to differences in education, project duration and age means between these two groups are presented here. These tests follow conventional statistical techniques for comparing mean values for independent groups.¹ Here \bar{X} denotes calculated mean values, s represents unbiased

¹David Huntsberger and Patrick Billingsley, Elements of Statistical Inference, 3rd. edition (Boston: Allyn & Bacon, Inc., 1973), Section 9.2.

estimators of the population standard deviation, n is the size of each group under consideration and μ represents the population mean values. The information about the experimental group appears in Tables B.5 to B.8 in this Appendix. The information about the basic group was presented in Appendix A.

Education. The information concerning this variable is presented below for both groups.

<u>Experimental Group</u>	<u>Basic Group</u>
$\bar{X}_1 = 7.8$	$\bar{X}_2 = 7.2$
$n_1 = 116$	$n_2 = 1,550$
$s_1^2 = 6.64$	$s_2^2 = 5.7$
$s_1^2/n_1 = 0.057$	$s_2^2/n_2 = 0.0037$

The null hypotheses is:

$$H_0: \mu_e = \mu_b$$

and the alternative hypothesis is:

$$H_1: \mu_e \neq \mu_b.$$

The calculated t statistic, t^* , is equal to:

$$t^* = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

$$= \frac{0.6}{0.247} = 2.43$$

The value of t at the 5% level of significance on a two-tailed t distribution with 115 degrees of freedom is equal to 1.658, this value is smaller than t^* , and consequently, the null hypothesis is rejected

because there is no reason to believe that mean values are statistically equal.

Age. The information about age for both groups is:

<u>Experimental Group</u>	<u>Basic Group</u>
$\bar{X}_1 = 33$ years	$\bar{X}_2 = 29$
$n_1 = 116$	$n_2 = 1,550$
$s_1^2 = 156.0$	$s_2^2 = 95.28$
$s_1^2/n_1 = 1.34$	$s_2^2/n_2 = 1.28$

$$t^* = \frac{4}{2.62} = 1.52$$

In this case the null hypothesis, H_0 , that the mean values for both groups are equal is accepted at the 5% level of confidence, and the alternative hypothesis, H_1 , that the mean for the experimental group is larger than the mean value for the basic group, is rejected.

Project Duration. The information about the duration of training projects for the two groups is as follows:

<u>Experimental Group</u>	<u>Basic Group</u>
$\bar{X}_1 = 21.7$ weeks	$\bar{X}_2 = 12.3$
$n_1 = 116$	$n_2 = 1,550$
$s_1^2 = 527.62$	$s_2^2 = 123.91$
$s_1^2/n_1 = 4.55$	$s_2^2/n_2 = 0.08$

$$t^* = \frac{9.4}{2.15} = 4.37$$

Again, t^* is larger than 1.658, so the null hypothesis is not accepted and the hypothesis that average duration of projects for those individuals in the experimental group is larger than for those in the

basic group is accepted. In summary, members of the experimental group are, on the average, more educated than members of the basic group and have participated in the program for longer periods of time.

Education Differences between the Norm Group and the Experimental Group

In order to justify the educational adjustment made to the norm group's earnings, it is necessary to show that the differences in educational levels are statistically significant. This is done by using a procedure similar to the one used in the previous section. The following information is used:

<u>Experimental Group</u>	<u>Norm Group</u>
$\bar{X}_1 = 7.8$	$\bar{X}_2 = 6.8$
$n_1 = 116$	$n_2 = 396$
$s_1^2 = 6.64$	$s_2^2 = 8.4$
$s_1^2/n_1 = 0.057$	$s_2^2/n_2 = 0.021$
$t^* = \frac{1.0}{0.279} = 3.58$	

Because $t^* > t_{0.05}$, at the 5% level of confidence, the hypothesis that the mean values for these groups is equal is rejected. Therefore, the hypothesis that the average education for members of the experimental group is significantly higher than the average education for members of the norm group, is accepted.

Educational Differences between the Norm Group and the Basic Group

Adjustments have been made to the average earnings of norm group members in order to account for the difference in education between this

group and the experimental group (see Chapters 5 and 7). In the previous section it was shown that this difference is statistically significant. In this section, the hypothesis to be examined is that the difference in average education between the norm group and the basic group is not statistically significant, so that the adjustments made to the norm group earnings can be extended to the basic group. The relevant information for both groups is:

<u>Norm Group</u>	<u>Basic Group</u>
$\bar{X}_1 = 6.8$	$\bar{X}_2 = 7.2$
$n_1 = 396$	$n_2 = 1,550$
$s_1^2 = 8.4$	$s_2^2 = 5.7$
$s_1^2/n_1 = 0.021$	$s_2^2/n_2 = 0.0037$

The value of t^* is equal to:

$$t^* = \frac{.4}{0.157} = 2.5$$

This value is larger than 1.658, and therefore it is accepted at the 5% level of significance that the average education of the basic group is higher than that of the norm group. This implies that the educational adjustment to the earnings without training should be greater (and the opportunity costs also greater) if inferences from the analysis are extended to the basic group.

Characteristics of the norm Group and the Experimental Group

Tables B.1 to B.4 present a summary of the information regarding labour status, age, education and racial status for members of the norm group, while Tables B.5 to B.8 present this same information for members of the experimental group.

Average education and age are higher for the experimental group (7.8 and 33 years, respectively) than for the norm group (6.8 and 31 years respectively). The percentage of treaty indians in the norm group (41.2%) is larger than the percentage in the experimental group (34.5%). However, this information is presented solely for descriptive purposes, because the issue of racial discrimination was not extensively considered in this study for reasons given in Chapter 5.

Table B.1
 Basic Information about the Norm Group
 (n = 396 males)
 1968-1975

Number of Dependants per Household (n = 191)	:	Average	3.75
		Standard Deviation	3.8
Age	:	Average	31 Years
		Standard Deviation	12.1 Years
Education	:	Average	6.8 Years
		Standard Deviation	2.9 Years

Source: Interlake Manpower Corps Form A03FB1-526J, 1976.

Table B.2

Norm Group Population Divided by Age
and Labour Force Status before applying to the Program

Labour Status \ Age	Less than 21 Years	21-29	30-39	40-49	50-+	Total
Employed	8	18	11	8	6	51
Unemployed	80	110	42	37	38	307
Seasonally Employed	6	8	5	8	11	38
Total	94	136	58	53	55	396

Source: Interlake Manpower Corps Form A03FB1-526J, 1976.

Table B.3

Norm Group Population divided by Education and
Labour Force Status before applying to the Program
(1968-1975)

Labour Status \ Education	Education					
	No Education	1-4 Years	5-7 Years	8-9 Years	10-12 Years	Total
Employed	1	7	20	16	7	51
Unemployed	16	35	104	96	56	307
Seasonally Employed	-	10	17	9	2	38
Total	17	52	141	121	65	396

Source: Manpower Corps Form A03FB1-526J, 1976.

Table B.4

Norm Group Population divided by Age
and Racial Status
(1968-1975)

Age Groups \ Racial Status	Treaty Indians	Non-treaty Indians	Total
Less than 21 years	34	60	94
21-29 years	65	71	136
30-39 years	36	22	58
40-49 years	15	38	53
50 years and more	13	42	55
Total	163	233	396

Source: Manpower Corps Form A03FB1-526J, 1976.

Table B.5
Basic Information about the Experimental Group
(n = 116)

Number of Dependants per male Household (n = 63)	:	Average	3.3
		Standard Deviation	2.3
Age in 1975 Males (n = 116)	:	Average	33 yrs
		Standard Deviation	12.6 yrs
Education (n = 116)	:	Average	7.8 yrs
		Standard Deviation	2.6 yrs
Last Occupation before training (males)	:	Agricultural	28
		Non-agricultural	60
		No Answer	28

Source: Interlake Manpower Corps Questionnaires, Summer 1976.

Table B.6

Composition of the Experimental Group according to Age
and Labour Status before Training
(Males, 1975)

Age Labour Status	Age					Total
	Less than 21 years	21 - 29	30 - 39	40 - 49	50 - more	
Unemployed	5	29	10	9	10	63
Employed	-	7	4	3	-	14
Seasonally Employed	1	5	4	5	7	22
Student	5	9	-	-	-	14
No Answer	-	3	-	-	-	3
Total	11	53	18	17	17	116

Source: Interlake Manpower Corps Questionnaires, Summer 1976.

Table B.7

Composition of the Experimental Group according to
Education and Labour Status before Training
(1975)

Education \ Labour Status before Training	Education					Total
	No Education	1-4 Years	5-7 Years	8-9 Years	10-12 Years	
Unemployed	2	8	15	23	15	63
Employed	1	-	5	3	5	14
Seasonally Employed	-	-	8	10	4	22
Student	-	-	-	7	7	14
No Answer	-	-	-	3	-	3
Total	3	8	28	46	31	116

Source: Manpower Corps Questionnaires, Summer 1976.

Table B.8

Experimental Group divided according to
Age and Racial Status
(Males, 1975)

Age Groups	Racial Status		Total
	Treaty Indian	Non-Treaty Indian	
Less than 21	4	7	11
21-29 years	15	38	53
30-39 years	10	8	18
40-49 years	7	10	17
50 and more	4	13	17
Total	40	76	116

Source: Manpower Corps Questionnaires, Summer, 1976.

APPENDIX C

RACIAL ORIGIN AND TRAINEES' EARNINGS: SOME ADDITIONAL EVIDENCE

A deep concern of policy-makers in the field of training programs for particular segments of the population is the extent to which racial discrimination does exist and therefore the potential benefits of training are erased by social distortions. It is argued in this Appendix that the evidence points to that direction and that a more detailed analysis should be advanced in the future.

A common argument in explaining wage differentials at a given point in time is that they are closely related to characteristics such as age, education, experience on the job, etc. . . . and that individuals differ from each other in the level and quality of these characteristics. Consequently, observed differences in earnings are due basically to what may be called "endowment."

In a broader framework, endowment includes two types: acquired (education, experience) or natural (age, sex, race). As long as acquired endowment is shown to be more significant than natural endowment, policy-makers can effectively influence those differentials by concentrating their policy decisions on the relevant variables by increasing or redirecting investments in schooling and training. The analysis of the influence of acquired endowment on earnings belongs to the realm of the Human Capital approach, although natural endowments also enters in the specification of earnings functions.

The study of the influence of sex and racial background on earnings

has been left to a body of concepts, known as Economics of Discrimination, also in the neo-classical tradition, but a step forward to the inclusion of non-economic behaviour in the study of earnings differences.¹ The effect of education on white-black differentials in receipts in the United States has been studied by Welch² who showed that the quality of education tends to reduce them. Reid presented some evidence in the sense that institutional training programs tend to reduce, although in relatively small amounts, the black-white earnings gap, also for the United States.³

As far as Indian-nonIndian (or Treaty Indian-non Treaty Indian) wage differentials analysis in Canada is concerned, the literature is scarce and the evidence less explicit. The more important findings have been produced by Kuo.⁴ He shows that wage differentials in the Mackenzie District, using 1969-1970 census figures, are explained reasonably well by the Human Capital approach: those with lower acquired endowments earn, in average, less income than those with higher acquired endowment, as shown in Table C.1.

¹Ray Marshall, "The Economics of Racial Discrimination: A Survey," Journal of Economic Literature, XII, 3 (1974) pp. 849-871.

²Finis Welch, "Black-White Differences in Returns to Schooling," American Economic Review, 63:893-907, December, 1973.

³Clifford E. Reid, "Some Evidence on the Effect of Manpower Training Programs on the Black-White Wage Differentials," Journal of Human Resources, XI, 3 (Summer 1976), p. 408.

⁴Chun-Yan Kuo, op. cit., pp. 396-397.

TABLE C.1
Earnings and Acquired Endowment by Race
in the MacKenzie District

<u>Racial Group</u>	<u>Average Years of Schooling</u>	<u>% of Sample with High School</u>	<u>Average Earnings</u>
Indian	2.81	6.09	1213.80
Eskimo	4.11	11.61	2622.96
Metis	5.95	19.06	3564.55
White	9.10	24.80	7726.91

Note: Earnings figures are in 1970 dollars.

Source: Chun-Yan Kuo, Op. Cit., p. 398.

This information hides, however, some important issues:

1. There was no explicit test for the existence of racial discrimination, presumably because the variables included in the model, 13 in total, explained around 70% of the variance of earnings.

2. The model itself prevented the test of hypothesis of discrimination because of its linear specification. In fact, Kuo uses Y as earnings, S as the ratio of white to total population in the community (openness to southern influence according to his interpretation), and E as the educational level of the native individual. By assumption, then:

$$\frac{\partial Y}{\partial S \partial E} = 0$$

which means that the effect of education on income when S is changed is neglected from the very outset, because the model did not intend to

study educational discrimination.

3. The relatively high correlation coefficient obtained (about 70%), was produced by the inclusion of W, the number of hours worked by the individual. Again, by assumption of the model

$$\frac{\delta Y}{\delta S \delta W} = 0$$

although it would have been interesting to investigate the effect of S upon Y through W.

Kuo's conclusion is that, given the objectives and the specification of the model, formal education is important in terms of improving earnings for Indians, but not for Metis; S is significant for every group, but of little monetary impact, and that institutional training (vocational as well as Manpower Corps type) is worthwhile for natives, especially Indian, but of no effects for Whites. Age, on the other hand, presents irregular effects, smaller in money terms than training and particularly strong for Metis, as shown in Figure C.1.

These results have to be compared with the findings by Molgat and MacMillan especially in relation to the fact that, in spite of a large dropout rate by Indian students (27% in elementary school according to Kuo), the effect of additional education is larger for them than for Metis, Eskimos and Whites. They found that there is a negative relation between the proportion of Indian and Metis in the community and the school dropout rate, although the opposite might be expected.⁵

⁵Paul Molgat and J.A. MacMillan, op. cit., p. 71.

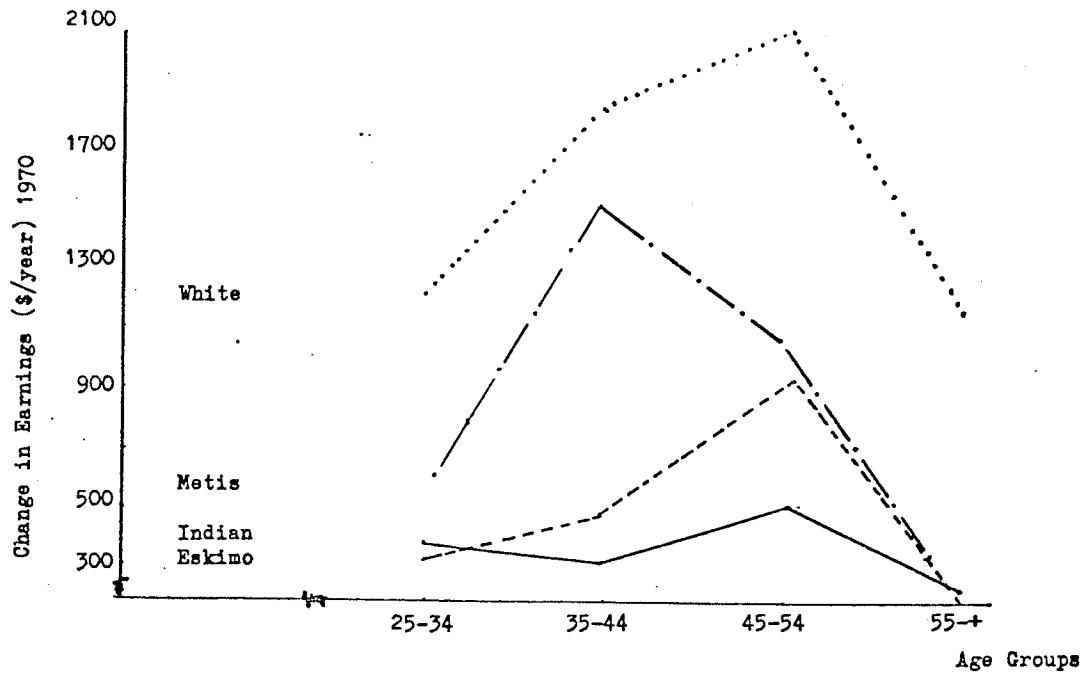


Figure C.1

Age-Earnings Profile according to Race for the McKenzie District, Canada

Source: Kuo, *Op. Cit.*, p. 396.

One possible source of conflict was suggested by the authors: it was difficult for surveyed school principals to determine the racial background of their students. Similarly, Kuo's dropout figure corresponds only to Indians and not to Metis, whom he pooled together with Whites when he presented his dropout rates (about 8% for the combined group).

An initial attempt in the Interlake Area using data from the experimental group was shown in equation (5.4), Chapter 5. Another attempt with different data provides tentative support for the hypothesis of discrimination. An equation of the type:

$$Y = b_0 + \sum_{j=1,5} b_j Z_j + u$$

was estimated using ordinary least squares and data obtained from Manpower Corps trainees surveyed by Carl Wall, for whom earnings situation was obtained for the period 1970-1973.⁶

In the previous equation:

Y represents the present value of future income for each trainee in the sample (N=18), discounted at 10% per year, using as rate of increase in earnings, the computed rate for the three years period, and assuming 55 years as the end of the active life.

Z₁ represents the highest formal education, in years, attained by the trainee.

Z₂ measures the previous experience of the trainee in the labor market.

Z₃ is a dummy variable with value zero if the trainee is of Indian origin and 1 if he is not.

Z₄ is the age of trainee, in years.

Z₅ is a dummy variable with value zero if the person was unemployed in the year previous to training and one if he was not.

u is the random term originated by the estimation.

The linear form of the equation suggests that:

$$\frac{\delta Y}{\delta Z_j, \delta Z_k} = 0$$

for all j and k, which implies that the marginal change in income due to, for example, higher education is independent of age, experience, etc. . .

⁶Questionnaires collected by Carl Wall, Op. Cit.

This assumption is a weakness of the specification, although logarithmic equations produced inferior results.

The numerical solution to the estimation is:

$$Y = 121.34 + 3.5 Z_1 + 2.7 Z_2 + 64.8 Z_3 - 4.2 Z_4 + 12.5 Z_5$$

$$(1.97) \quad (.45) \quad (1.22) \quad (2.62) \quad (2.15) \quad (.43)$$

(the values in parentheses are the estimated t values for the coefficients).

$R^2 = 0.555$, and none of the usual estimation problems in ordinary least squares method were present. Variables Z_1 and Z_5 were found not significantly different from zero at the 5% level of confidence using a one tailed t-test. However, Z_3 the proxy for discrimination, was significant; b_4 appears with negative sign, opposite to the hypothesized sign, due perhaps to the linear specification of the equation.

The presence of racial discrimination poses additional problems respect to the philosophy of the Program: to what extent its structure helps perpetuating the dualism by concentrating the training on these skills which are presumably demanded by the secondary sector of the discriminating market?

Unfortunately, the dual-market approach to study racial discrimination still lacks a consistent theoretical framework in which to build testable hypotheses about the efficiency effects of the existence of dual labour markets.⁷

⁷Ray Marshall, op. cit., p. 856.

APPENDIX D

INTERSECTORAL MOBILITY OF TRAINEES AND ITS EFFECTS ON EARNINGS

In this Appendix a discussion of the importance of occupational selection on the amount of monetary earnings is made and some evidence of its influence is provided using figures from the experimental group of trainees from Interlake Manpower Corps. The use of individual earnings as a measure of training benefits may be misleading when, as in the case in hand, the mobility of labour from one occupation to a more productive one is difficult to achieve for reasons suggested below. This lack of intersectoral mobility prevents the trainee from obtaining a larger wage rate and consequently, it tends to produce, *ceteris paribus*, a lower rate of return to investment in training than if this mobility had existed.

Define "original occupation" as the one in which the trainee was engaged, as employee or as unemployed, before starting the Program, and "destination occupation" as the one in which he engages or seeks to engage after finishing his training, whatever the reason he might have had for finishing it. In this Appendix, a particular pattern of origin-destination mobility is studied, namely, that between occupations related to the primary activity sector (hereafter, primary occupations), basically farming and fishing, and occupations related to the secondary and tertiary sectors (hereafter, secondary occupations), such as carpentry, painting and similar structural work activities.

The reason for this division is explained by the number of trainees whose experience have had to do with either of these categories: of those individuals in the experimental group who reported experience in any original activity, 97 in total, 27 or 27.8% had it in fishing or farming, and 51 or 52.6% had it in carpentry, etc. . . . The rest, 19 or 19.6% had experience as clerical and sales workers and in personal services. At the same time, 25 individuals reported farming or fishing experience in the destination activity during 1975, year for which the follow-up questionnaire recorded complete information, and 79 reported experience in secondary occupations. When more than one occupation appeared during the year, as it was the case with 36 individuals, each movement was considered as an independent observation. Only male workers who reported both origin and destination experience were selected for this analysis.

With two sets of occupations, four alternative paths can be devised: from primary to primary (I), from primary to secondary (II), from secondary to primary (III), and from secondary to secondary (IV).

The total number of individuals in each path, the average annual wage corresponding to each one of them according to the Manpower Corps Survey, and these wages' standard deviations are shown in Table D.1.

In order to analyze the effect of occupational choice on average wages, the impact of variables such as sex, age and education should be isolated. Because only the male population was included in the classification, sex differences have no influence, and age and education mean values differences for each group were found not significant for the group under scrutiny.

TABLE D.1

Average Wages of Origin-Destination
Mobility Paths for the Experimental Group
(\$ 1975)

Alternative	Total Number of Observations	Average Wage (Annual Rate)	Wage Rate Standard Deviation
I	22	6,091	3,449
II	11	9,707	4,704
III	3	8,316	1,056
IV	41	10,968	4,530

Source: Interlake Manpower Corps Questionnaires, 1976.

Two tests of differences of means are presented here: one, considering the hypothesis that the average yearly wages for alternative I are statistically different from those in alternative IV; the other, is produced by pooling together alternatives I and III on one side, namely, those individuals with equal primary destination occupation, and alternatives II and IV, it is, those individuals with secondary destination occupation. It is hypothesized that the mean earnings, in dollars per year, of the first group is different from that of the second group.

It can be argued, however, that the comparison of earnings of those who were actually working in 1975 can be misleading in the sense that the magnitude which determines the mobility of labour is the expected average earning; namely, monetary earnings adjusted by the probability of unemployment in the specific activity, and not the nominal earnings alone.

In order to include this dimension of the problem, the own rate of unemployment for the experimental group has to be calculated for each of the two groups of destination occupations. The information available does not specify the occupation in which the individual was seeking for job while unemployed. As a proxy for this variable, although a defective one, the unemployment rate in the original activity was used, and it was found that, out of 18 cases where original primary activities were reported, 14 of them registered unemployment status (about 77%); for 50 cases where original secondary activities appeared, 39 or 78%, were cases of unemployment.

It is assumed, then, that the use of monetary earnings instead of expected earnings would not modify the nature of the results.

First Test: On differences of means between earnings under alternative I and alternative IV.

The null hypothesis is:

$$H_0: u_1 = u_2$$

and the alternative hypothesis is:

$$H_1: u_1 > u_2$$

where u_1 and u_2 are the true mean values of the yearly earnings for all trainees after the courses.

Following conventional statistical techniques it is found that the computed t statistic is 7.62 and that the t value of a one-tailed distribution at the 95% of confidence and 61 degrees of freedom is 1.67, so the null hypothesis is rejected and it is concluded that $u_1 > u_2$.

Second Test: On difference of means between earnings under alternatives II and IV and under alternatives I and III.

Again the null hypothesis is $H_0: u_1 = u_2$ and the alternative hypothesis is $H_1: u_1 > u_2$. The calculated mean for the first group is \$10,701.50 and for the second group, \$6,358.70. The test concluded that, with 95% of confidence, the null hypothesis is again rejected, and u_1 is accepted to be greater than u_2 .

The information used for the previous analysis is based on earnings reported by members of the experimental group for a particular year, 1975. It would be interesting to determine if the pattern appears also when data for different periods for the same group are used. In order to do so, information taken from the questionnaires prepared by Wall¹ is used, in which a three year follow-up (1970-1973) of former trainees from the Selkirk Plant under the Manpower Corps Program was made.

Figure D.1 shows the average earnings for each group every six months, approximately, on a yearly basis. For those related to agricultural-type of activities, the pattern of earnings is irregular, while for those on secondary occupations they tend to increase steadily over time, and their average values over time were always above the values for the first group.

Unfortunately, the number of cases (12 for each one of the categories) proved to be small in terms of the multivariate analysis required to consider more than one variable at the time in regards to

¹Carl Wall, Op. Cit.

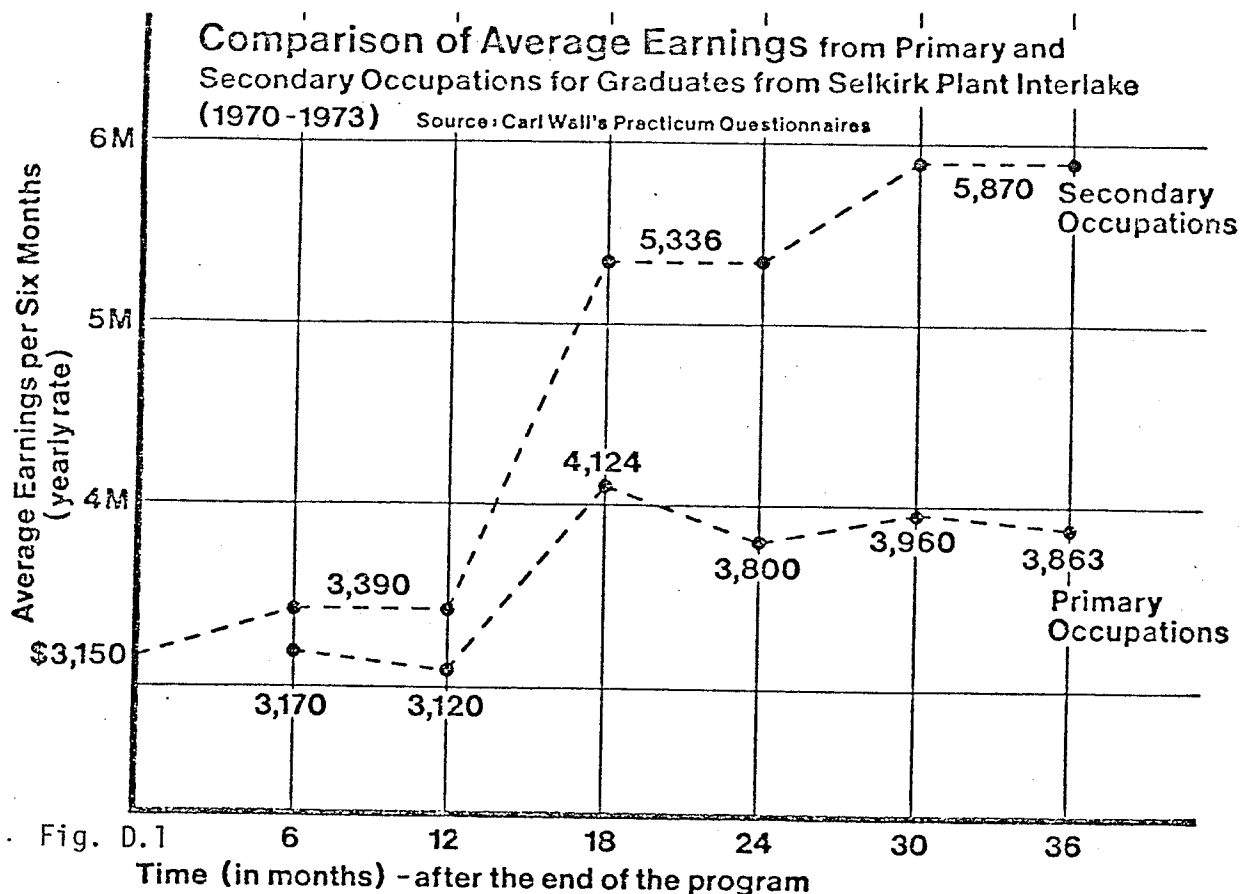


Fig. D.1
Time (in months) - after the end of the program

their relation to earnings, and therefore no definitive results can be obtained from the previous observations. The presentation so far does not explain why this pattern of mobility exists and what is the rationality, if any, behind it. Two reasons can be alleged for the behaviour of those who return to primary occupations having been trained for secondary occupations, in spite of the fact that the average expected receipt for the first seems to be lower than the average expected receipt for the second group.

The first reason deals with the nature of the fishery activity, where most of the trainees returning to primary activities engaged: on one hand, seasonality permits the individual to attend training courses when the fishing season is off, and return back when it is on, in order to increase his overall yearly income: in addition to that, fishermen

valuate not only monetary receipts but also:

. . . non-financial amenities such as working outside in the fresh air, comradery of other fishermen, and being 'one's boss.'²

Also the attraction of a potential "big catch" reduces fishermen's incentive to leave this activity,³ namely, they behave as "risk lovers" and not as "risk aversors."

The second reason, and perhaps the more important, is the social, and cultural relation Indians possess with their land, the Reserves, with the type of activities developed there, with the style of living existing in them and with the relative working control they exert upon themselves. All this tends to disappear in urban-oriented activities.⁴

For all these reasons, it can be concluded that the measurement of social profitability of training Programs in cases where the population involved in them might have a utility function somewhat different from the one of those who evaluate them, should be analyzed with particular caution.

²Gordon S. Gislason, J.A. MacMillan and N.J.R. Ward, "An Overview of the Manitoba Freshwater Fishery" Winnipeg: Department of Agricultural Economics, University of Manitoba, December, 1975 (Preliminary Draft), p. 117.

³S.H. Gordon, "The Economic Theory of A Common Property Resource: the Fishery," Journal of Political Economy, 62: 124-142, April, 1954.

⁴James Burke, Paper Tomahawks (Winnipeg: Queenston House, 1976), pp. 48-49.

APPENDIX E

METHODOLOGY FOR SEPARATING PRODUCTION COSTS FROM HUMAN DEVELOPMENT COSTS

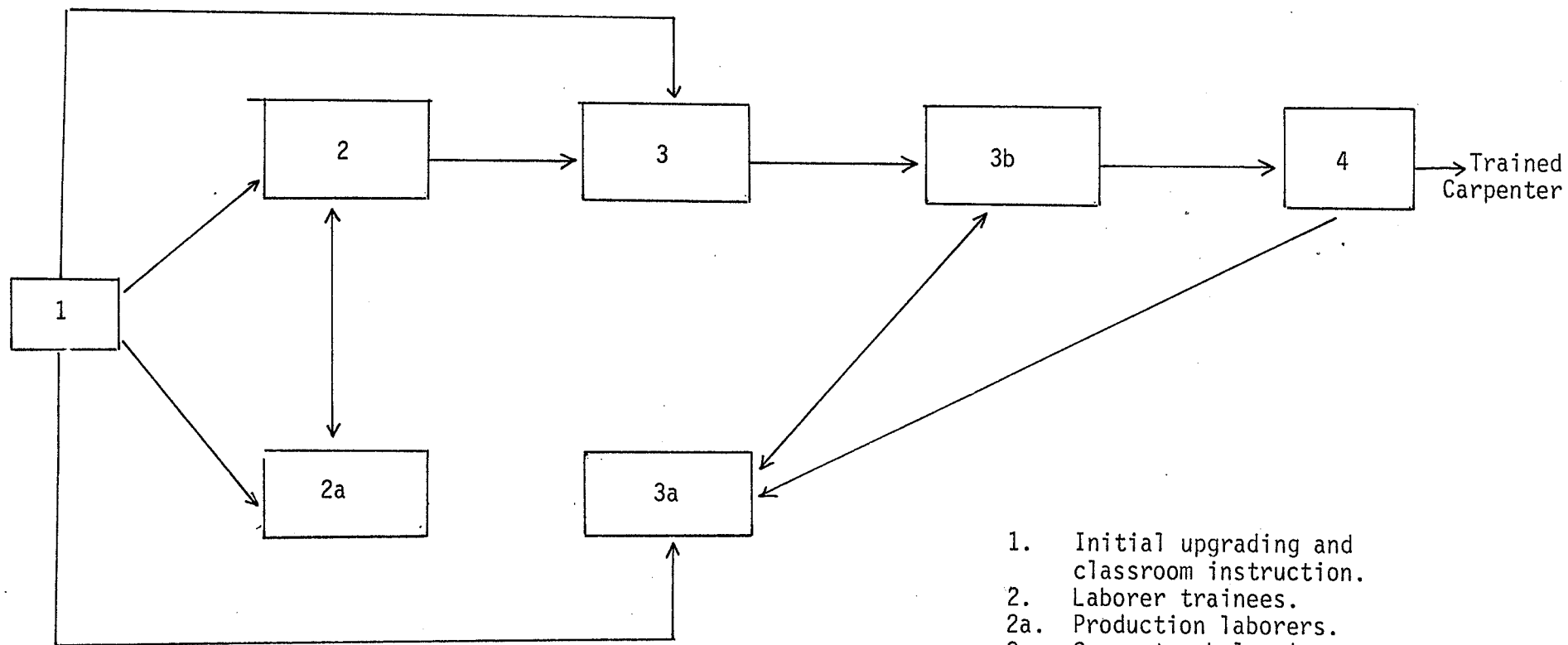
In this appendix the methodology for differentiating production costs from training costs (or human development costs) is discussed. This appendix is based on documents prepared by a Manpower Corps Task Force during the period June 1974 - September 1974. Preliminary results obtained from this methodology were used in Chapters 6 and 7.

One of the objectives of the Task Force was to produce a model to segment the costs incurred by the Manpower Corps program into two categories. The first category includes "training costs", defined as those costs attributed to the training period. The training period was defined as the time which the workers were not considered to be independent, that is, able to produce at an acceptable level without a supervision level in excess over the normal supervision requirements. The second cost category includes "production costs", or those costs which could be attributed to actual production of goods and services.

The allocation of production versus training time was estimated using data on the Ashern housing project. This allocation involves the definition of four phases (see Figure E.1). Phase one, in which the trainee receives initial upgrading and classroom instruction (100% of allowances are attributed to training). Phase Two is the initial phase of on-the-job training proper. At the beginning of this phase, 80% of allowances are attributed to training, but at the end of it (after

Figure E.1

Proposed Training Phases for Construction Projects



1. Initial upgrading and classroom instruction.
2. Laborer trainees.
- 2a. Production laborers.
3. Carpenter helper's probationary period.
- 3a. Production carpenter helpers.
- 3b. Carpenter helper trainees.
4. Apprenticeship program.

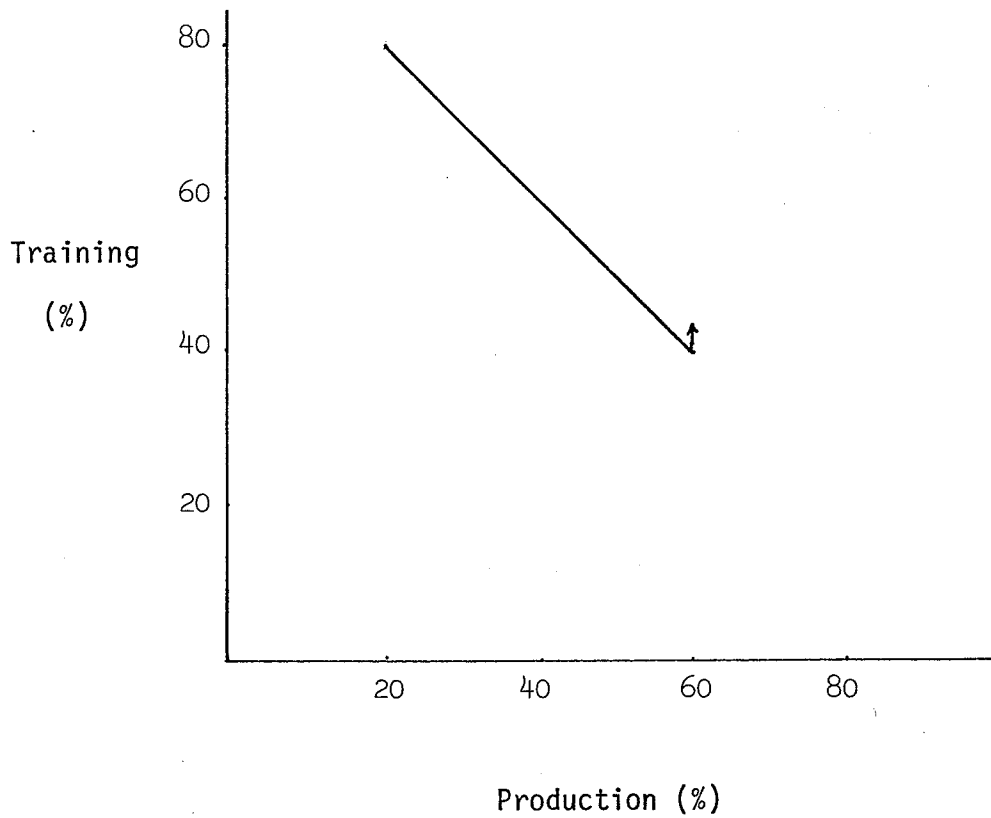
approximately two months), only 20% of allowances are attributed to training costs.

After this phase, the trainee either moves to phase three or reverts to phase 2a, according to his progress. If he is reverted to phase 2a, he is called a "production laborer", and the training/production ratio is increased, according to the foremen's evaluation of the individual. If the individual advances to phase 3, called the "probationary period" (about five months), the training/production ratio varies from 80%/20% at the beginning of the phase to 50%/50% at the end of the phase. It is at this stage that the individual is placed either on the training schedule proper (phase 3b) or classified as a carpenter helper (phase 3a). Finally, after a period of about six months, the individual is evaluated and the decision is made as to whether he is capable of entering the apprenticeship program (phase four) or whether he is to stay as a carpenter helper (phase 3b).

This system of rating individual trainees requires a detailed follow-up of the progress of each trainee. This evaluation should be made by the foreman or the acting supervisor. This system has not been fully implemented by the Manpower Corps, and consequently there is not enough information to assess the training/production ratio for each individual in the experimental group of this thesis.

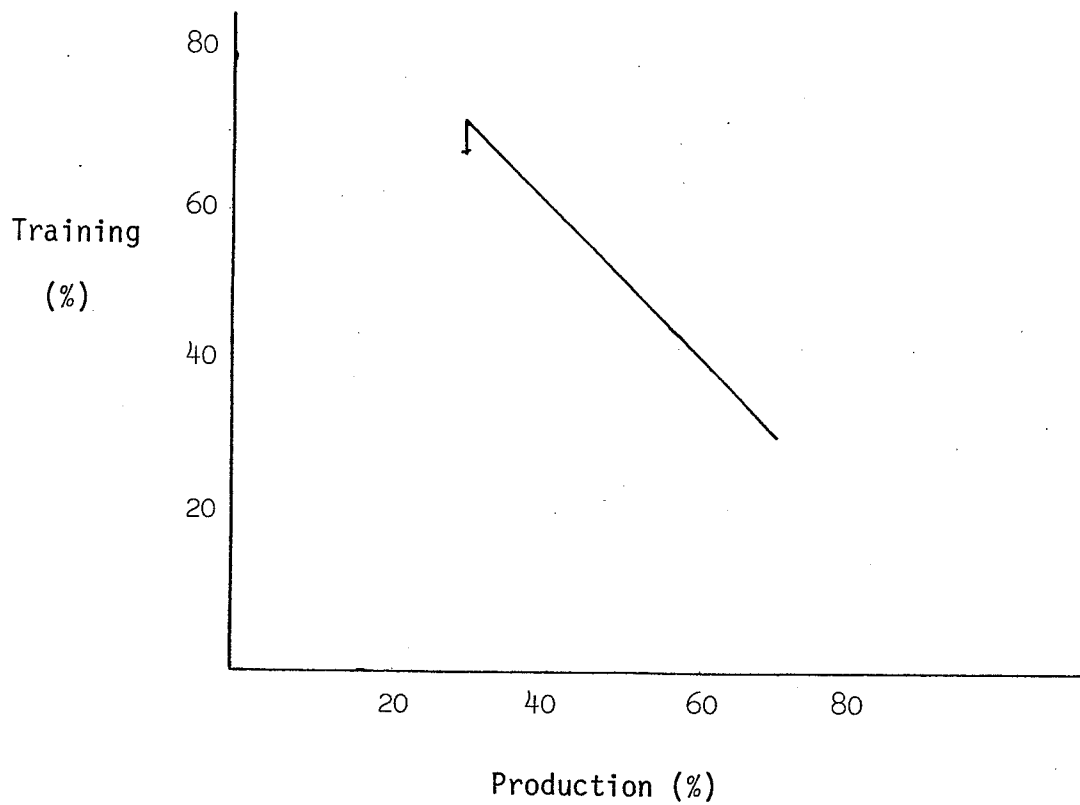
The separation of training and production costs can be done using a "learning curve" which shows the average individual's progression from low productivity to high productivity in the latter stage of his apprenticeship. Figures E.2 and E.3 show these curves for the probationary period (phase 3) and for the carpenter helper training period (phase

Figure E.2
Carpenter Helper Trainee's Learning Curve
(Phase 3)



Source: Working paper prepared by G. T. Boychuk and R. W. Dilay, September 3, 1974.

Figure E.3
Carpenter Helper Trainees Learning Curve
(Phase 3b)



Source: Working paper prepared by G. T. Boychuck and R. W. Dilay,
September 3, 1974.

3b). Besides the problems encountered in the construction of the "learning curves", already noted in Chapter 6, these curves only applied to some projects such as the Selkirk Plant or housing construction. They are not applicable either to short term projects or to projects where services and not a physical output is produced. If the Manpower Corps program concentrates on the projects where these curves can be applied, it is important that this methodology for separating training costs from production costs is implemented, so that more detailed evaluations could be undertaken.

APPENDIX F

OPTIMAL DURATION OF TRAINING

It is possible to estimate the optimal social duration of the program using information presented in Chapters 5 and 7. In order to do so, it is necessary to calculate the marginal social costs and benefits of trainees postponing their entrance into the labour force by one week.

The marginal benefit of remaining in the program one additional week is equal to the present value of the increase in real output induced by that additional week of training. The marginal cost is equal to the social opportunity cost of the resources diverted during that week from other activities in the economy.

The marginal social cost (MSC) of postponing the entrance into the labour force by one week (i.e., of continuing training) after k weeks of training is, therefore:

$$MSC = (\$94.30 + \$1.02 k) + R \quad (F.1)$$

Here, \$94.30 is the average real opportunity cost per week without training (see Chapter 7), \$1.02 is the increase in real production per week associated with one additional week of training, and R is the resource cost of operating the program.

The marginal social benefit (MSB) is equal to:

$$MSB = \$1.02 \times \left[\frac{(1+r)^{n-26} - 1}{r(1+r)^n} \right] \quad (F.2)$$

where: 1.02 is the increase in real product per additional week of training and n is the assumed duration of benefit from training in weeks.

Therefore, the social optimal duration of training appears at the value of k , k_S^* , for which $MSB = MSC$. This is found by equation (F.1) to (F.2):

$$94.30 + 1.02 k + R = 1.02 \left[\frac{(1+r)^{n-26} - 1}{r(1-r)^n} \right]$$

$$k_S^* = \frac{1.02 \left[\frac{(1+r)^{n-26} - 1}{r(1-r)^n} \right] - 94.30 - R}{1.02} \quad (F.3)$$

Table F.1 shows the socially optimal duration of training in weeks, which corresponds to three assumptions about the social rate of discount, r , (8%, 10% and 12% per year) and two assumptions about the duration of benefits, n , (8 years and 10 years). The values of R are taken from Tables 7.1 and 7.3.

Table F.1
Socially Optimal Duration of Training
(in weeks)

Duration of Benefits	Social Opportunity Cost of Capital		
	8%	10%	12%
8 years	118.2	92.8	68.4
10 years	168.9	135.1	103.8

Source: Equation (F.3).

It can be seen that the socially optimal training period is shorter than the optimal duration of training from an individual viewpoint. This is found by applying a procedure similar to the one used to calculate the figures in Table F.1. However, from a trainee's viewpoint, the marginal cost (MCT) of remaining in the program for one additional week after for k weeks of training is equal to the weekly expected

earnings elsewhere in the economy after k weeks of training:

$$\text{MCT} = \$81.21 + \$0.92 k \quad (\text{F.4})$$

where \$81.21 is the value of average expected earnings calculated in Chapter 5, and \$0.92 is the increase in earnings due to one additional week of training (equation 5.4).

The marginal benefit from an individual viewpoint (MBT) includes the value of average training allowances and the present value of future earnings attributable to the program:

$$\text{MBT} = \$96.44 + \$0.92 \left[\frac{(1+r)^{n-26} - 1}{r(1+r)^n} \right] \quad (\text{F.5})$$

where \$96.44 is the value of average weekly allowances per trainee.

The optimal value of k from a trainee's viewpoint, k_t^* , is found where marginal cost = marginal benefit, or

$$81.21 + 0.92 k = 96.44 + 0.92 \left[\frac{(1+r)^{n-26} - 1}{r(1+r)^n} \right]$$

$$k_t^* = \frac{96.44 - 81.21 + 0.92 \left[\frac{(1+r)^{n-26} - 1}{r(1+r)^n} \right]}{0.92} \quad (\text{F.6})$$

Table F.2 shows the values of k_t^* for the various rates of personal time preference and duration of benefits used in Chapter 5.

Table F.2

Individual Optimal Duration of Training
(in weeks)

Duration of Benefits	Rates of Time Preference				
	6%	12%	18%	24%	30%
8 years	321.1	258.4	211.9	176.7	149.8
10 years	381.7	293.8	232.6	188.9	157.0

Source: Equation (F.6).

The optimal individual duration of training is longer than the social optimal. The main reason is that the individual cost of quitting the program includes the value of weekly allowances as well as the present value of future benefits.

Individuals finish their courses before the optimal time because, as was noted in Chapter 2, the length of projects is in most cases not decided by trainees. Project length is determined by the officials of the program, according to the nature of the demand for trainees by public agencies. The implication of these results is that it is socially desirable to extend the duration of training beyond the historical average of 13 weeks.