TRADE ADJUSTMENT ASSISTANCE: THE COSTS OF ADJUSTMENT AND POLICY PROPOSALS

Prepared by
ECONANALYSIS INCORPORATED
for
THE DEPARTMENT OF INDUSTRY TRADE AND COMMERCE

June, 1978

Industry, Trade and Commerce
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Dear Sir:

The attached report, "Trade Adjustment Assistance: The Costs of Adjustment and Policy Proposals", deals with a recently completed report by a group of consultants (Econanalysis Incorporated) for the Department of Industry, Trade and Commerce. This report specifically addresses itself to the concept of adapting a rational adjustment assistance program in Canada which could be applied directly to current trade liberalization measures which may be forthcoming under the Multilateral Trade Negotiations (MTN).

The report is for information and it draws attention to the development of a possible methodology whereby social costs of adjustment can be calculated in a form designed to provide an input into adjustment assistance policy.

As indicated the study was prompted by an awareness of needed adjustment in the context of a freer trade environment. However, the same kind of approach would be applicable to plant closures arising from a wide variety of circumstances, including more normal market pressures. The type of adjustment involved and the degree of the adjustment assistance that would be justified for each displaced worker is discussed with numerical examples being provided.

The study concentrates on the social costs involved in the permanent closing of a plant and the laying off of its workers. This, therefore, can also serve to determine if these costs outweigh the dollars that would be required to keep the plant open indefinitely or delaying its closure for a determined period of time. The study focusses on two kinds of losses: the expected income loss of displaced workers and the costs to the economy from lost jobs. The gross cost to the economy of lost jobs is always much greater than the private income

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loss suffered by workers directly affected. In a specific case study for example, it was determined that in a plant shutdown in the Owen Sound region (Ontario) the gross cost to the economy as a result of loss of jobs spread over five years was estimated at $19,170 per worker (1977$) or about 33% of the wage bill, whereas the direct income loss to the worker was estimated at $4,800. The net cost to the economy of the plant closure would also have to take into account other factors such as the effects of tariffs or quotas.

The level of this direct income loss appears to vary with the demand for labour and with the age of workers affected. It was determined also that the income loss of older workers (55 years of age) was about five times as large as for younger workers (25 years of age). Thus the age factor was found to be a very important variable in determining alternative job prospects.

The unemployment rate for prime age males was used as an indicator for the demand for labour. In the case of unemployment for prime age males, a rise of 2 percentage points (from 3% unemployment rate to 5%) resulted in doubling of the direct income loss to the worker affected.

The costs to the economy, unlike the direct income loss to the worker, was not found to be unduly affected by the characteristics of the laid off workers themselves. Rather it was more dependent on the characteristics of the region of the plant shutdown. A regional general equilibrium model was therefore developed to estimate the costs to the economy of a plant shutdown. This approach reflects more directly the significance of the industry or plant on its regions.

The report suggests two policy options for the federal government for trade related adjustment assistance: (1) Income compensation policies and (2) Redeployment promotion policies. With regard to the first option, the specific proposal is for a direct income compensation program for workers displaced as a result of MTN. With regard to the second, consideration is given both to an employment subsidy program, and a loan foregiveness program which is tied to the hiring of displaced workers.

Income compensation and re-employment promotion are quite different in concept and in the methodological determination of the amounts of money involved. The case studies given in this report are only illustrative of the method developed. There is, in fact, a very extensive data base which is being developed for this purpose.

The IT&C Labour Force Tracking data base together with other Administrative data are used in this work. The IT&C data base contains the socio-economic characteristics and the 5 years work history of about 10,000 individuals who experienced layoffs during the period 1974-1976. This survey was conducted in 1977. A similar survey is being conducted this summer to gather information for new regions as well as completing work on regions where the survey was undertaken last year.

The Economic Analysis Branch of IT&C is in the process of completing more case studies as well as studying the effect of provincial, regional and industry sector characteristics on the duration of unemployment and the social costs of plant shutdowns. The objective is to validate the specific hypotheses which have been developed thus far and to generalize the application of this type of evaluation to a much wider variety of circumstances.

A very important element in this particular study is the development of a methodology whereby the probable social cost of a permanent plant shutdown can be determined in advance. The probability and simulation models that have been developed for this purpose takes into account a number of important variables including the characteristics of the labour force employed in the plant and the regional environment in which the plant is located.

As more results emerge from the current research we will keep you informed. In the mean time your comments will be very much appreciated and should you or some of your groups require more information on our work, I can be contacted at 995-9891.

Yours truly,

Jean Massicotte

Jean B. Massicotte,
Senior Policy Analyst,
Economic Analysis Branch.

Attach.

TRADE ADJUSTMENT ASSISTANCE:
THE COSTS OF ADJUSTMENT
AND POLICY PROPOSALS

BY

GLENN P. JENKINS

GRAHAM GLENDAY

JOHN C. EVANS

CLAUDE MONTMARQUETTE

THIS REPORT WAS FINANCED BY CONTRACT NUMBER 93/810-936-3 AND SUBMITTED TO THE ECONOMIC ANALYSIS BRANCH, DEPARTMENT OF INDUSTRY TRADE AND COMMERCE, JUNE, 1978. THE VIEWS EXPRESSED IN THIS STUDY ARE THOSE OF THE AUTHORS AND DO NOT REPRESENT GOVERNMENT POLICY.

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A special word of gratitude is owing to Mr. Jean Massicotte and Mr. Don Allen in the Economic Analysis Branch, Department of Industry Trade and Commerce for initiating this study and for guiding

the contract through to final approval. We are grateful to them for allowing us to use the results of the labour force tracking survey for our two case studies. Mr. Massicotte also deserves credit for obtaining the personnel records from the two companies studies.

We wish to extend our appreciation to the Department of Employment and Immigration for their support of the labour force tracking survey and for supplying data from the UIC administrative files. The two companies used as our case studies were also most cooperative. We are most grateful to the numerous individuals who took the time to answer our questions and to assist with the data collection.

Mr. Iain Henderson and Mr. Roy Atkinson contributed very helpful comments on various sections of the report. We would also like to thank Mr. Graham Gibb and Mr. Robin Butler for their interest in our work.

Finally our thanks go to Mr. Daniel Chartrand for his work in typing and producing this report.

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Executive Summary

Many studies have recommended the liberalization of trade based on the long-run gross benefits of freer trade, but few studies have analyzed in detail the associated short-run costs. Yet it is evident that these costs have loomed sufficiently large to restrain a rapid movement towards trade liberalization. This study focuses on the costs of adjustment and the appropriate policy responses of governments.

Multinational trade liberalization will encourage a realignment of industrial activity in Canada. The export sectors will expand while the import-competing sectors will be forced to contract or to change their product mix. The realignment of industrial activity will provide long-run benefits to Canada through an improvement in the way that Canada's resources are employed. Yet the process of adjustment will involve short-run costs for the individuals directly affected and for the economy as a whole. The purpose of this study is to identify and measure the costs of adjustment with the use of a consistent methodology. Based on our empirical findings, specific programme proposals are outlined to reduce the overall costs of adjustment and to compensate those individuals who are made worse-off. Even though

this study focuses on the costs of adjustment caused by trade liberalization, the methodology is also applicable to a wider range of adjustment problems.

The costs of adjustment are perceived differently by the various groups affected by trade liberalization. Labour is concerned about the income losses when workers are laid off by firms with declining sales and production. For labour, keeping jobs in place is of paramount importance. The owners of the firms are concerned about a possible decrease in the value of their equity investment. Governments are pressured by both groups to maintain protection or to provide subsidies to weak firms if trade barriers are removed. Yet governments must also be concerned about an efficient allocation of the country's resources. It may be more efficient to subsidize the early re-employment of the displaced workers, or to compensate them for their foregone income, than to perpetuate trade protection or to provide financial assistance to firms with declining sales. A rational choice among these policy alternatives can only be made on the basis of their relative economic costs and benefits.

This study concentrates on the adjustment costs of laying off workers from firms which are forced to reduce production and employment. Both the private income losses to the displaced workers and the costs to the economy of labour displacement are examined in detail. Less attention is directed to the adjustment costs of the owners of

the firms. This is because many of the weaker firms in industries likely to be affected by trade liberalization are already experiencing financial difficulties despite the fact that their assets have been almost completely written off and that their sales are currently protected from international competition. Therefore, any subsequent change in the value of the owner's equity will likely be small. The owners of productive facilities are also able to avoid the full impact of trade liberalization by reinvesting either in other activities or outside the country. These steps should be made easier by the gradual phasing in of tariff reductions. While no estimates are made of the adjustment costs for plant capacity, a detailed discussion of how to measure a change in the value of the equity investment is provided in an appendix.

The Expected Income Loss of Displaced Workers

The costs of adjustment for displaced workers are measured by the difference between the present value of two full income streams. The first measures what the workers would expect to receive if their existing jobs were to continue, whereas the second measures what they would expect to receive if a layoff takes place. Full income is defined to include the after-tax wages received when employed and the after-tax unemployment insurance benefits and the monetary value attached to leisure when unemployed. The expected change in full income

is based on a statistical analysis of the determinants of the proportion of time employed and the wages workers earn both before and after separation from a job. These determinants include labour-market conditions and the socio-economic characteristics of the workers.

For illustrative purposes, two data sources were used in the statistical analysis. The first (from the Labour Force Tracking Survey of Industry, Trade and Commerce) documents the unemployment/employment experience of specific workers separated from their jobs at two plants. The one plant is located in the Owen Sound area of Ontario, while the other is in the Sherbrooke region of Québec. The second data set (from the records of the Unemployment Insurance Commission (UIC)) traces the labour force experience of workers permanently separated from their jobs in the same regions as the two plants over the three year period, 1974 to 1976.

The analysis yielded measures of the present value of the expected income loss for the average worker over a three-year period. Such estimates, shown in Table 1, provide a measure of the compensation that would have to be paid to workers to make them indifferent between the full income stream they could expect to receive if their existing jobs were to continue and the amount they could expect to receive if they were displaced and had to seek alternative employment. The higher

income losses for workers displaced from the Owen Sound plant were not unexpected. These workers were on average older, had more seniority, and earned higher wages before layoff than the sample of workers from the Sherbrooke plant.

Table 1

Estimates of the Present Value of Expected Income Losses for the Average Displaced worker Over Three Years (1977 Constant Dollars)

Data Source	Owen Sound	Sherbrooke
Labour Force Tracking Survey for Two Plants	$4,800	$2,100

The UIC data base permits a check on the sensitivity of the estimates of the expected income loss to changes in the key variables which determine the unemployment/employment experience of workers after layoff. Older workers bear substantially heavier costs of adjustment than younger workers, and the costs are higher at higher rates of unemployment. This is evident from the figures presented in Table 2.

Table 2

Sensitivity of the Present Value of the Expected Income Loss Over Three Years to Changes in the Unemployment Rate[1] and the Age of Displaced Workers[2]
(1977 Constant Dollars)

Unemployment Rate (percent)	Owen Sound Area		Sherbrooke Area	
	Age 25	55	25	55
3	*	600	125	1,490
5	260	2,170	580	2,720

* The income loss is negligible for this group

1. The unemployment rate is for Canadian prime-age males. The average value of this unemployment rate from 1974 to 1976 was slightly over 4%; its value during the first quarter of 1978 was over 6%. The unemployment rate for Canadian prime-age males is highly correlated with provincial unemployment rates, and the latter can be used for policy purposes.

2. These estimates are for low-skilled workers.

The Costs to the Economy from Lost Jobs

A dynamic simulation model was developed to capture the general repercussions in a regional labour market from disturbance such as a plant shut-down. The model simulates the changes in labour migration, labour force participation, early retirement, and new job creation. It also includes the regional multiplier effects resulting from reduced regional expenditures. This model provides the basis

for estimating the costs to the economy from the loss of job opportunities in a regional labour market. If this were a study of the overall costs and benefits of trade liberalization, then the benefits of newly created job opportunities in the expanding export sectors would also have to be estimated.

The costs to the economy of labour displacement is measured as the present value of the difference between the social value of the output of labour with and without the layoff of workers.[1] The social value of the output of labour is broadly defined as the sum of the social values of their employed and unemployed or leisure time. Without the layoff the social value of the employed time is measured as the wage bill that would have been incurred by the firm.[2] When workers are laid off the social value of the output of labour is reduced by the forgone wage bill. This loss to the economy is offset, however, by the social value of the additional employment and leisure time that results from the labour market adjustment responses to the layoff. This addition to the social value of the output of labour also equals the

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1. Social value is measured as the dollar value of an economic activity that accrues to all Canadians.

2. The wage bill includes all wage, salary, overtime and piece-work payments plus all employer contributions to fringe benefits.

social opportunity cost of retaining workers in their current employment.[3] This methodology for estimating the costs to the economy from worker layoffs forms the basis for examining alternative programmes which would serve to reduce the cost.

Adjustment Assistance Programmes

The policy options for trade adjustment assistance fall into two categories: income compensation policies and re-employment promotion policies. The specific alternatives that are discussed are 1) a Direct Income Compensation Programme for Displaced Workers, 2) An Employment Subsidy Programme, and 3) a Loan Forgiveness Programme which is tied to hiring displaced workers.

The study draws a careful distinction between the two categories of adjustment assistance - income compensation and re-employment promotion. Both the concepts and the calculations to estimate the amounts of money involved are quite different. The Direct Income

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3. The social opportunity cost of employing labour in one activity is the social value of the activities which otherwise would have been undertaken. Unless there is specific information about new job opportunities which are going to be created in the regional labour market where the layoffs occur, the positive employment effects of trade liberalization per se are not included in the estimation of the social opportunity cost of labour in a specific region. In general within a region, such effects on the social opportunity cost of retaining labour in an activity are difficult to measure but are expected to be relatively small. This does not imply, however, that the social benefits arising out of new jobs created in the economy as a whole as a result of the MTN would be an insignificant benefit.

Compensation Programme would be based on the income loss which workers could expect to suffer as a result of displacement. The purpose of the programme would be to make designated workers indifferent between the prospects they face with and without reduction in trade barriers. If the present value of the expected income loss for the workers laid off from the two plants in Owen Sound and Sherbrooke were paid as a monthly installment over three years, the compensation would equal approximately 15 and 10 percent, respectively, of their previous wages. Analysis of a wider range of cases is required to substantiate these results.

The Employment Subsidy Programme and the Loan Forgiveness Programme are both intended to promote the earlier re-employment of workers displaced from their jobs. The gross benefits of these programmes take the form of reductions in the present value of the costs to the economy from forgone job opportunities. The accrued benefits of reducing these costs of worker displacement are measured as the present value of the difference between the social opportunity cost of labour (i.e., the social value of the output of labour following a layoff) with and without the subsidy programme in place. The benefits from an Employment Subsidy Programme are achieved if a displaced worker finds a subsequent job sooner and/or keeps it longer. Although it is difficult to estimate the net amount of incremental

employment which is created from subsidizing wages, the methodology used gives an estimate of the gross benefits which can be expected. Under a reasonable set of assumptions, the magnitude of the accrued gross benefits per worker over three years from the increases in the social value of the output of labour is approximately equal to the amount of the wage subsidy per worker. This estimate of the gross benefits from wage subsidies could be offset, however, if there were negative efficiency effects associated with the expanded output of a firm receiving a wage subsidy.

The Loan Forgiveness Programme could be incorporated into the Enterprise Development Programme administered by the Department of Industry, Trade and Commerce. The present value of the gross benefits of retaining employment opportunities for workers, designated as having been affected by trade liberalization, could be deducted from the value of the principal of any loan raised by a firm with government assistance. To be eligible, a firm would be required to employ each of the designated workers for a specified time period - say, for at least 40 weeks in each of the subsequent 5 years. Table 3 presents upper-bound estimates of the accrued gross benefits per worker that can be expected by delaying a layoff for different lengths of time. The expected duration of the delay depends on the financial viability of the assisted firm under anticipated market developments.

Table 3

Upper Estimates of the Accrued Gross Benefits[1] from Delaying the Layoff of an Average Worker (1977 Constant Dollars)

Case		Number of Years by Which Layoff is Delayed	
		5	10
Plant in Owen Sound Area	Accrued Gross Benefits per Worker	$19,170	$31,070
	Gross Benefits / Wage Bill	0.33	0.52
Plant in Sherbrooke Area	Accrued Gross Benefits per Worker	$15,440	$24,970
	Gross Benefits / Wage Bill	0.32	0.50

1. The accrued gross benefits per worker from delaying a layoff are calculated as the present value of the reduction in the costs to the economy discounted by the social discount rate. The social discount rate equals the social opportunity cost of public funds and has been estimated at 10 percent per annum.

The magnitude of the gross benefits from retaining employment for workers depends to a large degree on the quality of the employment that the jobs offer. Two important dimensions of job quality are the wage rate paid and the degree of permanence of employment. The loss of jobs that offer temporary employment and relatively low wages,

for example, create costs per worker of about one-third those that arise from the loss of higher paying permanent jobs. Approximately 85 percent of the man-years of employment in the two plants examined in the study consisted of permanent jobs.

To maintain employment by delaying layoffs requires that the firm be kept in business. Whether it is economically efficient for the government to offer financial assistance to keep a firm in business depends on whether the net present value of the net economic benefits from the operation is positive. Although the present value of the gross benefit from retaining workers on the job could be relatively large (up to 50 percent of the wage bill), this gain may be offset by the economic costs from other effects on the economy of the firm's activities. Thus, for example, if a firm continues to receive high levels of effective protection from tariffs or import quotas even after trade negotiations are complete, then the social value of its output could be less than its social cost. This would be the case if the social value of the foreign exchange saved by producing the goods domestically, rather than importing them, were less than the social value of the resources used to produce them. The trade-off between the gross benefits associated with the delay of layoffs and the potential costs to the economy of continued protection can be

illustrated as follows:

If the annuitized gross benefit of
retaining employment = 50% of wage bill,

and the wage bill = 30% of sales value,

then the gross benefits of retaining
employment = 15% of sales value,

If the costs of effective protection
= 20% of sales value,

then the net cost to the economy in
each year from keeping the firm in
business in order to avoid layoffs = 5% of sales value.

If the economic analysis of all the activities of a firm indicates that its operation results in a net economic benefit for the economy, then the government is justified in assisting the firm to stay in business. The extent of this assistance should not exceed that amount required to make the continued operation of the firm an attractive investment from the perspective of the private sector. This amount may be considerably less than the accrued gross benefits generated by the firm by delaying worker layoffs.

If the continued operation of a firm creates a net cost to the economy, however, the government cannot justify keeping the firm in business on the grounds of improving economic efficiency. As a

result of trade liberalization, the firm may be forced to shut down one or more of its plants and the workers would lose their jobs. In this case, the government should be prepared either to promote re-employment of these workers or to compensate them for their expected income losses. This study thus provides not only the conceptual framework for the policy analysis of trade adjustment assistance, but also the methodology for determining the form and magnitude of any government assistance.

CHAPTER 1

THE ROLE OF ADJUSTMENT ASSISTANCE IN TRADE LIBERALIZATION POLICIES

1.1 Introduction

The economic rationale for multinational trade liberalization is to improve the allocation of resources within and between countries. By reducing tariff and non-tariff barriers, exporters are better able to penetrate foreign markets and countries are encouraged to specialize in producing goods in which they have a comparative advantage. This results in efficiency gains from two sources. First, prices are lower than they would be with protection, and consumers are made better off by being able to purchase goods at lower prices. Second, the residents of the country in general are made better off because fewer resources are devoted to producing goods which could be imported at a lower cost.[1] Multinational trade liberalization thus encourages countries to expand their export-competing sectors and to contract their import-competing sectors. In fact, the production benefits from trade liberalization depend upon the movement of labour and capital from the import-competing to the export-competing sectors.

The movement of resources between sectors can generate long-run efficiency gains, but only at the short-run efficiency cost of displacing factors of production from their current employment. The efficiency losses

arise because the social value of the output (including leisure) may be less during a transition period than it would have been if the factors had retained their current employment. The present value of these efficiency losses measures the potential gains that can be obtained from an adjustment assistance programme designed to facilitate the re-employment of the displaced factors. These potential benefits also place a ceiling on the expenditures for adjustment assistance that can be justified on the grounds of improving economic efficiency.

A related, but somewhat different, concern of an adjustment assistance programme is with the distribution of the benefits of trade liberalization. While all Canadians taken together are made better off as a result of the efficiency gains, the owners of productive facilities in import-competing sectors and the workers who are displaced from their jobs could suffer a loss of income which leaves them worse off. If an adjustment assistance programme is to promote not only efficiency gains by encouraging re-employment, but also equity in the distribution of the gains and losses of trade liberalization, then there must be some provision for compensating those who suffer income losses.

It is very important to realize that the economic efficiency losses of displaced factors of production and the income losses suffered by the same individuals are conceptually and empirically different. Although each of these topics will be introduced in this chapter, they receive separate attention later in the report. Thus, Chapter 2 focuses on

the costs of adjustment borne by individuals and includes estimates of the income losses suffered by displaced workers based on a partial equilibrium model of labour adjustment. These estimates provide a measure of the compensation with could be paid to workers who lose their jobs. There is also a discussion of how to calculate the compensation which could be paid to owners of productive facilities. Chapter 3 examines the costs of adjustment to the economy as a whole; estimates of the efficiency losses of displaced workers are based on both a partial equilibrium and a generally equilibrium model of how a regional economy responds to the decrease in employment. These estimates provide a measure of the potential economic gains from encouraging earlier re-employment and an empirical basis to determine the magnitude of adjustment incentives.

Specific policy recommendations are made in Chapter 4. No matter what kind of adjustment assistance is being discussed, the design of the assistance programmes deserve careful consideration. The programmes can themselves be efficiency positive, efficiency neutral, or efficiency negative. It would be folly, for example, to have a compensation programme with implicit work disincentives which are efficiency negative while simultaneously offering efficiency positive inducements to employers to hire the same workers. If an adjustment assistance policy is to be effective in promoting fairness and improved economic wellbeing, then the programmes should reinforce each other.

1.2 Benefits from Trade Liberalization and the Movement of Productive Resources

A programme of trade liberalization often generates much heated debate because of the way that different groups are affected. For labour, trade liberalization means a decrease in employment as import-competing sectors are forced to contract becasue of stiffer foreign competition. Subsequent employment opportunities may become available in the expanding export sectors, but these jobs may require different skills than those possessed by the displaced workers. Moreover, it might take considerable time for workers to find new jobs. Not surprisingly, therefore, trade unions and other labour groups demand that the government subsidize unprofitable operations to keep jobs in place. Organized labour is seldom concerned about the declining profit margins of the firms in the contracting sectors.

The owners of the firms take a different point of view. Their major concern is with the decrease in the profitability of their activities, and hence, in the value of their equity investment. The owners of productive facilities are not usually faced with as long a period of adjustment as are workers because an expected decrease in the return on their investment due to trade liberalization is usually capitalized in the value of the equity before or shortly after tariff barriers are actually reduced. Labour poses no special problem to owners because redundant workers can be laid off (subject, of course to the provisions of the union contract). Manufacturers' associations and other industry groups also want the government to assist

firms which have difficulty in competing against cheaper imports. Since tariffs are similar to a production subsidy, the owners demand either an exception from the tariff reductions, a quota on imported goods, or another subsidy to replace the one given up.[2]

Canadian tariffs have encouraged the growth of industry and employment in those sectors where goods would otherwise have been imported. At the same time foreign tariffs have discouraged the development of our export sectors. Canadian tariffs misallocate resources in the sense that Canadians devote more capital and labour to the production of goods which could otherwise be imported at a lower cost. Foreign tariffs mean that our export sectors face smaller markets and cannot take advantage of the economies of scale. Canada must thus forgo the efficiency gains which would come with longer production runs. Despite the fact that the growth of the sectors producing exportable goods has been curtailed by the international structure of tariffs, there are many Canadians who have a stake in keeping Canadian tariffs in place. It is not surprising that both workers and owners want to see a continuation of the status quo ante.

The government has a number of important functions to perform with respect to trade liberalization. First, only the government can negotiate multinational tariff reductions for all Canadians. The economic rationale for Canadian participation in these negotiations is clear: all Canadians taken together will benefit from lower prices of imported goods and from the efficiency gains of an improved allocation of Canadian resources.

Second, the government should differientiate between the private interests of the groups affected and the social wellbeing of all Canadians. The private concerns of workers and owners of productive facilities over tariff negotiations have been briefly reviewed. Next the issues affecting overall social wellbeing are examined.

The capital losses suffered by owners of productive facilities as a result of reduced trade barriers are private losses, but not economic costs. Although trade liberalization may entail transportation and transactions costs from shifting machinery and equipment to new uses, the capital losses are no longer part of the social opportunity cost of capital used in any particular activity. The social opportunity cost of the capital in firms affected by trade liberalization is based on the value that the capital would have in the future if it were invested in other sectors of the economy. Any decrease in the value of the owners' equity investment thus represents a sunk cost to the economy as a whole.

The economic costs of workers laid off from their jobs is equal to the difference between the social value of labour's output before and after trade liberalization. Since displaced workers are usually unemployed for a spell after being laid off, we would expect the costs of the labour adjustment to the economy to be higher, the longer that unemployment remains above its normal level. Note, however, that the unemployment experience of the individual workers directly laid off and the change in unemployment over time in the region where the layoffs occur will not usually be the same. Whereas the private income losses suffered by the displaced workers depend on how long they as individuals remain unemployed, the economic cost of the labour adjustment depends on how unemployment in the region has changed which, in turn, is a function of changes in other factors such as changes in labour force participation and labour

migration. The costs of the labour adjustment to the economy are thus conceptually and empirically different from the private income losses suffered by the displaced workers.

The dislocation of labour and the resulting short-run efficiency losses to the economy from trade liberalization should be weighed against the efficiency gains from a long-run improvement in the allocation of resources. If the government were attempting to maximize social wellbeing, then it would not reduce tariffs unless the net present value of net economic benefits were positive. That is to say, trade liberalization would come about only if the present value of the long-run economic benefits exceeded the present value of the short-run economic costs.[3] The government can make trade liberalization a more viable proposition by designing a trade adjustment assistance programme to reduce the short-run economic losses from the dislocation of labour.

The government may wish to adopt a policy of compensating workers and owners of productive facilities for their private income losses resulting from trade liberalization, but the government should not promote economic inefficiency in the process. One method of compensating the factors of production for a change in tariff policy, for example, is to provide support to declining firms so that they remain in operation. This is the solution frequently advocated by labour unions and manufacturers' associations. The problem with this approach is that resources will continue to be used in these firms which can result in negative efficiency effects.

Government support for these firms to keep them in business should be limited, therefore, to the difference between the payment made to the factors and the social value of the activities foregone by retaining them in that employment (i.e., their social opportunity cost). In other words, the government should offer assistance to help keep firms going only to the extent that additional net economic costs would be incurred by having to shut them down. The policy recommendations made in Chapter 4 are designed first, to provide equitable compensation to factors of production without encouraging economic inefficiency, and second, to provide a measure of the magnitude of government assistance which could be offered in a programme to promote re-employment of displaced workers.

The government's point of view with respect to trade adjustment assistance is different from that of workers and owners of productive facilities. The government should concern itself with being fair to both groups affected by trade liberalization while at the same time encouraging greater efficiency in the use of Canada's resources. The goal of improving the allocation of Canadian resources is the chief economic motivation for Canada's participation in the multi-national trade negotiations; it should be the hallmark of Canada's policy on trade adjustment assistance.

1.3 Protected Industries and the Decreased Mobility of Factors of Production

Tariffs raise the domestic prices of importable goods and provide and additional margin within which import-competing firms can operate. This extra margin allows firms to pay the going wage and still earn a rate of return sufficient to keep them in business. Tariff-protected industries are relatively labour intensive with a large number of fairly small plants.[4] In some industries like textiles, for example, tariff protection has been in place since the nineteenth century and many firms could not continue to pay their current wage rates and remain in operation without this protection.[5]

While rates of return in these industries have been sufficient to keep a larger number of firms in business, they have generally been below average. These firms have not had a strong financial incentive to make large investments to update their plant and equipment or to adopt new technology. As a result, many firms in protected industries have aging plant and equipment and outmoded production techniques. In the past, the pattern of employment in tariff protected industries was generally quite stable, but within the last decade increased competition from the European Economic Community, Japan, and the developing countries has left the future of many Canadian firms in doubt.[6]

The employment provided to generations of workers by protected

firms has lead to the growth of towns and cities dependent of these firms. The permanent workers in these firms are often in quasi-fixed supply. That is, they have become specialized in their jobs through lengthy and specific on-the-job training and their productivity is often higher in their current employment than in alternative employment. Moreover, because they tend to be older, their occupational and geographical mobility is limited. This means that the costs of adjustment for such displaced workers are likely to be positively related to their age. Female workers, if married, also tend to be geographically immobile. Hence, the sex of the worker can also have an important influence on the size of the adjustment costs.

The adjustment costs are usually larger in regions which are relatively more isolated from other large labour markets and which lack diversity in the type of skills demanded. The number of alternative job opportunities is more limited, and workers may have to migrate in order to find employment. The displacement of workers in large, heterogeneous labour markets generally results in shorter periods of unemployment and a smaller change in earnings. Proximity to an urban centre also ensures a greater demand for housing so that the prices of homes do not decline as much is a firm is forced to shutdown and to layoff its workers. Hence workers are less likely to face a capital loss on the sale of their homes if they have to move to find another job.

When the major firm shuts down in more isolated communities, potential migrants might suffer such a sizeable capital loss as a result of

a decrease in housing prices that they cannot afford to move to an urban centre where housing prices are substantially higher. These factors combined with family relations and social ties to the communtity discourage migration between labour markets and raise the costs of adjustment for both the workers and the economy.

Given the characteristics of the labour force and the region, the adjustment costs are closely related to economic conditions in the region and and the economy at large. If the unemployment rate is initially low and the demand for labour is growing rapidly, then workers can be expected to experience a shorter duration of unemployment and have lower costs of adjusting from one activity to another.

1.4 Costs of Adjustment to Individuals

1.4.1 Costs of Adjustment for Labour

Trade liberalization will force some firms in the import-competing sectors to reduce their scale of operations or to shut down completely. In either case workers will be laid off. Before being permanently laid off, workers receive their net-of-income-tax earnings when employed, and if they are unemployed for part of the year, they receive their net-of-income-tax unemployment insurance payments plus the value of their leisure time. This

combination of earnings from employment, unemployment insurance benefits and leisure is referred to as the workers' full private income before trade liberalization. Since workers who are laid off usually experience an additional amount of unemployed time, at least during a transition period while searching for a new job, the relative amounts of time spend in employment and unemployment change. Hence their expected full income after layoff changes as well. Workers may also experience a loss of pension benefits.

If individuals were in a competitive labour market where there is no involuntary unemployment, or if they could choose the number of hours or weeks they work each year, then the net-of-tax wage would be equal to the value of unemployment compensation net-of-taxes, plus the value of leisure. In this case, the full income of workers would be the same before and after trade liberalizaiton because employed and unemployed time would be valued the same. Because of minimum wage laws and collective bargaining agreements, however, wage rates prevailing in many labour markets, are higher than their market clearing levels. For individuals in such markets, the net-of-tax wage income per period is greater than the total of their net-of-tax unemployment insurance benefits plus the value of their leisure, because they would prefer to work more at the higher wage. In addition, when people become unemployed, they may not expect to be able to collect unemployment compensation throughout the entire period of unemployment. In most cases therefore, the value of employed time exceeds the full value of unemployed time.

After a group of workers is laid off, some workers find another job immediately, some older workers choose early retirement, but most workers experience a period of unemployment. For those who find permanent work immediately, their private income is equal to their net-of-tax wage in their alternative employment, which could be higher or lower than their income before trade liberalization. Older workers who retire early receive pensions, which are usually substantially less than their previous wages. But if they have chosen to retire early, those workers must be receiving private income including leisure that has a value equal to or greater than what they expect to receive if they remained in the labour force. Because the proportion of time spent in employment and the alternative wages are lower for older workers, as evidenced by the empirical results found in Chapter 2, it is not difficult to understand how the value of retirement could be higher. Through time the proportion of those initially laid off who become employed increases while the proportion of those who are still unemployed decreases. The proportions of employed and unemployed eventually reach a level that is representative of the employment situation of this group and remain relatively stable thereafter. These proportions are thus a function of time, and how rapidly they change through time depnds on the characteristics of the workers laid off and the economic conditions during the interval. Given the alternative wage which displaced workers can expect to earn, the full private income (including the monetary value of leisure) received after layoff can be measured.

The alternative wages facing displaced workers are frequently less than what they were earning before being laid off. As we indicated in the previous section, many workers have lengthy on-the-job experience which increases their productivity and the wages they earn. However, these skills are often plant specific and do not command a price in the labour market. Not only can alternative wages be lower, but subsequent employment may not be as stable as the previous employment. Workers may find that there is an increased probability of losing their new jobs because of either greater fluctuations in employment or lower seniority in the new firm. This might be more true of workers with little education and fewer marketable skills than for workers with technical expertise who are more often in demand.

When a major firm in a small community is forced to close down, some individuals in the labour force move away. This causes a decrease in the demand for housing services and for the services of other capital items in the community. The reduced demand for housing services could cause rental prices to fall, or at least to rise less quickly, and in the short-run could have a major impact on house prices. Since the supply of housing is fixed and cannot be reduced in the short-run, housing prices will fall and home-owners will suffer a capital loss. This fall in housing prices does not represent an economic resource loss, but it is a financial loss which could be eligible for compensation under an equity criterion. Such capital losses are likely to be greater in regions where the population is small relative to the number of employees working for the declining business.

The closer is the community to a major urban centre, conversely, the smaller is the impact of a decline in economic acitivity on the market prices of fixed assets.

Not everyone in even the more isolated communities need be worse off as a result of a decline in the demand for housing services. Individuals who rent and remain in the community, on the one hand, are better off if rental prices fall or do not rise as quickly; landlords, on the other hand, suffer a capital loss. Those individual home owners who decide to move out of the community soon after the firm shuts down and to sell their property are likely to bear a capital loss. Their job prospects elsewhere must be sufficiently good to enable them to make up for the relatively more expensive housing costs. Older workers who lack marketable skills are more likely to remain in the community. As long as they do not have to sell their homes, the workers who remain in the community do not suffer an immediate capital loss. Nevertheless at a future date they or their heirs will be worse off by the decrease in the value of the estate.

Equity compensation refers to the amount of income or wealth that the government would have to pay individuals affected by government policy to make them indifferent to the change in policy. Should the government compensate workers laid off to make them indifferent between their present state and their previous prospects in the declining firm, or between their present state and their average past experience at the declining firm or at any other firm? For workers who had been employed only by this firm over the recent past, the two bases for compensation are equivalent. For

workers who had only recently joined this firm, however, their previous employment experience might differ from what they would have experienced with that firm. To predict what the employment experience of workers would have been if the firm had not shut down is difficult. This is because it requires a great deal of information on the employment experience of workers who remained with or left the firm. We have opted instead in Chapter 2 to estimate the previous private income of workers based on their average past work experience regardless of whether it was all with the declining firm.

The net present value of the equity compensation which would leave displaced workers as well off as they had averaged in the past is equal to the difference in the net present values of their full private incomes before and after trade liberalization. Estimates of the equity compensation calculated on this basis for two case studies are presented in Chapter 2.3.

1.4.2 Costs of Adjustment for Owners of Productive Facilities

A change in government policies often has an impact on the return received by the owners of fixed business assets. If a policy change causes an unexpected decline in the return on these assets, then the owners suffer a capital loss.

It is important to distinguish between the capital losses

that occur prior to the change in government policy because unprofitable investments were made, and the losses that occur as a direct result of the policy change. The distinction is especially important in the case of trade liberalization because many of the firms in the industries which are likely to bear the brunt of the increased foreign competition - textiles, leather products, clothing, furniture, electrical products - have aging plant and equipment, outmoded technology and production techniques, an inefficient scale of operation, unimaginative management, and high costs relative to productivity.[7] Such firms can continue in business only as long as trade protection is maintained.

The managers of many of the declining firms know that they may have to reorganize or shut down their operations in the not-to-distant future, and their short-run objective is just to keep the plant running from year to year by pressuring the government to given them additional protection or other financial assistance. Alternatively firms can initiate new ventures elsewhere in the world where there is greater protection or where labour costs are sufficiently low to enable them to compete. If firms are planning to expand abroad, then the continued operation of their Canadian plants becomes a very important source of cash and an added incentive to pressure the government to impose quotas or to maintain other forms of protection for another few years. As soon as trade protection ceases, these firms could liquidate their aging Canadian assets, use any capital losses to reduce other taxes, and then continue business elsewhere.

Government compensation to the owners of productive facilities for any capital losses requires a methodology to estimate the change in the value of the owners' equity investment caused by trade liberalization. The basic problem in this estimation of capital losses is the question of whether the decline in the return on an asset is expected or unexpected as of the date of acquisition of the asset.

If the expected decline in the return on the assets was capitalized into the value of the assets before the current owners purchased them, then the government has no need to compensate the current owners. In this case any compensation should be paid to the previous owners because it was they who experienced the capital losses by selling their assets at a lower price.

If capital assets were purchased before the change in market conditions was anticipated, then the current owners suffer a windfall loss. The loss is realized by the owners if the capital is sold at any point after the market begins to anticipate the change, or when the decline in the return begins to occur. A methodology for estimating trade related decreases in the value of the owners' equity investment is outline in an appendix to Chapter 2.

There are several reasons for believing that unexpected capital losses in industries affected by multinational trade negotiations (MTN) will be small and largely avoidable. First, despite the fact that the assets of many declining firms in these industries have already been written off and even though their sales are currently protected, these firms are still having

difficulty. The market value of their assets is already low and probably could not fall much further. Second, the current proposal to phase in trade liberalization gradually over eight years gives the managers of declining firms the opportunity to reinvest either in other activities or outside the country. Third, to the extent that the market accurately predicts the size and timing of tariff changes, the unexpected capital losses are reduced accordingly. Nevertheless, some unavoidable capital losses are bound to occur and the government may wish to compensate the owners of the assets.

Foreign ownership of Canadian firms presents a further complicating factor. Should the foreign owners of productive facilities be compensated in the same fashion as Canada residents? It has frequently been argued that tariffs encouraged foreign direct investement in Canada.[8] Since the lowering of tariffs will probably reduce the incentive for foreign investment in Canada, earnings and any other payments made to foreign owners are likely to be repatriated instead of being reinvested in Canada. As was already suggested, some Canada firms also have an incentive to invest abroad, and in this sense there is probably not much difference between the expected behaviour of Canadian and foreign-owned forms. Both could invest compensation payments from the government into their operations abroad.

Canadians aggregated together could be worse off as a result of the additional investment abroad. A recent study has suggested that the tax revenues generated by foreign-owned investment have contributed a sub-

stantial benefit to Canada.[9] When funds currently in Canada are invested abroad, Canadian residents lose this tax revenue, and hence on the foreign-owned portion of any compensation payments they would definitely be worse off. Despite the loss of tax revenue on the Canadian-owned portion of any compensation payments invested abroad, Canadians might still be better of if the net-of-tax rate of return on operations abroad were higher than the gross-of-tax or social rate of return in Canada. The social rates of return for a few import-competing industries are presented in Table 1.1.

The magnitude of the unavoidable capital losses facing the owners of productive facilities depends on what happens to the firm after trade liberalization. If the firm remains in operation after tariffs are reduced, then the owners' expected loss is equal to the decline in the in-use value of their equity investment. If the firm, or a plant in a multi-product firm, shuts down as a result of trade liberalization, then the expected loss equals the difference between the in-use value of the owners' equity and the net liquidation value of the assets.

The in-use value of the owners' fixed business assets before trade liberalization is not equal to their net book value which appears in the firm's balance sheets. The latter is a reflection of the historic costs of the assets, and the various accounting conventions which govern book depreciation, but indicates nothing about their ability to generate income in the future. Inflation, changes in technology and changes in tastes since the assets were purchased have combined to make the in-use or market value of the assets today very difference from their net book value.[10]

Table 1.1

Social Rates of Return from Capital in Selected Industries (a)

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	Average
Leather Products	10.00	13.63	11.55	13.67	12.27	11.56	16.17	13.36	17.40	20.92	14.05
Textile Mills	8.79	8.55	6.16	8.20	9.71	5.02	9.19	7.41	11.29	13.02	8.73
Knitting Mills	3.52	10.29	11.60	14.18	12.74	12.03	13.44	13.30	13.39	10.30	11.48
Clothing Industries	9.90	9.59	11.93	13.51	13.86	12.28	14.24	16.15	17.79	19.28	13.85
Electrical Products	14.66	15.83	13.22	12.37	14.29	11.01	14.03	16.39	18.47	20.13	15.04
Total Manufacturing	14.35	13.07	12.49	14.44	14.84	11.33	.2169	13.93	15.88	17.32	14.13

(a) Social rates of return include sales taxes and are adjusted for economic depreciation and inflation.

Source: Glenn P. Jenkins, "Capital in Canada: Its Social and Private Performance 1965-74", Discussion Paper N° 98, Ottawa: Economic Council of Canada, October 1977, Table E-13

1.5 Costs of Adjustment to the Economy

Section 1.4.1 of this Chapter contained an outline of the methodology for measuring the compensation that the government would have to give the employees of a declining firm if they are to remain as well off as they were prior to being laid off. One way compensation can be made to the owners of the factors of production is for the government to give financial assistance directly to the firm and thus prevent its closure.

A firm's decisions to continue in business is essentially based on the profitability of the operation when evaluated from a financial point of view. If, after payment of all variable inputs, the profits are large enough to cover the financial cost of the capital invested, the firm will continue in operation. When a trade liberalization policy is introduced, the financial return to the firm may be driven below the financial opportunity cost of the capital and the owners of the firm may wish to stop operations, even though the social return may still be larger than the social opportunity cost of the investment. This could occur if the social opportunity cost of the factors employed in the activity were sufficiently below the financial costs borne by the firm. In this case it is economically more efficient for the government to give assistance to the firm and keep it in operation that to let it close.

The justification for a government subsidy to keep a firm operating is tied to the fact that the positive difference between the private financial costs of labour and capital and the social opportunity costs of these factors is not a cost of real resources to society, but simply a transfer of income from the government to the workers or investors

in the firm. With the change in demand caused by trade liberalization, the firm may require a greater subsidy than the difference between the financial and social opportunity costs of the factors of production to be willing to continue production. If such a case occurs, then the firm should be allowed to phase out its activities, and either a re-employment promotion programme or some form of equity compensation should be provided to the displaced factors.

The foregoing presumes that a trade liberalization policy reduces the effective level of protection to zero so that tariff distortions can be ignored in the decision whether to give financial assistance to the firm. If tariff protection is not reduced to zero, however, then the gross economic benefits of keeping jobs in place will be reduced because the remaining protection encourages expanded output which could have been imported at lower economic cost. This negative economic externality from continued protection must be subtracted from the subsidy the government would be prepared to pay based on the difference between the financial and social opportunity costs of the factors. In order to avoid overly complicating the analysis of the net economic benefits from keeping resources employed, or encouraging their earlier re-employment, a discussion of the negative economic externality from continued protection is postponed to Chapter 3.

The estimation of the resource cost of capital employed in a declining firm is based on the highest of the going concern, en bloc, or piecemeal liquidation value of the assets used in its operation. While the

financial cost of capital is based on historical purchase prices, this number is not relevant for the evaluation of the social cost of keeping these assets in their present use. The social income stream which is required before society can justify the continued employment of resources in this firm is measured by multiplying the social opportunity cost of capital (10 percent) by the resource cost or liquidation value of the assets employed.[11] The social income stream actually generated by a firm is equal to its annual net economic benefits, which are measured inclusive of all taxes paid and where all resources like labour are valued at their social opportunity costs.

1.5.1 Economic Costs of Adjustment of Displaced Workers

When a declining firm lays off workers, some will retire, others will obtain employment and others will initially be unemployed. By examining the subsequent labour force activity of displaced workers, a partial equilibrium model of labour market adjustment can be constructed. If labour force tracking information is available for the displaced workers, the social opportunity cost of displaced workers can be estiamted as a weighted sum of the social opportunity costs of those who enter early retirement, those who find other employment, and those who remain unemployed.

For those workers who choose to retire early their private situation in retirement must be at least as satisfactory as their private opportunity

cost if they had remained in the labour force. The social opportunity cost of retired workers may be less than their private opportunity cost, however, if they can obtain their pension benefits only by stopping work. These retirement benefits will make the retired person willing to stop working at a point when the non-monetary benefits he enjoys from retirement are still less than the private income he would generate if he continued working. The social opportunity cost of retaining a worker in a firm, if his next best alternative is early retirement, is equal to the private opportunity cost of his time if he were to remain in the labour force minus the pension benefits that are tied to his stopping work.

Since most firms are price-takers in the labour market, additional labour is hired up to the point where the marginal economic value generated by full-time labour is equal to the gross-of-income-tax compensation paid to labour. The workers who are successful in finding alternative employment, therefore, will generate a product with a value at least equal to the gross-of-tax compensation they earn in that job. The social opportunity cost of retaining workers in a declining firm, when these workers would have been employed elsewhere, is the gross-of-tax wage in their alternative employment.[12]

The social opportunity cost of the workers who become unemployed is only the non-monetary value of the leisure they enjoy. While they may be receiving unemployment insurance payments which are a private benefit from being unemployed, these payments are considered transfers from an economic point of view, and hence are not included in the estimation of their social opportunity cost.

As the time since layoff increases, the proportion of displaced workers who find and keep employment also increases. As this proportion changes, by the same token, so does the social opportunity cost of labour. For those workers who do not retire, the social opportunity cost of labour can be estimated at each point in time by weighting the gross-of-tax wage and the monetary value of leisure by the proportions of workers who are expected to be in each state.

The central weakness with using the work histories of only the people directly laid off by the declining firm to measure the social opportunity cost of displaced workers is that it is implicitly assumed that there are no externalities created in the rest of the labour market when these additional people are laid off. We would usually expect that the workers released by the declining firm would compete for jobs with other members of the labour force and thus increase their duration of unemployment as well. In Chapter 3, we develop a methodology for the measurement of the social opportunity cost of labour based on a general equilibrium model of labour-market response. This model incorporates other aspects of labour market dynamics such as interregional migration, the income multiplier and changes in labour force participation.

When migration occurs between regions, the social opportunity cost of labour need not be determined by the marginal product of labour that is foregone elsewhere. Because of differences in working conditions and the environmental characteristics of regions, labour may require very

different levels of wages in alternative areas in order to be equally satisfied in utility terms. For example, the competitive supply price of labour and the marginal product of labour may be significantly higher in the remote regions of northern Canada than in the southern cities. The difference in wages between the areas may be just sufficient to leave incremental workers moving to northern Canada as well off as they would have been in the south. The social opportunity cost of this type of labour in the sourthern city, therefore, is derived from the supply price of labour in the southern city, and not from the foregone marginal product that is lost by not having the workers employed by a project in the north. In a model which allows for labour mobility, furthermore, all the externalities created by the process of labour migration should be included in the measurement of the social opportunity cost of migrant labour. These externalities are discussed in detail in Chapter 3.3.

When a firm shuts down in a community and causes additional unemployment, some of the additional unemployment is reduced through time by workers' leaving the labour force. The workers who decide not to continue their participation in the labour force need not be those who were initially laid off. What is important in a general equilibrium model of labour-market adjustment is that some workers respond in this fashion. The social opportunity cost of non-participants is based on the private income that they would expect to earn if they had remained in the labour force. Because some of the private benefits from being outside the labour force (like welfare payments) can be received only after having left the labour force, they should be

deducted from the expected private income in order to estimate the social opportunity cost of non-participants.

In some labour markets in Canada the demand for labour is strong, and if labour is released from one activity, it will allow others to expand more rapidly than they otherwise would have been able. While migration and labour force participation are likely the most important channels of labour market adjustment in the slow growth regions in Canada, the process of adjustment in the high growth areas is likely to be through a more rapid expansion of production. The economic value of the contribution of labour to the expansion of production that comes about because of the release of workers from a declining firm is equal to the gross-of-tax wage that they earn. An important issue, that is left to be resolved, is the determination of the time required for this employment to be obtained. This problem will be discussed later in the report when each of these channels of adjustment is integrated into a dynamic model of a labour market.

To evaluate the full economic impact on the costs of labour adjustment from a decline in industrial activity on a region, the general equilibrium model incorporates not only the direct employment effects over time, but also the multiplier effects on employment of reduced regional expenditures. The social opportunity cost of retaining workers in a declining firm is equal to the value of the activities which would be undertaken if they were released. The social opportunity cost of retaining workers can thus be estimated by the value of the net increase in total leiusre time, plus the social opportunity costs of all migrants, retirees, and individuals who leave the labour force, plus the value of forgone expanded production,[13] minus the value of the output saved in the secondary sectors.[14]

The negative economic externality from the loss of job opportunities in a regional labour market is measured as the present value of the difference in the social value of labour's output before and after the workers are laid off. The gross compensation paid to workers by a firm represents the social value of their employed time before being laid off. The social value of labour's output after layoff is equal to the social opportunity cost of retaining the workers in their current employment. The latter is estimated on the basis of the dynamic response of the labour market over time which is captured by the simulation model. This methodology for estimating the economic costs from worker layoffs forms the bases for examining alternative programmes which would serve to reduce the loss.

1.6 Objectives of Adjustment Assistance Policies

Trade adjustment assistance policies of one kind or another have been adopted in the past by many countries including Canada. Such policies can take many forms and often have more than one objective. At the end of this Chapter, Table 1.2 summarizes some of the policy objectives and the instruments used to achieve them. The various policy instruments are not mutually exclusive and are frequently combined in order to promote complementary goals. For example, capital assistance may be warranted if a firm can convert its existing operations over to a new product line. It may also be desirable to subsidize the wages bill to keep workers employed, as opposed to laying them off during the conversion period, and to initiate a retraining programme. In this way existing workers avoid a loss of income in the short run, and they retain their jobs in the future by acquiring the skills necessary to operate any new machinery and equipment.

Most countries have enjoyed only limited success with trade adjustment assistance aimed at providing direct compensation to workers and owners. Often the policies lack consistency between the objectives and the methods of achieving them. In other cases problems develop in the administration of the policy instruments; the eligibility criteria may be too restrictive, the adjudication process may take too long, and the funding may be inadequate or misapplied.

Canada's experience with the Adjustment Assistance Benefits (AAB) programme under the Textile and Clothing Industry Board is a case in point. Established in 1971, this programme provides supplementary unemployment benefits for older workers released by declining firms in the textile industry. In 1974 it was extended to cover the footwear and tanning industries under the Enterprise Development Board. These programmes have become commonly known as pre-retirement benefit programmes. The following passage describes the main features of the programme:

> The program was designed to assist the older, immobile worker with few skills and a long-run attachment to the industry. Immobility associated with a language barrier was a particular problem in Québec, which accounts for fully 2/3 of the affected workforce. The related problem of skill mix is indicated by the fact that over 50% of all textile workers have attained a maximum of a Grade nine education. Hence the criteria limits assistance to those over fifty-four years of age who were deemed to be substantially unemployable, with or without re-training, or those who have accepted employment at less than their former insurable earnings. Two further criteria were a minimum of ten years employment in the industry, out of the last fifteen, and that the layoff had been certified by the Textile and Clothing Board as resulting from the proliferation of imports. These criteria limited eligibility to workers whose skills and work history were specific to the industry suffering import competition, and to cases where the layoff was not merely part of normal plant rationalization. This latter provision was reinforced by an additional requirement that a minimum of fifty employees or 10% of the firms workforce be affected for a period exceeding four weeks. Presumably, layoffs of this magnitude would result from the proliferation of imports, and hence were distinguishable from the short-run adjustments which occur quite frequently in the textile and clothing industry. Benefits were initially set at a maximum of 50% of the former average weekly insurable earnings and were reduced by that fraction for any income from outside sources, such that no payment is made once former earnings are regained. These were payable from the time of expiration of Unemployment Insurance benefits, until the individual reached the retirement age of sixty-five.[15]

The work disincentives implicit in this programme are such that very few recipients report further employment after they are ac-

cepted.[16] The Programme has also been criticized because it is funded by the Department of Labour, but administered by the Unemployment Insurance Commission. Since the latter agency does not have fiscal responsibility, it has less incentive to enforce the provisions or to investigate complaints. [17]

The United States also had problems with its Trade Expansion Act of 1962. Technical assistance covering engineering, management, marketing and research and development was provided to firms wishing to prepare an adjustment proposal. Financial assistance for intra-industry firm improvements or inter-industry conversion could take the form of direct loans, loan guarantees, and tax assistance. The eligibility requirements were strict and the certification process time consuming. Firms that applied for assistance had to show that their trade-related injury had affected the entire firm, and not merely one product line. The firm also had to show that it was no longer credit worthy. The firms which applied thus tended to be small, poorly managed, and in bad financial shape. From 1962 through 1969 no firm was certified eligible for assistance; by 1975 only 19 firms received assistance and a further 9 received technical assistance in proposal preparation.[18] For firms which actually received assistance, moreover, an average of 20 months elapsed between petitioning for certification and receiving assistance. The loan guarantee programme has not proved very successful because neither the rate, the term, nor the extent of the guarantee were attractive to the lender.[19]

The objective of the present study is not to provide a detailed outline of specific programmes that would form the basis for a policy of trade adjustment assistance. Rather the prupose of the study is to identify the important parameters that influence the amount of assistance which is justified and that determines the efficiency of the allocation of resources in the economy. By providing an economic framework within which policy decisions can be made, this study tries to avoid the mistakes and problems which have plagued previous programmes. By identifying the key parameters, moreover, programmes should be made more cost effective. Although the administrative structure for a programme can be a key determinant of whether a policy is implemented successfully, this report refers to this topic only in passing.

The objective of trade adjustment assistance policies is taken to be the following: to compensate those individuals who suffer financially as a result of trade liberalization, and/or to prevent a net economic cost from occuring, in an economically efficient manner. The income compensation could be based on the income losses which workers can expect to suffer as a result of displacement. The gross economic benefits of delaying worker layoffs, or promoting re-employment, take the form of reductions in the negative economic externality from forgone job opportunities. These gross benefits provide a measure of the amount of financial assistance that the government can give firms on the grounds of improving economic efficiency to encourage the earlier re-employment of displaced workers. The methodology employed to estimate the gross economic benefits also applies to the problem of determining whether it would be economically efficient to offer a declining firm financial assis-

tance to remain in business. The gross economic benefits of maintaining jobs in place or promoting re-employment could be offset, however, if there were other economic costs associated with keeping a firm in business or expanding its output.

It is crucial to distinguish between the amount of compensation required to leave individuals as well off as they were before trade liberalization and the amount that the government can on efficiency grounds give to subsidize employment at either new or existing firms. The methodology for measuring the expected income losses was discussed in Section 1.4 and is developed more fully in Chapter 2 where sample calculations are provided for two case studies. The basic model for estimating the economic costs of dislocation was outlined in Section 1.5 and receives more detailed analysis in Chapter 3. Both of these elements are drawn together in Chapter 4 where a number of policy alternatives are examined.

Table 1.2

Alternative Adjustment Assistance Objectives and Instruments

Policy Objectives	Policy Instruments
1. To provide compensation for displaced workers.	a) Promote income compensation through extended unemployment payments, early retirement assistance, subsidizing rents or housing construction in new destinations, or direct monetary compensation.
	b) Promote re-employment through relocation, retraining, job counselling and job search assistance (after early warning of potential displacement).
	c) Promote re-employment through wage subsidies, tax exemptions and investment incentives.
2. To provide compensation for owners of productive facilities.	a) Delay the shut down of a plant or firm through temporary protection or provide other financial assistance (e.g. direct loans, interest rate subsidies, loan guarantees, tax deductions or credits, accelerated depreciation, averaging, loss carry back or forward,

		input or output subsidies, government procurement)
	b)	Assist firms to make product line conversions or intra-industry adjustments, and to improve their corporate strategies with respect to production, distribution, marketing, and management techniques.
	c)	Assist firms by offering external technical advice, market surveys, or management assistance.
	d)	Provide government assistance in the sale and/or capital recovery of obsolete or unprofitable capital equipment, subsidize market liquidation values, or provide direct monetary compensation.
3. To promote industrial growth in expanding sectors and an efficient reallocation of resources.	a)	Provide financial assistance for/or improvements in infrastructure (e.g. utilities, transportation, harbours, ports, docks).
	b)	Promote technological innovation and improvements in productivity through research and development assistance, provide grants for testing, adapting, or adopting new production

techniques, and encourage patent enforcement.

c) Provide legal, technical and financial assistance to encourage smaller firms to merge in order to rationalize the industry and to enjoy economies of scale from longer production runs.

d) Use regional development programmes to provide capital grants, job subsidies, or other investment incentives.

Footnotes

1. Ronald J. Wonnacot, Canada's Trade Options, Economic Council of Canada, (Ottawa: Information Canada, 1975).

2. Richard E. Caves, "The Political Economy of Tariff Structures", prepared for inaugural W.A. MacKintosh Lecture, Queens' University, January 1975.

3. Robert Baldwin and John H. Mutti, "Policy Issues in Adjustment Assistance: The United States", in Prospects for Partnership, Helen Hughes (Ed.), (Baltimore: John Hopkins University Press, 1972); Chapter 6. John H. Mutti, "The Employment and Welfare Effects of Foreign Trade Policy", Unpublished Ph.D. dissertation, University of Wisconsin, 1974.

4. For establishments with less than 50 employees in 1974:

Industry	% of establishments in industry	% of employment in industry
Clothing	72	23
Primary Textiles	70	11
Shoe	47	-

In the electronics industry in 1975 69% of the companies had annual sales of less than a million dollars.
This data was taken from Sector Profile Discussion Papers of the Department of Industry, Trade and Commerce, Ottawa.
Further data on the relative degrees of concentration of the industrial sectors at both the establishment and enterprise levels is available for 1965 in "Concentration in the Manufacturing Industries of Canada", Report of the Office of Investigation and Research, Department of Consumer and Corporate Affairs, Ottawa, 1971. Very low levels of concentration are particularly evident in the clothing and subsectors of the footwear industry.

5. Economic Council of Canada, Looking Outward: A New Trade Strategy for Canada (Ottawa: Information Canada, 1975), Chapter 1.

6. S.W. Langdon, "Report to the Canadian International Development Agency on Industrial Adjustment and Trade Relations with Less Developed Countries", (Ottawa: Carleton University, 1976); Looking Outward, Chapter 2.

7. Richard E. Caves, Diversification, Foreign Investment and Scale in North American Industires, Economic Council of Canada (Ottawa: Information Canada, 1975); Looking Outward, Chapter 3.

8. Looking Outward, Chapter 3

9. Glenn P. Jenkins, "Capital in Canada: Its Social and Private Performance 1965-74", Economic Council of Canada, Discussion Paper N° 98, October 1977, Chapter 5.

10. Glenn P. Jenkins, "Capital in Canada", Chapter 1.

11. The social opportunity cost of capital has been empirically estimated for Canada. See Glenn P. Jenkins, "Capital in Canada", Chapter 6.

12. Note that this is probably an underestimate because of the sales tax and foreign exchange externality also foregone. John C. Evans, the Social Opportunity Cost of Labour in Canada", Unpublished Ph.D. dissertation, University of Chicago, Chapter 1.

13. If releasing workers from a declining firm would have led to expanded production elsewhere, then the value of foregone output adds to the social opportunity cost of retaining workers in the firm.

14. When workers are retained by a declining firm we avoid the multiplier effects of a major layoff and, hence, we avoid reductions in employment in the secondary sectors. Because employment and output are therefore higher in the secondary sectors, the social opportunity cost of retaining workers in the declining firm is lower by an amount equal to the value of output saved. Note that if workers are still employed in the secondary sectors, we have gained their output, but they have given up leisure time. The value of this lost leisure time is subtracted from the value of the net increase in total leisure time.

15. Tony Wohlfarth "Adjustment Assistance Benefits Program" a situation report, Economic Analysis Directorate, Labour Canada, October 21, 1977..

16. Only 3% of AAB claimants retained employment providing renumeration greater than their previous earnings. During the period of the AAB programme when the tax-back rate was 50%, some 12.5% reported earnings while on the AAB programme. When the tax-back rate rose to 66 2/3% this number dropped to 6%. Ibid.

17. Ibid.

18. "Adjustment Assistance Certification Calendars for Firms", for Trade Expansion Act of 1962 and Trade Act of 1974 up to March 16, 1977, U.S. Department of Commerce, Washington.

19. Harold A. Bratt, "Assisting the Economic Recovery of Import Injured Firms", Law and Policy in International Business, Vol. 6, N° 1, (1974); Charles Frank, "Trade Adjustment Assistance in the U.S.", Chapter 8 in Adjustment for Trade: Studies on Industrial Problems and Policies, OECD, Development Centre Studies, Paris (1975).

CHAPTER 2

DETERMINANTS AND ESTIMATES OF THE PRIVATE COST OF ADJUSTMENT

2.1 Introduction

In this chapter we evaluate the magnitude of the financial losses imposed on displaced workers and the owners of productive facilities as a result of trade liberalization. Equity compensation refers to the amount of income or wealth that the government would have to pay to the individuals affected by the government policy to make them indifferent to the change in policy. This requires estimation of the full private incomes of displaced workers both before and after they are laid off. In order to estimate the latter we develop an empirical model to identify the key parameters affecting the duration of unemployment and the probability that workers will retain their subsequent employment. Knowing these factors, we can estimate the probability that displaced workers with given characteristics will be employed at any point in time after being laid off. The wages that workers with given characteristics can expect to earn in alternative employment are also estimated from the same data base. These alternative wage estimates together with the probability of workers' being employed form the basis for our estimation of the private full incomes of displaced workers after they are laid off. Given information on the prior work

experience of displaced workers from a labour force tracking survey, we can estimate the magnitude of their financial losses. We also present a sensitivity analysis of our results to show how the financial losses depend on the characteristics of the workers affected and on the economic conditions at the time of layoff.

An important aspect of the methodology used in this study to estimate the full income loss suffered by displaced workers is that we recognise the possible change in the proportion of time an individual works before and after the loss of a job. It is not assumed, for instance, that all workers move from one permanent job to another when they experience a layoff. It is possible that a worker who previously filled a permanent position may be able to find only temporary employment. Alternatively, the first job that a laid-off worker takes may only be a temporary stop-gap job while searching for a permanent position. The proportion to time that a worker spends employed after layoff is therefore modeled to reflect its dependence on the ability of the worker both to find and to keep a job.

Whether the owners of productive facilities will be made worse off as a result of trade liberalization is less clear. Reductions in tariffs lower the expected selling prices of import-competing goods, and many firms will either earn smaller profits or be forced to shut down. As we indicated in Chapter 1, if the decline in the return on the assets were accuraterly predicted when the assets were purchased, then the prices paid for the assets would have been lower and the expected capital

losses to the current owner would have been avoided. Since most fixed capital assets were owned by their current owners before the multinational trade negotiations were begun, however, any decline in the return earned by the assets is likely to show up as a decline in the value of the current owners' equity. For many of the firms affected by the MTN the capital losses should be avoidable and/or quite small. The government may decide to pay compensation for any unavoidable losses. If so, a methodology for measuring the expected losses by the change in the value of the owners' equity investment in the firm is outlined in Appendix 2.0. Since the owners have an incentive to maximize their compensation payments, a number of biases which should be avoided when estimated the expected loss, are indicated.

In Section 2.2 we present our methodology for estimating the costs of adjustment borne by displaced workers along with a brief description of the empirical techniques employed. This methodology is then used in Section 2.3 to estimate the financial losses for workers displaced from two firms. One firm was located in the Owen Sound area of Ontario, the other in the Sherbrooke area of Québec. These case studies also allow us to identify the key parameters which determine the magnitude of the costs of adjustment borne by labour displaced from these firms. In Section 2.4 we outline a method to estimate the expected losses

which the owners of productive facilities are likely to incur. Given the magnitude of these costs to displaced workers and owners of firms, the question is how can these costs be decreased by government policies, or does compensation have to be paid to these individuals in order to make trade liberalization equity "neutral"?

2.2 Nature and Measurement of the Costs of Adjustment to Displaced Workers

In order to derive a measure of compensation, it is first necessary to estimate the size and nature of the private income stream the worker could expect to receive if the change in government policy did not occur. Second, the individual's income prospects after the change in government policy must be measured.

Prior to the change in government policy, a typical firm provides some workers with permanent employment throughout the year while others are employed only seasonally when production is at a peak. For a given group of workers, therefore, the average expected income stream prior to the decline in employment is not the wage paid by the firm, but some combination of wages and unemployment insurance compensation. If the workers are unemployed for part of the year, then in addition to the money income, they also have the opportunity to enjoy more leisure than those persons who are permanently employed.

As leisure in general has a positive value, this additional leisure must be added to the workers' net-of-tax money income in order to measure their full income before trade liberalization.

We can measure a worker's full private income in the absence of trade liberalization as follows:

$$I^b = P^b_n W^b + (1 - P^b)\ (f\ UIC^b_n + V^b) \qquad (2.1)$$

where I^b = the private income per period that a worker could expect to earn in the absence of trade liberalization.

P^b = the proportion of time during a period that a worker can expect to spend employed in the absence of trade liberalization.

$(1 - P^b)$ = the proportion of time during a period that worker can expect to be laid off.

$W^b_n = W^b\ (1 - t')$ = the average real net-of-income-tax wage earned by a worker before being laid off.

W^b = gross-of-income-tax wage earned before being laid-off.

$UIC^b_n = UIC^b\ (1 - t')$ = the average, real, net-of-income-tax unemployment insurance benefits based on the worker's insurable earnings before layoff.

f = the proportion of time that a person expects to receive unemployment insurance benefits while unemployed.

t' = the average personal income tax that a worker pays on his income.

V^b = the non-monetary value of leisure time.

The first term of equation 2.1 ($P^b\ W^b_n$) measures the worker's expected employment income during a period; the second term $(1 - P^b)(f\ UIC^b_n + V^b)$ measures his monetary and non-monetary income when laid off.

The non-monetary value of leisure time can be estimated from the worker's trade-off between labour-market and non-labour-market activities. In a competitive labour market there is no involuntary unemployment, or if people could choose the number of hours or weeks they work each year, then the net-of-tax wage rate would be equal to the value of unemployment compensation net of taxes plus the value of leisure,

$$W^b (1 - t) = UIC^b (1 - t) + V^b \qquad (2.2)$$

where t = the marginal personal income tax rate that a worker pays on his incremental income. When the worker decides to give up leisure in order to earn extra income from employment, he pays additional taxes equal to the marginal tax rate times his incremental income.

The wages in some labour markets are not competitive because minimum wage laws and collective-bargaining agreements have raised wages above their market clearing levels. In consequence the value of employed time is higher than unemployed time; the net-of-tax wages earned from work will then be equal to some multiple of the values of unemployment benfits and leisure enjoyed when not at work. This relationship can be expressed as

$$W^b (1 - t) = B (f\ UIC^b (1 - t) + V^b) \qquad (2.3)$$

where B = a coefficient which reflects the value individuals place on working rather than being unemployed. In a competitive labour market B is approxiamtely equal to one. When the wage rate is set above the competitive rate, then $B > 1$. Thus B will depend in part on the union-nonunion wage differential and the percentage of workers covered by collective bargaining in the area.

Given the value of B, we can solve equation (2.3) for the non-monetary value of leisure

$$V^b = \frac{W^b (1 - t) - B\, f\, UIC^b (1 - t)}{B} \qquad (2.4)$$

The second relationship that we need to measure is the income situation of the workers after the decline in the firm occurs and they are now laid off or in alternative employment. Immediately after a group of N workers have been laid off from their jobs, most of them will be unemployed and some will be retired. We denote the proportion of the workers who retire immediately as (R) and the proportion that are employed (P^a).

For the workers who find work immediately, their private income will be equal to their net-of-tax wage in their alternative employment (W_n^a). The private compensation received by the individuals who are still unemployed will be equal to the net-of-tax unemployment insurance compensation they receive plus the value of leisure ($f\ UIC_n^a + V^a$). To measure the private income received by the workers who are still in the labour force, we need to weight the compensation received by those employed and unemployed by the proportions of workers in these two classes. For the N workers initially released from the firm who have not retired, the level of income at time t is evaluated as follows:

$$\text{Private income after layoff of workers in labour force} = N(1 - R)\left[P_t^a\, W_n^a + (1 - P_t^a)(f\ UIC_n^a + V^a)\right] \qquad (2.5)$$

where $W_n^a = W^a(1 - t') =$ the average, real net-of-tax wage earned by a worker in his subsequent employment after layoff,

$$V^a = \frac{W^a(1 - t) - B\ f\ UIC^a(1 - t)}{B}$$

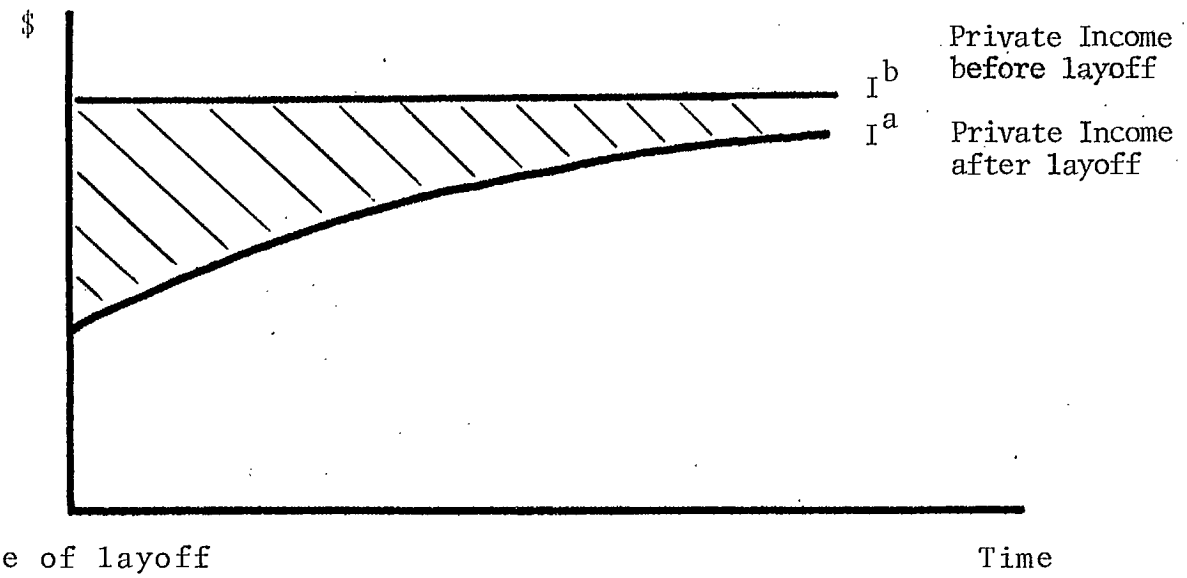
The previous employees of the firm who have now chosen to retire must be receiving private income including leisure that has a value equal or greater than what they expect to receive if they remained in the labour force. We anticipate that these older workers will find themselves in a substantially worse situation than the younger employees who were also laid off. The equation that would give a minimum measure of the level of income received by the retired workers will have a similar structure to equation (2.5), but other studies have shown that both the proportion of time spent in employment (P_t^a) and the alternative wage (W_n^a) when working are lower. The expression that measures the minimum income situation of retired workers is as follows:

$$\text{Private Income of Retired Workers after layoff} = NR\left[P_t^a\ W_n^a + (1 - P_t^a)(f\ UIC_n^a + V^a)\right] \qquad (2.6)$$

Equations (2.5) and (2.6) must be added together to provide the total private income (including the non-monetary value of leisure) that is received by the workers displaced from the firm. Figure 2.1 illustrates the relationship between expected income if the firm had not declined (I^b) as expressed by equation (2.1) and the private income that is received by the workers after the layoff (I^a), equations (2.5) plus (2.6).

Figure 2.1

Measurement of Costs of Adjustment to Displaced Workers



The shaded area represents the value of the private income that is lost by displaced workers because of the decline in this firm or industry. The crucial variables in equations (2.5) and (2.6) are the probability that workers are subsequently employed at any point in time after layoff (P_t^a) and their alternative wage (W^a).

As we indicated in Section 1.3 and 1.4, there can be additional costs of adjustment for labour if the decline in the firm's activities decreases the demand for housing services and the price of houses fall. These adjustment costs will usually be larger in regions which are relatively more isolated and which lack diversity in the types of skills demanded. Since the two case studies we examine are both located in reasonable proximity to larger urban centres, we exclude these adjustments costs from our calculations.

For the same reason we do not consider the private costs borne by local merchants and the community at large. Proximity to larger cities permits workers to retain their residence in the local region and still find work elsewhere. Unless widespread migration occurs local merchants should not experience a serious decline in the volume of their business. But in more isolated communities, owners of small shops could be seriously affected by major lay-offs. Since small enterprises have a high failure rate, however, it could be difficult to prove that a merchant was forced to go out of business because of trade liberalization. Although we do not examine this issue in great detail, the methodology for calculating the expected losses to owners of productive facilities is generally applicable to local merchants who are forced to shut down. This methodology is outlined in Appendix 2.0.

2.2.1 Variables Affecting the Probability of Being at Work (P_t^a)

The probability that an individual is at work after having been laid-off depends on the probability of his first finding alternative employment (i.e., on the duration of his unemployment) and on the probability of his retaining that job (i.e., on the duration of his subsequent employment). The interval probabilities of finding a job between various periods of time since layoff, (e.g., 0-1 month, 2-3 months, and more than 3 months) are estimated using a probit statistical model. The dependent variable is 0 or 1 depending on whether the individual is still unemployed

(0) or employed(1). When a person becomes employed within an interval, this observation is dropped from the sample for the analysis of subsequent intervals. A complete data set of independent variables has to be constructed for the individuals still remaining in any given interval for which the determinants of the probability of finding work are to be investigated.

The probability of retaining a subsequent job, and hence, the duration of this employment is analyzed in a similar fashion. In this case the dependent variable is set equal to (0) if the worker remains employed, and equal to (1) if he loses his subsequent job. Having become unemployed again, the worker faces a probability of finding yet another job, and so the pattern is repeated.

An example of the calculation of the probability of being at work (P_t^a) at a point in time t after separation from a firm is given in Table 2.1. Time from the separation date is broken down into intervals of 4 weeks each. Although only three of these intervals are shown in Table 2.1, the calculation of P_t^a can be extended out over a sufficient number of time intervals for it to stabilize at some long-run equilibrium value. The probabilities of being at work 4, 8 and 12 weeks after separation are given by P_1^a, P_2^a and P_3^a, respectively. These depend upon the interval probabilities of finding and keeping a job. The probabilities of finding a job in successive 4 week intervals (given that a job was not found in a prior interval) are given by P_1, P_2 and P_3. Similarly, the interval

probabilities of keeping a job are K_1, K_2 and K_3 for successive 4 week intervals from the date of starting work in a new job.

The probability of being at work by the end of the first 4 week interval, P_1^a, is given by the probability of finding a job within this time interval, P_1. In the second time interval P_2^a equals P_1K_1 (for those that found a job in the first interval and kept it through the second interval) plus $(1 - P_1)\ P_2$ (for those who did not find a job in the first but subsequently found one in the second time interval.) The probability of being at work by the end of the third interval, P_3^a, depends upon the sum of the probabilities of workers falling into four groups that have followed different paths to being at work by this time. P_3^a depends upon the sum of the probabilities of those who a) found a job in the first interval and kept it for the next two intervals ($P_1K_1K_2$), b) did not find a job in the firms, but found a job in the second and kept it for the third interval ($(1 - P_1)\ P_2K_1$), c) did not find a job in the first or second intervals but did find one in the third interval ($(1 - P_1)(1 - P_2)\ P_3$), and d) found a job in the first, lost it in the second but found another job in the third interval ($P_1\ (1 - K_1)\ P_1$). The probabilities of being at work in subsequent time intervals are found from similar branching probability functions.

The cumulative probability of finding a job after time t from the date of separation from a firm, P_t^c, can also be expressed in terms of the interval probabilities of finding a job. By the end of the first time interval the cumulative probability of finding a job is merely the probability of finding a job in the first time interval (i.e., $P_1^c = P_1$.)

The cumulative probability of finding a job by the end of the second interval (P_2^c) equals the probability of finding a job in the first interval (P_1) plus the probability of not finding a job in the first but then finding one in the second ($(1 - P_1) P_2$). The cumulative probabilities of finding jobs by the end of subsequent time periods can be built up in a similar manner. The cumulative probability of losing a job by any time after a job start date can also be derived in terms of the interval probabilities of losing a job according to the same procedure.

Table 2.1
Calculation of the Probability of Being at Work after Separation from a Firm

Time Interval Since Separation	Probability of Being at Work by End of Time Interval
0-4 weeks	$P_1^a = P_1$
5-8 weeks	$P_2^a = P_1K_1 + (1 - P_1) P_2$
9-12 weeks	$P_3^a = P_1K_1K_2 + (1 - P_1) P_2K_1 + (1 - P_1)(1 - P_2) P_3 + P_1 (1 - K_1) P_1$

A. The Probability of Finding Employment (P_t)

The probit statistical technique allows us to identify the key variables which determine the interval probabilities of finding or retaining employment. Personal factors related to the individual as well as local and general economic conditions will affect the interval probabilities. Among the personal factors affecting the probability of finding employment

we would expect the following ones to be important:

a) Sex
b) Age
c) Education
d) Skill level
e) Marital status
f) Number of dependents
g) Home ownership status
h) Labour force status of spouse

The local and general economic conditions are reflected by the following variables:

i) Dummy variable to measure whether worker moved to another labour-market area.

j) Canadian unemployment rate for prime age males.

The sex of the displaced worker, factor a), is expected to be important because of discrimination by employers against hiring women. To the extent that women tend to be secondary income earners in a household or family more frequently than men, it is expected that women would experience less pressure in a job search situation. If the dummy variable for sex equals one for males, then the coefficient on this variable should be positive.

Age, education, and skill level, factors b), c), and d), measure the personal capacity of the displaced worker to obtain a new job. We expect older workers to have a more difficult time finding a job. This may result from union policies or from the age restrictions on hiring imposed by the pension plans of potential employers. Retraining becomes a less attractive investment from the perspectives of both the employer and worker as the potential working life of the worker decreases with age.

This raises the costs of hiring some older workers. Older workers, especially those near retirement, may also have less incentive to search for a job. The education and skill level variables measure the general and/or specific nature of the human capital of the displaced worker. General training and education should help the worker to find another job more quickly, whereas specific training could operate in the other direction.

Marital status, number of dependents, home ownership status, and labour force status of spouse, factors e), f), g), and h), provide indicators of the various pressures on a worker to find subsequent employment. Married workers with large families should have greater incentive to find another job quickly. This positive inducement could be offset, however, if the spouse is already employed. With other members in the family actually working, and with generous and extended unemployment insurance benefits, the displaced worker will tend to feel less pressure to find alternative employment. Home ownership can restrict labour mobility and will tend to deter a worker from seeking employment outside his current labour-market area. Home ownership also reveals part of the worker's wealth and could have a negative impact on the probability of finding subsequent employment.

High unemployment rates in the local region and in the country at large, factor j), should have a negative effect on the probability of re-employment. On account of the high degree of collinearity between local and national unemployment rates, however, we have used only the national unemployment rate for prime age males as our measure of whether

economic conditions are favourable for early re-employment. One advantage of using the unemployment rate for prime age males as opposed to the national average for all workers is that the former is less subject to fluctuations in labour force participation. The prime age male unemployment rate is therefore a good indicator of the demand for labour in that it is free for the effects of changes in the supply of labour. Changes in labour force participation create even more of a problem in using local unemployment rates as indicators of the demand for labour. Another reason why we use the national, as opposed to local, unemployment rate is that workers who migrate out of their region in search of a new job are more likely to be influenced by the national rate. We are interested in a worker's finding a new job anywhere in Canada and not only in the immediate area of his/her previous job.[1] A dummy variable is used in our regressions to indicate when a worker moved to another labour-market area, factor i).

B. The Probability of Retaining the Subsequent Employment (K_t)

The duration of a worker's subsequent employment is affected by the same variables. We would generally expect older workers to have a higher probability of retaining employment, and hence a lower probability of losing their new job. More highly skilled workers and those workers who own their homes should behave in a similar fashion. If personal and family ties to the local community are strong, then those who moved away might have a higher probability of quitting their subsequent employment to return home.

The unemployment rate could affect the job turnover rate in two ways. First, a lower unemployment rate signifies that new job prospects are good and this could encourage more quits. Second, a lower unemployment rate also means that workers laid off are more likely to be rehired elsewhere and thus would not be available for recall; under these conditions firms are unlikely to lay off trained workers, and the probability of retaining employment is consequently higher. The sign on the unemployment rate coefficient depends, therefore, on the relative strengths of the effects of the unemployment rate on quits and layoffs.

In addition to the previously mentioned variables, we could also include the reason why the worker terminated his previous employment. Workers who voluntarily resign from their previous jobs are more likely to have found alternative employment before leaving. They are also more likely to retain their subsequent employment for a longer period of time. The permanency of a worker's prior employment is also included as an explanatory variable of the probability of retaining a job. A high level of permanency is expected to reflect the skills and good work-oriented characteristics of a worker.

Data on the duration of unemployment and subsequent employment of workers are available from two sources, namely: a labour force tracking survey conducted by the Department of Industry, Trade and Commerce, and a separation work file extracted from the Unemployment Insurance Commision's Long-

itudinal Data Base. The probit statistical technique is applied to both data bases. The results are presented in Section 2.3

2.2.2 Variables Affecting the Alternative Wage (W^a)

A large number of the factors affecting the probability of finding a new job will also influence the expected wage rate. Age and sex should influence the new wage in the same direction as they influence the probability of re-employment; a male can expect to earn higher wages, but an older worker will generally face a lower wage rate. The human capital variables like education and skill should also have the same effect, except for specific training which should be positively related to the alternative wage. The economic pressure variables such as marital status, number of dependents, and other earners in the family should all lead the worker to accept a lower wage rate. Since less mobile workers will usually earn lower wages and since home owners are generally less mobile, we would expect a worker who owns his own home to be prepared to accept a lower wage. This relationship should hold more in smaller communities as opposed to large urban centres.

The longer a worker remains unemployed the lower will be his expected alternative wage. This decline reflects two factors. First, a long duration of unemployment signifies to a potential employer that this worker may lack basic skills or have other negative attributes which make him an undesirable employee. Second, as prolonged unemployment continues

the worker will revise downwards his own expectations of what he can earn, and his supply price will fall accordingly.

The unemployment rate, used as a measure of labour-market tightness, should influence the alternative wage in the same way as it affects the probability of re-employment. Low unemployment rates lead workers to anticipate earning higher wages. When demand and production are high, furthermore, employers are prepared to pay more for the workers they need to hire.

The determinants of the alternative wage are estimated using a single equation ordinary least squares regression. Information on alternative wages is taken from both the labour-force tracking survey and a sample of unemployment records.

2.2.3 Permanency of Previous Employment (P^b) and the Previous Wage Rates (W^b)

The full private income earned by the worker before being laid off (I^b) is estimated from equation (2.1). This requires information on the average duration of his previous employment (P^b) and on his previous wage (W^b). Some workers will have been permanently employed by the declining firm ($P^b = 1$), while others will have been temporary employees ($P^b < 1$). Permanent workers may have developed plant specific skills which raise their productivity and value to the firm. If these skills are not generally marketable, then permanent employees will have a previous wage greater than their alternative wage ($W^b > W^a$). This difference in wage rates, combined

with the fact that alternative permanent employment may not be available ($P^a < 1$), means that permanent employees who are laid off may face a sizeable decrease in their private incomes. Much of this loss takes the form of foregone rents. Temporary employees may not be affected as seriously. They are less likely to have plant specific skills, and their previous average wage rate is less likely to contain rents. The proportion of a temporary employee's time previously spent in employment (P^b) will probably also be closer to his subsequent employment experience after layoff (P^a).

Using the above reasoning, we would expect older workers who are laid off by a declining firm to exprerience the biggest loss in private income. By virtue of their age, older workers probably have more seniority in the firm. If senior workers have "bumping" privileges, then older workers are more likely to be permanent employees, to have acquired plant-specific skills, and to be receiving wages above what they could expect to earn in alternative employment. When laid off, moreover, older workers can expect to experience a longer duration of unemployment before finding alternative employment at a lower wage rate. Only the fact that they are more likely to retain their subsequent employment longer helps to reduce their loss in private income. The costs of adjustment for older workers are even greater when the unemployment rate is high.

A number of the determinants of the wage rate before layoff (W^b) and the permanency of previous employment (P^b) are investigated. The effects of age, seniority, sex, general education and skill levels,

the degree of permanency of employment and the existence of dependents on W^b are analysed. We expect that higher wages are earned by the older workers who have higher seniority, have experienced a high degree of permanency in their employment history, claim dependents and have high education and skill levels.

The factors affecting P^b that are analyzed include the age, sex, skill level, wage rate received, and existence of dependents for each worker before layoff. We expect age, the skill level, the wage rate, and the existence of dependents to be positvely related to P^b. Although it is expected that the wage rate is positively correlated with the other explanatory variables, the wage rate gives a good indication of the specific value of the worker to the firm, and hence, the quasi-fixity of the worker with respect to a firm. The relationship between P^b and sex is not obvious on a priori grounds. Even though males are expected to find jobs faster than females, if their stability once employed is less than that of females, then females may be employed for a greater proportion of the time they spend in the labour force. Given the homogeneity of the labour force tracking survey for separations from a single firm, regression analysis of the determinants of P^b was conducted only on the ROE/UIC claim data sets which display greater variance in P^b.

Information on the previous employment experience of a displaced worker can be obtained from the firm being examined as well as from labour tracking data sets. In the case studies which follow we make use of the labour force tracking survey of workers displaced from two firms, a sample of the personnel records from these firms, and a sample of unemployment

insurance records of workers living in the region. The variables P^b and W^b are calculated as sample averages from these data sources.

2.3 Case Studies of Costs of Adjustment for Labour

We have applied the above methodology to two case studies. The first is an establishment in the Owen Sound area in Ontario, which we refer to as company X (or abbreviated to Co. X.) This plant was finally shut down in October, 1975. The second case study involves a plant in the Sherbrooke region of Québec. We refer to this plant as company Y. This plant is still in operation, but it has experienced periodic cutbacks in employment and high labour turnover.

The labour force tracking survey conducted by the Department of Industry, Trade and Commerce provides a cohort study of the labour force experience of workers both before and after their final lay off from the firm. This survey also yields the greatest amount of detail on the characteristics of individual workers.[2] One problem with this data, however, is that the workers included in the survey may not be representative of the total work-force at the plant. For this reason we also sampled the personnel records at these two firms.

Our other data source relates more to the general labour force experience of workers in the region. We have detailed data on the spells of unemployment of workers in the region from a file which combines information on the individual's Record of Employment (ROE) with his unemployment insurance claim (claim data). The record of employment is submitted by the employer to the Unemployment Insurance Commission in order to establish the worker's eligibility for unemployment insurance. The claim data results when the worker initiates a claim and starts to draw his unemployment benefits. The data on this file are extracted from the Unemployment Insurance Commission's Longitudinal Data Base. The period covered is January, 1974 through March, 1977 for the ROE data and January, 1972 through March, 1977 for the claim data. The remainder of our labour force data for the region is drawn from Statistics Canada's Labour Force Survey and the 1971 and 1976 Censuses.

In order to present our empirical findings in a straightforward fashion we first describe the work forces at each of the plants. Second, we use the probit statistical model and the data from the labour force tracking survey to estimate the probability of a displaced worker's finding employment after having been laid off. Third, with the same data, we estimate the probability of his losing his subsequent job, or in other words the duration of his subsequent employment. Fourth, the alternative wage is estimated using a single equation regression. Having examined the two case studies in turn, we then use the ROE/claim data to repeat the last three steps of the analysis for a sample of workers in the region. Estimates of the permanency of employment before separation are also made for the workers in the ROE/claim regional samples.

Because the sample size of the ROE/claim data is bigger than the survey sample, this procedure provides a check on our original results and further verification four our methodology.

A general problem in performing any statistical analysis on samples from the labour force tracking survey based on only one company is the relative smallness and degree of homogeneity within the sample. This restricts the ability of the researcher to identify significant explanatory variables. To help overcome these problems in future analysis the labour force tracking data from a number of firms can be combined on sectoral or regional bases. With the ROE/UIC claim regional data, the sample sizes and heterogeneity increase, and hence, more significant results for the individual explanatory variables (as evidenced by the t-statistic) or for the overall specification (reflected by the F-statistic or maximum likelihood ratios) can be expected.

2.3.1 Company X (Owen Sound Region): Results Using the Labour Force Tracking Survey

A. Descriptive Statistics

Our labour tracking sample for the Co.X plant located in the Owen Sound region of Ontario contains 141 individuals.[3] This corresponds to about 35% of the total labour force employed during the final year of operations. The final shut down of the plant occurred in October, 1975 after a phased layoff of workers over a two year period. Table 2.2 presents some descriptive statistics on variables from the labour tracking sample and compares them with the other available data.

Following a phased layoff of unionized workers with bumping priveleges, it is not surprising that our sample contains mainly older workers with high seniority. The workers are predominately male, married with children, and home owners. In comparison with information drawn from Co.X 1974 personnel records these workers also appear to be more highly skilled and were among the best paid in the company before being laid off. The UIC sample data confirm that the workers in the survey were older and more skilled than the workers who had resigned from their jobs and/or experienced unemployment in the Owen Sound region.

Note that the average wage rate of employees at the Co.X plant was substantially higher than that earned on average by other workers who experienced unemployment in the region. It would appear that the workers at the Co.X plant were earning sizeable quasi-rents.

Table 2.2

Descriptive Statistics of the Co.X (Owen Sound) Labour Force Tracking Sample, the 1974 Co.X Personnel Records and the Owen Sound Regional Labour Force Sample (administrative data base for 1974-76)

Variables	Labour Force Tracking Sample	Personnel Records (1974)	Owen Sound Regional Labour Force Sample
Age (years)	45.26 ± 11.28*	40	32.03 ± 13.41
Sex (% males)	91	88	64
Married (%)	87	-	-
Home owners (%)	84	-	-
Number in household	3.07 ± 1.46	-	-
Spouse working (%)	23	-	-
Claim dependents (%)	-	-	26
Seniority (years)	14.7	11.5	-
Permanency of prior employment (% of time employed before separation)	99.85	82.7 (with Co.X)	-
Reason for Separation Laid-off (%) Resignation (%)	 88 9	 - -	 49 32
Skill (equivalent years): Specific Vocational Preparation General Education Development	 1.36 ± 2.36 8.84 ± 2.11		 .89 ± 1.68 7.74 ± 2.59
Average Monthly Gross Wage (1971 $)	589	604	473

*Standard deviation of observation

B. Factors Affecting the Probability of Finding a Job (Duration of unemployment)

Table 2.3 summarizes the results of the probit analysis to identify the key variables which determine the probability that a worker finds a job during various time intervals after being laid off from the Co.X plant Generally speaking, the fit of the regressions, as measured by the likelihood ratio test, is relatively good. The significance of the point estimates of the coefficients and their corresponding t-statistics vary, however, from period to period.

For the first month after layoff, the coefficients for the age of the worker, the unemployment rate, dummy variables for home ownership, and the employment status of the spouse have the expected sign and are statistically more significant than the others. It is interesting to note that using the Canadian unemployment rate for prime age males yielded on average more significant estimates than were achieved using the unemployment rate for the local region.[4] This means that older workers will have a longer duration of unemployment, that workers whose spouses are employed will take longer to find another job, and that all workers will have more difficulty finding alternative employment when the unemployment rate is higher. Somewhat surprisingly, the coefficients on the human capital variables, education and skill[5], are not significant; the negative coefficient on the years of schooling was not anticipated. The non-significant, negative coefficient on the dummy variable for district location may indicate that these workers had to spend more time in job search in the new area.[6] The positive coefficient

Table 2.3

Factors Affecting the Probability of Finding a Job for the Co.X (Owen Sound) Labour Force Tracking Survey Sample.

	Probability of Getting a Job		
Independent Variables	in 1st month after separation	between the 1st and 3rd months	after the 3rd month
Sex (male = 1)	.2319 (.41)*	.5760 (.93)	1.007 (1.39)
Age at separation	-.0361 (-2.4)	.0047 (.28)	-.0810 (-3.00)
Schooling (years of primary and secondary schooling)	-.1051 (-1.38)	.0440 (.48)	.1753 (1.64)
Marital Status (married = 1)	.2490 (.54)	-.2398 (-.35)	.5548 (.63)
Number in household	-.0268 (-.26)	.2023 (1.51)	-.1421 (-.66)
Home owner (= 1)	-.7545 (1.70)	-.6136 (-1.23)	-.8996 (-.89)
Change in location (If change in Census District, then = 1)	-.6496 (-1.24)	-.2645 (-.34)	2.331 (1.23)
Spouse working (= 1)	-4.38 (-2.96)	-.1741 (-.45)	-.0882 (-.17)
Skill (years equivalent of specific vocational preparation	.0497 (.88)	.0334 (.41)	-.0356 (-.22)
Unemployment rate (Canadian prime age male)	-.3554 (-1.49)	.0382 (.17)	.5000 (.68)
Months of job search (starting from third month)	- -	- -	.1624 (1.73)
Constant	4.621 (2.86)	-1.63 (-.84)	-2.652 (-.57)
Likelihood ratio test (d of f) **	64.64 (10)	6.57 (10)	27.79 (11)
# of positive/total observations	63/141	24/78	32/54

* ( ): t-statistics ** (d of f): degrees of freedom

on the dummy variable for sex indicates that males are likely to find employment sooner than females.

Between the first and the third month after lay off, no factors seem to dominate the explanation of the probability of finding a job during that period. In fact, none of the coefficients is significant, and many of them including the one on the unemployment rate variable show the wrong sign. This might be due to either an incorrect specification of the time interval or a lack of sufficient variability in the data.

In the last time interval, schooling and the number of months of job search have statistically significant coefficients with the expected sign. The unemployment experience of workers displaced from the Co.X plant clearly indicates the importance of age as a key determinant of the probability of finding employment.

C. Factors Affecting the Probability of Losing a Job (Duration of Subsequent Employment)

Table 2.4 summarizes the results of the factors affecting the probability of losing the jobs found after layoff from the Co.X plant.[7] Goodness of fit is again satisfactory. It is particularly interesting to note the relative importance (in terms of statistical significance) of the coefficients on the change in census district location and the skill variable. The former has a positive sign which suggests that a migrant worker tends to find employment in the temporary labour force sector of the economy. The negative sign on the skill variable suggests that a skilled worker tends to find work in the permanent labour force sector of the economy. The

Table 2.4

Factors Affecting the Probability of Losing a Job for the Co. X (Owen Sound) Labour Force Tracking Sample.

Independent Variables	Probability of Losing a Job	
	in LESS than 3 months	in MORE than 3 months
Sex (male = 1)	.8103 (1.14)*	1.6849 (1.62)
Age	.0024 (.18)	-.0050 (-.34)
School (years of primary and secondary schooling)	.1003 (1.15)	.0024 (.03)
Marital status (married = 1)	.1486 (.29)	1.884 (2.08)
Number in household	.0268 (-.80)	-.090 (-.57)
Change of location (If change in Census District, then = 1)	1.705 (3.89)	4.1402 (3.54)
Resign from previous job (= 1)	-.1762 (-.49)	-.1558 (-.43)
Unemployment rate (Canadian prime age male)	.2828 (1.60)	.0331 (.11)
Skill (equivalent years of specific vocational preparation)	-.1624 (-1.82)	-.1270 (-1.63)
Time from job loss to survey date	- -	-.0027 (-.12)
Constant	-4.090 (-2.21)	-3.541 (-1.49)
Likelihood ratio test (d of f)**	20.81 (10)	29.90 (11)
# of positive/total observations	25/158	30/133

* ( ): t-statistics
** (d of f): degrees of freedom

coefficients on the unemployment rate variable are positive as expected and statistically significant in the less than 3-month time interval. Somewhat puzzling are the positive and significant coefficients on the male and marital status variables in the more than 3-month period. They probably do not reflect a causal relationship, but rather a problem of sample size; we have a predominately married, male population, and most of the 30 individuals who lost their job after 3 months come from that category.

D. The Wage Equations Before and After Final Layoff from Company X

Table 2.5 reports regression results on the monthly wage rate before and after final layoff from the company. Ordinary least squares regression analysis was used with a semi-logarithmic functional form for the dependent variable.

Very little is explained by the regression on the before layoff wage rate. Our sample of workers appears to form a rather homogeneous group with respect to the wage rates paid by Co.X, and only the skill variable has some significance in explaining what little variation exists.

Although still present, this problem of a homogeneous sample is less acute in the alternative wage rate equation. Coefficients on the human capital variables like skill or technical education have a positive sign as expected. Also important is the change in census district location. Coefficients affecting this variable are positive and statistically significant in both formulations of the alternative wage rate equation which is

Table 2.5

Estimation of Wage Rates Received Before and After Separation for the Co.X (Owen Sound) Sample.

Independent Variables	Log. of alternative wage		Log. of wage before separation
Constant	6.307 (20.0)*	6.462 (23.9)	6.300 (44.6)
Sex (Male = 1)	.0665 (.74)	.0683 (.78)	.114 (1.81)
Seniority (years)	- -	- -	.0000561 (.38)
School (years)	.0127 (.98)	- -	.00159 (.17)
Technical Education (years)	- -	.116 (2.71)	.000914 (.03)
Skill (equivalent years)	.0414 (1.45)	- -	.0129 (1.54)
University (years)	- -	- -	-.0275 (-.37)
Age	-.00251 (-1.16)	-.00144 (-.66)	-.00165 (-.96)
Marital status (Married = 1)	-.0630 (-.33)	-.108 (-.57)	- -
Number in household	.00909 (.60)	.00681 (.46)	- -
Home owner (= 1)	.0277 (.43)	.0269 (.43)	- -
Change of location (Change of Census District = 1)	.163 (2.24)	.114 (1.68)	- -
Duration of unemployment (months)	-.00666 (-1.13)	-.00518 (-.89)	- -
Resign from previous job (= 1)	.00519 (.08)	.04230 (.73)	- -
Unemployment rate (Canadian prime age male)	-.0362 (-1.09)	-.0462 (-1.45)	- -
F Statistic # of Observations	1.933 133	2.499 133	1.120 145

* ( ): t-statistics

consistant with the worker's decision to migrate. As for the other coefficients in the regressions, if they are not statistically significant, at least most of them tend to demonstrate the expected sign. This is certainly true for variables like age, duration of unemployment, and the unemployment rate.

Using average values for the variables, we find that the alternative wage rate (corrected inflation) is about 10% lower than the wage rate before layoff.

2.3.2 Company Y (Sherbrooke Region): Results Using the Labour Force Tracking Survey

A. Descriptive Statistics

The size of our labour tracking sample from the company Y plant located in the Sherbrooke region of Québec is 208 individuals.[8] This sample represents about 12% of the company's work force in 1976. The plant has experienced a decline in its activity over the last few years, but has still managed to remain active.

This sample has quite different characteristics from the survey data for Co.X in the Owen Sound area. There the workers were relatively older. whereas in the Co.Y plant, they are younger even relative to those who have experienced unemployment in the Sherbrooke region in general. Most of the workers have little seniority. There are also more females in this sample. Compared to unemployed workers in general in the region, the workers in the

Table 2.6

Descriptive Statistics of the Company Y (Sherbrooke) Labour Force Tracking Sample, the 1976 Company Y Personnel Records and the Sherbrooke Regional Labour Force Sample (administrative data base for 1974-76)

Variables	Labour Force Tracking Sample	Personnel Records (1976)	Magog Regional Labour Force Sample
Age (years)	24.7 ± 8.00*	30.5	31.0 ± 12.1
Sex (% males)	68	75	68
Married (%)	54	-	-
Home owners (%)	33	-	-
Number in household	3.74 ± 1.86	-	-
Spouse working (%)	21	-	-
Claim dependents (%)	-	-	25
Seniority (years)	3 ± 6	16	-
Permanency of prior employment (% of time employed before separation)	92.4	85.6 (with Co.Y)	-
Reason for Separation			
Laid-off (%)	29	-	62
Resignation (%)	59	-	22
Skill (equivalent years):			
Specific Vocational Preparation	.30 ± .54	-	.93 ± 1.66
General Education Development	5.53 ± 2.48	-	-
Average Monthly Gross Wage (1971 $)	400	490	413

*Standard deviation of observation

Company Y plant are relatively low skilled and received a lower wage rate. It is also intersting to note that a fairly high percentage of these workers resigned from their job at Company Y; we suspect that these resignations may have occurred in anticipation of pending lay-offs.

B. Factors Affecting the Probability of Finding a Job

Table 2.7 summarizes the results. The explanatory power of our probit analysis is quite satisfactory as evidenced by the likelihood ratio tests.

Results for the 1st month after separation are impressive. The positive and statistically significant coefficient on the variable indicating that workers resigned from their previous job with Company Y confirms our interpretation that workers anticipate being laid off and quit in order to find alternative employment. The positive and significant coefficient on the variable for marital status reflects the pressure felt by married workers to maintain the income level of the family. Similarly, the significantly negative coefficient on the spouse working emphasizes the importance of pressure variables as factors explaining the probability of finding a job one month after a worker was laid off or resigned from the company. In this particular sample it is also worth noting the positive and significant coefficient affecting the skill variable. Finally, the unemployment rate which measures the economic conditions during the first month after separation, has a negative and significant coefficient as expected.

The estimates for the second time interval continue to support the important role of the employment status of the spouse, but now the coefficients affecting the resign, marital status, skill, and unemployment rate variables have become statistically insignificant. The coefficient on the skill variable has reversed its sign. Age now starts to play a much more important role in determining the probability of finding a job. As mentioned before, the somewhat less significant results in this time interval reflect either the specification of the model or the complexity of the adjustment process between jobs.

The results for the open-ended period re-establish the importance of the skill variable and the marital status variable. The employment status of the spouse continues to be important, but now the age of the worker has equal significance. The resign and change in census district location variables also gain some importance. A surprising result is the positive and significant coefficient affecting the unemployment rate variable. One explanation is that since the open-ended time interval covers a period of almost three years, having the unemployment rate move along a trend may tend to dominate the variance within the group of workers at both ends of that period. Breaking up this time interval into smaller subperiods might be the solution to cope with this particular difficulty. [9]

Table 2.7

Factors Affecting the Probability of Getting a Job for the Company Y (Sherbrooke) Sample.

	Probability of Getting a Job		
Independent Variables	in 1st month after separation	between the 1st and 3rd months	after the 3rd month
Sex (male = 1)	.0614 (.051)*	.0108 (.02)	.6911 (1.38)
Age	-.0111 (-.57)	-.0894 (-1.56)	-.0632 (-2.05)
School (years)	.0262 (.38)	-.0343 (-.28)	-.1279 (-1.12)
Marital status (married = 1)	1.2593 (4.50)	.4223 (.73)	1.1429 (1.57)
Number in household	.0310 (.36)	.0470 (.57)	-.0772 (-.68)
Home owner (= 1)	-.1570 (.49)	-.2976 (-.45)	.5078 (1.10)
Change in location (Change in Census District = 1)	.1524 (.62)	.2456 (.58)	3.7263 (1.37)
Resigned from job (= 1)	.8032 (3.53)	.3293 (.88)	.5860 (1.50)
Spouse working (= 1)	-4.2465 (-3.49)	-2.3170 (-1.79)	-1.5610 (-2.11)
Skill (equivalent years)	.3957 (1.65)	-1.068 (-.54)	.8374 (1.97)
Unemployment rate (Canadian prime age male)	-.1585 (-1.65)	-.0916 (-.54)	.4615 (1.97)
Job search time (months after third month)	- -	- -	.0457 (3.23)
Constant	-.4431 (-.44)	1.393 (.75)	-1.2068 (-.54)
Likelihood ratio test	106.9 (11)**	20.25 (11)	71.22 (12)
# of positive/total observations	89/208	13/119	50/106

* ( ): t-statistic

** ( ) degrees of freedom

C. Factors Affecting the Probability of Losing a Job

Table 2.8 summarizes the results where once again the probit analysis demonstrates quite a good fit to the data. Our previous suggestion that a migrant tends to find work in the temporary sector of the labour force is reconfirmed by the positive and significant coefficients on the change in census district location obtained for both periods. A unionized worker will have a lower probability of losing his job as indicated by the negative and significant coefficients on the union dummy variable. If a worker resigned from his previous job, then it lowers the probability of losing his subsequent job; this is consistent with our previous interpretation of workers resigning in anticipation of a pending layoff. For the period less than 3-month, the house ownership variable has a negative and significant coefficient which might reflect the pressure to keep working in order to meet financial commitments. After three months, the skill variable has, as expected, a negative and significant coefficient. The positive and significant coefficient on the number of separations after lay off is clearly consistent with the temporary nature of the jobs undertaken by these workers. A similar result is obtained with the searching time variable. Results on the sex variable are not inconceivable, but nor are they easy to interpret. The negative and significant coefficient on age indicates that older worders have a higher probability of retaining their subsequent employment once they find it. This becomes an important consideration in estimating the probability of being at work which is calculated later.

Table 2.8

Factors Affecting the Probability of Losing a Job for the Company Y (Sherbrooke) Sample.

	Probability of Losing a Job	
Independent Variables	in LESS than 3 months	in MORE than 3 months
Sex (male = 1)	.2565 (.97)*	-.4514 (-1.53)
Age	-.0126 (-.90)	-.0367 (-1.93)
School (years)	-.0267 (-.46)	-.0133 (-.18)
Marital status (married = 1)	-.1653 (-.69)	.1222 (.39)
Number in household	-.0285 (-.55)	.0666 (1.12)
Home ownership (= 1)	-.4746 (-1.74)	-.2408 (-.86)
Resign from previous job (= 1)	-.2483 (-1.26)	-.6716 (-2.65)
Skill (equivalent years)	-.0632 (-.77)	-.1801 (-1.80)
Unionized (= 1)	-.4299 (-1.95)	-.5480 (-2.13)
Change in location (Change in Census District = 1)	.5957 (2.36)	3.1066 (4.95)
Permanency of prior employment (% of time employed)	-.0068 (-.09)	-.0087 (-.77)
# of jobs after separation (If more than 1, then = 1)	.0893 (.43)	.9190 (3.11)
Unemployment rate (Canadian prime age male)	-.0095 (-.09)	.1437 (.77)
Time from job loss to survey date (months)	- -	.0469 (4.50)
Constant	.8478 (.80)	.4094 (.23)
Likelihood ratio test (d of f)	31.54 (10)	81. 98 (14)
# of positive/total observations	60/235	70/175

* ( ): t-statistic

D. The Wage Rate Equation

Table 2.9 reports regression results on the monthly wage rate before and after lay off. An ordinary least squares technique was used along with a semi-logarithmic functional form for the dependent variables. The before layoff wage equation gives a significant but not powerful explanation. The sex, seniority, education and skill variables are significant in explaining the wage policy of company Y.

The fit on the alternative wage rate equations is obviously better. The coefficients for sex, education (total, university and technical), marital status, union membership and the dummy variable for resignation from previous job appear with the expected are statistically significant. The positive coefficient on age probably reflects the fact that our sample contains mostly younger workers; a non-linear specification of this variable might be more appropriate. The positive and significant coefficient of the variable for the number of jobs since separation may suggest the existence of a trade-off workers make between higher wage rates and a less stable job. Surprisingly, the coefficient on the duration-of-unemployment variable is not significant although it does have the right sign. The coefficient on the unemployment rate variable is not significant and is unfortunately positive; a trend element of the type explained before could be the problem. In future work it may be worthwhile to consider a change in the unemployment rate variable as well as the unemployment rate itself to cope with this problem.

Table 2.9

Estimation of Wages Received Before and After Separation for the Company Y (Sherbrooke) Sample

Independent Variables	log of alternative wage		Log of wage before separation
Sex (male = 1)	.2100 (3.80)	.2080 (3.53)*	.0776 (2.96)
Age	.0091 (3.10)	.0087 (2.78)	.9580 (.0070)
Seniority (years)	- -	- -	.0005 (2.29)
School (years)	.0312 (2.56)	- -	.0081 (1.182)
Technical Education (years)	.0392 (1.78)	- -	.0312 (2.505)
University (years)	- -	- -	.0134 (.36)
Total Education (years)	- -	.0326 (2.93)	- -
Skill (equivalent years)	- -	.0018 (.06)	.0558 (2.13)
Marital Status	.1160 (2.39)	.1050 (2.02)	- -
Number in household	.0089 (.787)	.0092 (.787)	- -
Home owner (= 1)	- -	.0469 (.857)	- -
Change in location (Change in Census District = 1)	.0534 (1.20)	.0562 (1.24)	- -
Unionized in new job (= 1)	.2810 (6.02)	.2790 (5.78)	- -
Permanency of prior employment (% time employed)	- -	- -	.00078 (.95)
Duration of unemployment (months)	- -	-.0013 (.26)	- -
Out of Labour Force (= 1)	- -	.0812 (1.16)	- -
Temporary lay-off (= 1)	- -	.0703 (.85)	- -
Permanent lay-off (= 1)	- -	.0352 (.49)	- -
Resign from previous job (= 1)	.0684 (1.159)	.0899 (1.52)	- -
Number of jobs since separation (If more than 1, then = 1)	.0956 (1.91)	.0889 (1.73)	- -
Unemployment Rate (Canadian prime age male)	.0267 (1.23)	.0273 (1.25)	- -
Constant	4.987 (26.00)	4.967 (25.58)*	5.738 (49.52)
F-statistic	8.887	6.155	4.312
# of observations	225	225	293

* ( ): t-statistic

Using average values for the variables, it was found that the alternative wage rate (corrected for inflation) is more than 15% higher than the wage rate before layoff. Since this result differs from the Co.X regression analysis, where we found average wage rates to be lower after layoff, it places greater importance on the status of the declining activity, the average age and seniority of the workers, and the mix of skills in the firm under examination.

The company Y plant hired mostly young low skilled workers who had high turnover rates and little seniority. Most of the employees at the Co.X plant in the Owen Sound area were older, highly skilled and had many years of experience. The fact that our empirical results are generally significant for such diverse types of workers is testimony to the validity of our model.

2.3.3 The Owen Sound Region: Results Using the ROE/UIC Claim Data

The ROE/UIC claim data compiled for a given region yields observations on individuals from the general labour force who have experienced at least one spell of unemployment during which a claim was established during the time period. The major advantages of this set of data from a statistical viewpoint are that it provides a greater number of observations and greater variance among those observations. Unfortunately, however, it does not provide us with as many explanatory variables as did the labour force tracking survey. For these reasons and others presented in the theoretical discussion of the model, it is very important to compare the results from the two sets of data.

The sample size of the ROE/UIC Claim data for the Owen Sound region is over 5,000 observations. Some descriptive statistics from this sample were presented in Table 2.2, where it can be seen that the workers were generally younger, and less skilled than in the Co.Xplant. There were also more female workers represented in the ROE/claim sample relative to the Co.X data.

A. Factors Affecting the Probability of Finding a Job (Duration of Unemployment)

Table 2.10 summarizes the empirical results. It should immediately be noted that the probit statistical technique yields a very good fit to this data. Even more important is the general consistency of the results across subperiods with respect to both the sign of the coefficients and their statistical significance. This is particularly true for the dummy variable for sex, and what is more important for policy puposes, for age and the unemployment rate in these regressions that leads us to some of our policy recommendations in Chapter 4.

The coefficient affecting the skill variable is negative for three periods and positive in only one, and generally has low t-statistics. Arguments can be made for both positive and negative coefficients for this variable; one of the drawbacks of the ROE/claim data set is that it does not contain any specific information on schooling which would be another measure of human capital. Experimentation with the skill variable, such as allowing for a non-linear relationship with the dependent variable and

Table 2.10

Factors Affecting the Probability of Finding a Job for the Owen Sound Regional Labour Market Sample.

	Probability of Getting a Job in Time Interval After Job Loss (weeks)				
Independent Variables	0-4	5-12	13-24	25-48	49+
Sex (male = 1)	.2617 (6.36)*	.2313 (3.89)	.2935 (4.09)	.3637 (3.36)	.4729 (2.49)
Age	-.0048 (-3.25	-.0068 (-3.31)	-.0125 (-4.97)	-.0166 (-4.56)	-.0110 (-1.95)
Resigned from previous job (= 1)	.7872 (16.83)	-.3825 (-5.18)	-.3467 (-4.15)	-.3740 (-3.16)	-.0122 (-.07)
"Other" reason for separation from previous job (= 1)	.1634 (3.23)	-.0014 (-.02)	-.1462 (-1.67)	-.1290 (-.97)	-.1877 (-.82)
Claim dependents (= 1)	.0714 (1.54)	.0999 (1.50)	-.0332 (-.39)	-.0633 (-.49)	-.2288 (-.10)
Claim established in same region (= 1)	-.0293 (-.57)	-.0279 (-.37)	-.1227 (-1.32)	-.5473 (-3.88)	-.6822 (-1.54)
Skill (equivalent years)	-.0205 (-1.85)	-.0162 (-1.02)	-.0306 (-1.60)	.0357 (1.52)	-.0629 (-1.40)
Recalled to previous employer (= 1)	.3434 (6.84)	.4958 (7.13)	.9233 (9.67)	1.4840 (7.09)	2.6435 (2.61)
Unemployment rate (Canadian prime age male)	-.0546 (-3.13)	-.2010 (-8.28)	-.1752 (-5.50)	-.0368 (-.50)	-.3966 (-5.14)
Out of labour force during unemployment episode (= 1)	-.0278 (-5.55)	-.1707 (-2.47)	-.1237 (-1.55)	-.1394 (-1.23)	-.6389 (-3.31)
# of weeks from separation to "survey date"	- -	- -	- -	- -	.0157 (6.15)
Constant	-.2278 (-2.13)	.3836 (2.60)	.8607 (4.66)	.9845 (2.78)	.2362 (.45)
Likelihood ratio test (d of f)**	440.64(10)	182.86(10)	221.68(10)	143.4(10)	119.76(10)
Positive observations/ total observations	2179/5017	770/2702	645/1636	359/753	101/390

* ( ): t-statistics ** (d of f): degrees of freedom

for interaction with the age variable, should be considered in further work.

The coefficient on the dummy variable indicating that the individual claimed unemployment insurance in the same region has a negative sign which suggests that the less mobile workers take longer to find a job. This is consistent with the finding from the survey data for workers unemployed more than three months. The dummy variable which captures whether or not workers have spent time out of the labour force during an unemployment episode has a negative sign and significant coefficient which suggests that these workers may have experienced a loss of job search time and of information about the labour market in general, and new job prospects in particular. Persistence through time of the negative sign may also reflect marginal attachment of these workers to the labour force. The fact that many of those out of the labour force are not collecting UIC when they in fact could have, can be taken to indicate a strong intention not to look for a job, and hence, it is not unexpected that they take longer to become re-employed. Further analysis of the interaction with skill, sex and unemployment rate variables should be of some interest here.

The positive and significant coefficient for the dummy variable for workers who resigned from their previous job for the 0-4 week subperiod, and then the negative sign for the other periods is not an improbable result. It may suggest that the workers' resignation in anticipation of layoff may explain only some of the quits and its effect disappears over time. These results may also characterize specific types of workers who could be identified

through interaction analysis. It can be postulated that those who resign fall into two groups. The first group would be expected to contain those who already had a new job lined up before they quit. This group would be expected to dominate the early time intervals after separation. The second group would contain those who quit because they disliked working in general or for a particular firm, but did not have another job to which to go. These workers either because of their marginal attachment to the labour force or because of their relatively poor work attitudes and habits (signalled to their subsequent employers by their quitting behaviour) can be expected to take longer to become re-employed, and hence, dominate the later time intervals. Since "other" reasons for separation also include individuals who in fact resigned, a similar interpretation applies to its coefficients as well.

The dummy variable for workers who were recalled to their previous employer are strongly, significantly and consistently positive indicating that those workers who are recalled find a job much faster than those who have to search for alternative employment. These results suggest that the duration of unemployment of workers who are regularly laid off for temporary periods is shorter than what workers who are laid off from a closing firm would experience. The significance and magnitude of the recall coefficients indicate the importance of temporary layoffs in studying the nature of unemployment[10]. These results also demonstrate the strength of this methodology for investigating labour turnover from the perspective of a firm, an industry or a region.

The positive and significant coefficient on the variable measuring the number of weeks in the sample is not surprising. The longer a worker

searches for a job, the higher is the expectation of finding one. This variable serves to normalize our estimates for the length of time over which we observe the individual.

B. Factors Affecting the Probability of Losing a Job (Duration of Employment)

Results of the analysis of the factors affecting the probability of losing a job are reported in Table 2.11. Goodness of fit remains satisfactory although not generally as impressive as for the probability of finding a job. The same applies to the overall consistency of the signs of the coefficients. For example, the coefficient on the age variable alternates in sign.

The unemployment rate variable has the expected positive sign and is statistically significant in three subperiods. In the last period the variable was dropped from the regression to avoid the trend problem discussed earlier. The skill variable presents consistently negative and significant coefficients. A negative sign on this variable in estimating the probability of losing a job is more appropriate than a similar sign affecting the probability of finding a job. This suggests that once a skilled worker has found a job, he is less likely to be laid off. This might reflect the large transaction costs for a firm in recruiting qualified workers. Qualifying remarks on this interpretation apply here as well with respect to interaction variables.

Table 2.11

Factors Affecting the Probability of Losing a Job for the Owen Sound Regional Labour Market Sample.

	Probability of Losing a Job in Time Interval from Job Start (weeks)				
Independent Variables	0-4	5-12	13-24	25-48	49+
Sex (male = 1)	.0484 (.909)*	.0811 (1.72)	.2058 (3.28)	.1600 (1.93)	.2898 (2.43)
Age	.0019 (.965)	-.0038 (-1.84)	-.0068 (-2.85)	.0063 (2.05)	-.0094 (-2.06)
Resigned from previous job (= 1)	-.3394 (-5.77)	.1202 (2.11)	.1642 (2.45)	.0733 (.82)	.3790 (3.15)
"Other" reason for separation from previous job (= 1)	-.0644 (-1.01)	.1700 (2.60)	.1011 (1.30)	.1501 (1.44)	.1684 (1.12)
Permanency of prior employment (proportion of time employed)	.0115 (.135)	-.4568 (-5.46)	-.1445 (-1.44)	-.2239 (-1.72)	.1471 (.82)
Claim dependents (= 1)	.0279 (.48)	-.0533 (-.88)	-.0860 (-1.21)	-.1745 (-1.87)	.0275 (.21)
Claim established in same region (= 1)	-.2110 (-3.41)	-.1941 (-3.02)	-.3623 (-4.60)	-.3503 (-3.10)	-.6122 (-3.59)
Skill (equivalent years)	-.0299 (-1.89)	-.0456 (-2.89)	-.0279 (-1.57)	-.0613 (-2.55)	-.5563 (-1.86)
Recalled to same firm (= 1)	-.3650 (-5.81)	.1864 (3.11)	.2332 (3.30)	.9531 (9.94)	1.24 (7.34)
Unemployment rate (Canadian prime age male)	.1866 (8.05)	.1051 (4.41)	-.0138 (-.48)	.5404 (9.18)	- -
# of weeks from job start to "survey date"	- -	- -	- -	- -	.0111 (6.09)
Constant	-1.3719 (-0.28)	-.5275 (-3.47)	.0187 (.11)	-2.4126 (-7.71)	-1.1108 (-3.78)
Likelihood ratio test (d of f)**	156.30(10)	91.51(10)	65.62(10)	253.11(10)	127.17(10)
Positive observations/ total observations	751/4039	923/3269	731/2236	614/1323	272/700

* ( ): t-statistics

** (d of f): degrees of freedom

Another interesting result is the negative and significant coefficients affecting the dummy varaible for those who claim in the same region. This suggest indirectly that migrant workers tend to find a job in the temporary sector of the economy which is consistent with our findings for Co.X workers from the survey data. Whether workers, who were previously employed on a permanent basis as opposed to a temporary basis, have a higher probability of retaining employment is not resolved by these results. Although most of the coefficients on the employment index measuring permanency of prior employment are negative, they still fluctuate in sign and in significance. In fact, by the very nature of the ROE/claim data we have almost no observations on the permanent labour force sector of the economy, because the workers for the permanent sector do not experience any spells of unemployment.

The coefficients for the dummy variable for resignation from the previous job are all positive except for the first period and all statistically significant except for one interval. If the hypothesis that was previously stated is true, viz., resignation cases can be divided into the workers switching directly from job to job and the more marginal workers. then it would appear that the first time interval is dominated by the first group and the later time intervals by the latter workers.

The coefficients for the workers recalled to their firms are all positive except for the first time interval and are also all significant. Although workers finding work with their previous employers tend to find work faster (many of these workers are probably on temporary layoff), after an initial

short stable period of employment they actually have a higher than average probability of losing their jobs. Again the importance of recalls in labour turnover for temporary sector workers is demonstrated as is the ability of this methodology to handle labour turnover phenomena.

Results on the sex dummy variable counterbalance those of the probability of finding a job, whereas the results of the "dependency status" and "other reason for separation" dummy variables do not appear important. Finally, the positive and significant coefficient of the variable measuring the number of weeks in the sample is again of no surprise.

C. The Wage Rate Equations

It is possible from the UIC data to impute a weekly wage rate for each individual worker from information on insured earnings during the last 20 weeks of employment as long as the limit on insured earnings is not reached. Many workers in our sample have reached the limit imposed by the UIC program. We have therefore run regressions on both full and partial samples. The partial sample includes only the workers with a monthly wage rate below the limit and for whom information about their skill level is also available. Table 2.12 reports the regression results derived from ordinary least squares and applied to the logarithm of the weekly wage rates existing both prior to separation and after re-employment. The wage rates are expressed in 1971 dollars to correct for inflation.

Our goodness of fit measures are impressive for all regressions. The results in terms of sign and significance of the coefficients or the regressions for the wage rate prior to separation compare favourably to the wage rate regressions after re-employment. This, in fact, follows from the general nature of the ROE/claim data.

It is interesting to note the consistent importance of the sex dummy variable, indicating wage discrimination againts females. The employment index variable has a positive sign which perhaps reflects on the nature of the work involved or on the particular qualities of the workers. It could also be a rough measure of the quasi-rents earned by more permanent employees. The negative sign on the variable for the duration of unemployment reflects revised anticipations for both the workers unemployed

Table 2.12

Estimation of Wages Received Before and After Separation for Owen Sound Regional Labour Market Sample.

	Full Sample		Partial Sample	
Independent Variables	Log of wage before separation	Log of wage in new job	Log of wage before separation	Log of wage in new job separation
Sex (male = 1)	.3339 (21.90)*	.3196 (22.12)	.2200 (12.40)	.2223 (12.89)
Age	.00345 (6.28)	.00084 (1.56)	.0012 (1.76)	-.00172 (-2.49)
Resigned (= 1)	- -	-.0293 (1.86)	- -	-.0034 (-.16)
"Other" reason for separation (= 1)	- -	-.0349 (2.49)	- -	-.0493 (-2.17)
Permanency of prior employment index	.1555 (6.38)	.0982 (4.18)	.1830 (6.20)	.1157 (3.91)
Claim dependents (= 1)	.0668 (3.94)	.0785 (4.18)	.0479 (6.20)	.0673 (3.91)
Calendar time (UIC week counter)	- -	.000079 (.48)	- -	.0000804 (.37)
Duration of unemployment (weeks)	- -	-.0016 (-3.38)	- -	-.00128 (-2.20)
Claim established in same region (= 1)	-.0133 (-.75)	- -	.0143 (.61)	- -
No change in regions (= 1)	- -	.0505 (4.0)	- -	.0494 (3.08)
Skill (equivalent years)	- -	- -	-.0039 (-.64)	.000668 (.11)
Recalled to same firm (= 1)	- -	.0496 (3.22)	- -	.0702 (3.45)
Constant	4.0223	4.1631	4.0276	4.1793
F-Statistic	148.1	76.7	39.3	24.7
Number of observations	3049	3049	1922	1922

* ( ): t-statistics

for a long time and the employers who are also aware of their extended unemployment.

We observe conflicting results with respect to the age variable. The sign of the coefficient is positive suggesting that age accounts for experience. The negative sign for new jobs in the partial sample suggests that older workers whose insurable earnings were below the ceiling may have to accept a lower wage rate in order to gain re-employment.

The coefficient on the dummy variable for dependents shows the expected sign and is significant. Workers with dependents are under pressure to maintain the monetary income of the household. Workers recalled to their previous jobs also earn significantly higher wage rates. This could reflect the maintenance of seniority rights, wage scale levels, and rents the worker receives from skills specific to the firm.

No interesting results were obtained for the skill or time or labour (productivity growth) variables. The positive and significant coefficients indicating no higher wage rates for a change in region are puzzling. This last result differs from our extimates using the labour tracking sample at the firm level, and we do not have an explanation at this point.[9] Further investigation of the data is also warranted for the results of the dummy variables for resignations and other reasons for separation. Note that in all these cases, the absolute values of the coefficients affecting these dummy variables are relatively low.

D. Factors Affecting the Proportion of Time Employed Before Separation

The proportion of time an individual was employed (P^b) is based only on the time spent in the labour force. From the employment histories developed for individuals on the UIC/ROE regional data base, a sample of P^b values is selected for analysis. This sample consists of the most recent separation of each individual on the file in order to maximize the amount of prior employment experience used to estimate P^b. Ordinary least squares regressions were performed on a semi-logarithmic specification.[12] The results for the Owen Sound region are given in Table 2.13.

The overall specification is significant. As expected, P^b is significantly and positively correlated to the age of the worker at separation, the skill level, the wage rate and the economic pressures of having dependents. The location of the employment (assuming that it is in the same region as the UI claim) is not significant in explaining variations in P^b.

The dummy variable for males turns out to be negative and significant. Females can therefore be expected to be employed a higher than average proportion of the time. Even though females have greater difficulty than males in finding jobs (see Table 2.10), they are better at keeping jobs (see Table 2.11). This latter effect appears to outweigh the former in determining the proportion of time at work.

Comparing specifications I and II in Table 2.13 it is seen that the inclusion of the wage rate adds singificantly to the overall explanation of P^b given by the model. The effects of the high degree of collinearity between the wage rates and some of the other variables is also evident. This

Table 2.13

Estimation of the Proportion of Time Employed Before Separation for the Owen Sound Regional Labour Market Sample

Independent Variables	Log of Proportion of Time Employed Before Separation	
	I	II
Sex (Male = 1)	-.0416 (-2.15)*	-.1017 (-4.92)
Age at separation	.0039 (6.10)	.0039 (6.17)
Claim dependents (= 1)	.0659 (2.90)	.0484 (2.13)
Claim established in same region (= 1)	-.0219 (-.72)	-.0115 (-.38)
Skill (equivalent years)	.0240 (5.38)	.0163 (3.62)
Weekly wage before separation (1971$)	- -	.0025 (8.08)
Constant	-.4949	-.6953
F-statistic	18.61	27.05
Observations	1943	1910

* ( ) = t-statistics

is particularly true for the sex, dependents and skill variables. The wage rate can be taken as an indicator of the degree of quasi-fixity of the worker to the firm. The specific value of the worker to the firm and the costs of firing, hiring and training a new employee to replace this worker result in the worker earning specific rents at this job and the increased reluctance of the employer to ever layoff such a worker.[13]

2.3.4 The Sherbrooke Region: Results Using the ROE/UIC Claim Data

We do not expect any major differences between the results from the Owen Sound region and the Sherbrooke region at least in terms of the sign of the coefficients and their statistical significance. Both samples are fairly large, and no sampling differences are evident from a brief overview of the descriptive statistics reported in Table 2.2 and Table 2.6. To avoid repeating arguments, we will focus our discussion on any differences which occur.

In Table 2.14 we report the results of the probit analysis on factors affecting the probability of finding a job. The impressive results in terms of goodness of fit, expected sign for the coefficients and statistical significance of the coefficients obtained with the Owen Sound region sample are repeated here. In fact, the results are almost point by point identical in both samples.

Table 2.15 shows the results for the factors affecting the probability of losing a job in the Sherbrooke region. Comparing the results of Table 2.15 with those derived from the ROE/claim data for Owen Sound (Table 2.11) we observe that they are also very close. The only differences between the

two sets of results are the signs of the coefficients on the sex dummy variable from the subperiods 25048, and 49+ weeks. These differences are minor, however, and not sufficient to cast doubt on the validity of the underlying model.

Table 2.16 presents the wage equation results. Again the results are very similar to those of the Owen Sound case except for two important variables. With the Sherbrooke sample, the coefficients for the variables measuring productivity gains over time and skill are of the expected positive sing and both statistically significant.[14] The much larger sample size of the Sherbrooke file over the Owen Sound file might explain this intersting improvement in the results.

Finally, Table 2.17 gives the results of the estimation of the proportion of time spent at work before separation in the Sherbrooke region. While the pattern of the results stayed almost the same as in the Owen Sound area (Table 2.13), the significance of the results improved. The only difference is that it appears that workers in the temporary sector may be able to remain employed slightly longer in the Sherbrooke region than in other areas in which they established claims.

These empirical results provide substantial evidence in support of the model of the adjustment process facing displaced workers which we have outlined. More testing for consistency and more experimentation with various specifications could further improve these already encouraging results. In particular, the use of interaction variables and non-linear relationships should be seriously considered.

Table 2.14

Factors Affecting the Probability of Finding a Job for the Sherbrooke Regional Labour Market Sample.

	Probability of Getting a Job in Time Interval After Job Loss (weeks)				
Independent Variables	0-4	5-12	13.24	25-48	49+
Sex (male = 1)	.1717 (5.42)*	.1200 (2.85)	.2540 (5.14)	.4505 (6.78)	.4101 (3.77)
Age	-.0012 (-.95)	-.0073 (-4.24)	-.0075 (-3.84)	-.0152 (-5.90)	-.0240 (-5.91)
Resigned (= 1)	.7972 (22.18)	-.3961 (-6.71)	-.3393 (-5.42)	-.3973 (-5.06)	-.2542 (-2.17)
"Other" reason for separation (= 1)	.2773 (7.14)	-.0557 (-1.08)	-.0095 (-1.55)	-.0016 (-.02)	.0717 (.53)
Claim dependents (= 1)	.1455 (4.02)	.0536 (1.08)	.1751 (2.96)	.0271 (.32)	.0139 (.10)
Claim established in the same region (= 1)	-.0137 (-.40)	-.1234 (-2.61)	-.0591 (-1.03)	-.0742 (-.94)	-.0474 (-.36)
Skill (equivalent years)	-.0306 (-3.60)	-.0057 (-.53)	-.0035 (-.29)	.0145 (.85)	.3904 (1.41)
Recalled to same firm (= 1)	.4133 (11.60)	.5309 (11.36)	.6325 (10.65)	1.50 (13.02)	2.6224 (4.65)
Unemployment rate (Canadian prime age male)	-.1026 (-7.89)	-.1297 (-7.66)	-.1299 (-6.18)	-.0132 (-.31)	-.3706 (-7.84)
Out of labour force during unemployment episode (= 1)	-.3257 (-7.19)	-.1430 (-2.46)	-.1050 (-1.66)	-.1428 (-1.76)	-.6073 (-4.62)
# of weeks from job loss to "survey date"	- -	- -	- -	- -	.0171 (10.70)
Constant	-.2919 (-3.62)	.0957 (.89)	.1636 (1.26)	.2703 (1.24)	.1124 (.3267)
Likelihood ratio test (d of f)**	750.98(10)	280.61(10)	271.75(10)	360.08(10)	365.93(11)
Positive observations/ total observations	3384/9407	1454/5822	1231/3804	1009/1984	329/955

* ( ): t-statistics

** (d of f): degrees of freedom

Table 2.15

Factors Affecting the Probability of Losing a Job for the Sherbrooke Regional Labour Market Sample.

	Probability of Losing a Job in Time Interval from Job Start (weeks)				
Independent Variables	0-4	5-12	13-24	25-48	49+
Sex (male = 1)	-.0915 (-2.31)*	.1521 (3.61)	.1167 (2.38)	.0002 (.002)	-.0787 (-.83)
Age	.0009 (.58)	-.0031 (-1.79)	-.0026 (-1.30)	-.0008 (-.29)	-.0069 (-1.72)
Resigned from previous job (= 1)	-.3462 (-7.47)	.0892 (1.99)	.1987 (3.66)	.2742 (3.84)	.3207 (3.09)
"Other" reason for separation from previous job (= 1)	-.1600 (-3.31)	.0271 (.55)	.0812 (1.39)	-.0850 (-1.10)	.1404 (1.29)
Permanency of prior employment index	-.1105 (-1.87)	-.4219 (-6.94)	-.3948 (-5.46)	-.4558 (-4.85)	.0972 (.68)
Claim dependents (= 1)	-.0299 (-.66)	-.0729 (-1.56)	-.0137 (-.25)	.0398 (.56)	-.0167 (-.16)
Claim established in the same region (= 1)	-.1659 (-3.90)	-.0167 (-3.69)	-.1010 (-1.81)	-.2182 (-2.90)	.0243 (.21)
Skill (equivalent years)	-.0478 (-4.10)	-.0426 (-3.80)	-.0193 (-1.66)	.0005 (.03)	-.0146 (-.65)
Recalled to same firm (= 1)	-.3162 (-7.34)	-.0395 (-.92)	.4172 (8.48)	.8879 (13.09)	1.1409 (11.7)
Unemployment rate (Canadian prime age male)	.0618 (3.81)	.0519 (2.88)	.0795 (3.48)	.4491 (10.06)	- -
# of weeks from job start to "survey date"	- -	- -	- -	- -	.0115 (7.77)
Constant	-.6562 (-6.14)	-.3233 (-2.81)	-.5493 (-3.87)	-1.7366 (-7.38)	-1.7339 (-6.99)
Likelihood ration test (d of f)**	159.40(10)	120.98(10)	127.90(10)	350.95(10)	219.53(10)
Positive observations/ total observations	1449/7383	1706/5832	1352/3980	1131/2302	364/1162

* ( ): t-statistics ** (d of f): degress of freedom

Table 2.16

Estimation of Wages Received Before and After Separation for Sherbrooke Regional Labour Market Sample.

	Full Sample		Partial Sample	
Independent Variables	Log of wage before separation	Log of wage in new job	Log of wage before separation	Log of wage in new job
Sex (male = 1)	.2690 (32.60)*	.2723 (35.90)	.1796 (20.00)	.2034 (25.70)
Age	.0038 (11.51)	.000803 (2.63)	.0018 (4.6)	-.00080 (-2.32)
Resigned (= 1)	- -	-.0339 (-4.20)	- -	-.0128 (-1.37)
"Other" reason for separation (= 1)	- -	-.0452 (4.96)	- -	-.0209 (-2.17)
Permanency of prior employment index	.0826 (6.84)	.05557 (5.00)	.0969 (7.00)	.0630 (5.10)
Claim dependents (= 1)	.1264 (13.75)	.1169 (13.90)	.0895 (7.40)	.0828 (7.86)
Calendar time (UIC week counter)	- -	.000226 (2.66)	- -	.00038 (3.96)
Duration of unemployment (weeks)	- -	-.00086 (-4.29)	- -	-.00092 (-4.13)
Claim established in same region (= 1)	-.0374 (-4.29)	- -	-.0134 (-1.26)	- -
No change in regions (= 1)	- -	.0192 (3.00)	- -	.0400 (5.26)
Skill (equivalent years)	- -	- -	.0126 (4.40)	.0131 (5.26)
Recalled to same firm (= 1)	- -	.0499 (6.80)	- -	.0676 (8.06)
Constant	4.1052	4.1474	4.1052	4.0498
F-Statistic	477.1	236.8	124.6	100.4
Number of observations	10891	10891	7260	7260

* ( ): t-statistics

Table 2.17

Estimation of the Proportion of Time Employed Before Separation for the Sherbrooke Regional Labour Market Sample.

Independent Variables	Log of Proportion of Time Employed Before Separation	
	I	II
Sex (Male = 1)	-.0235 (-2.09)*	-.0600 (-4.96)
Age at separation	.0034 (7.86)	.0034 (7.85)
Claim dependents (= 1)	.0809 (5.88)	.0622 (4.49)
Claim established in same region (= 1)	.0215 (1.52)	.0325 (2.29)
Skill (equivalent years)	.0169 (6.33)	.0121 (4.47)
Weekly wage before separation (1971$)	- -	.0016 (9.01)
Constant	-0.5753	-.7031
F- statistic	38.91	44.76
Observations	7451	7295

* ( ) = t-statistics

2.3.5. Sensitivity Analysis of the Probabilities of Being at Work and Wage Rates Before and After Layoff

A. Sensitivity Analysis of the Probability of Displaced Workers' Being at Work after Layoff (P_t^a)

A key paremeter in the estimation of the full income that a displaced worker with given characteristics can expect to receive after being laid off (I^a) is the probability that he will be at work at any point in time (P_t^a). As we indicated in Table 2.1, P_t^a can be estimated from the interval probabilities of an unemployed worker finding a job (P_t) and the interval probabilities of his retaining his subsequent employment (K_t). The key determinants of these probabilities have been estimated by the regression equations presented in the preceding sections. We first want to demonstrate that we obtain similar estimates of P_t^a whether we use data from the labour force tracking survey or the ROE/UIC claim files. Second, we want to show how the probability of an individuals' being at work varies with his age and the economic conditions at the time of layoff.

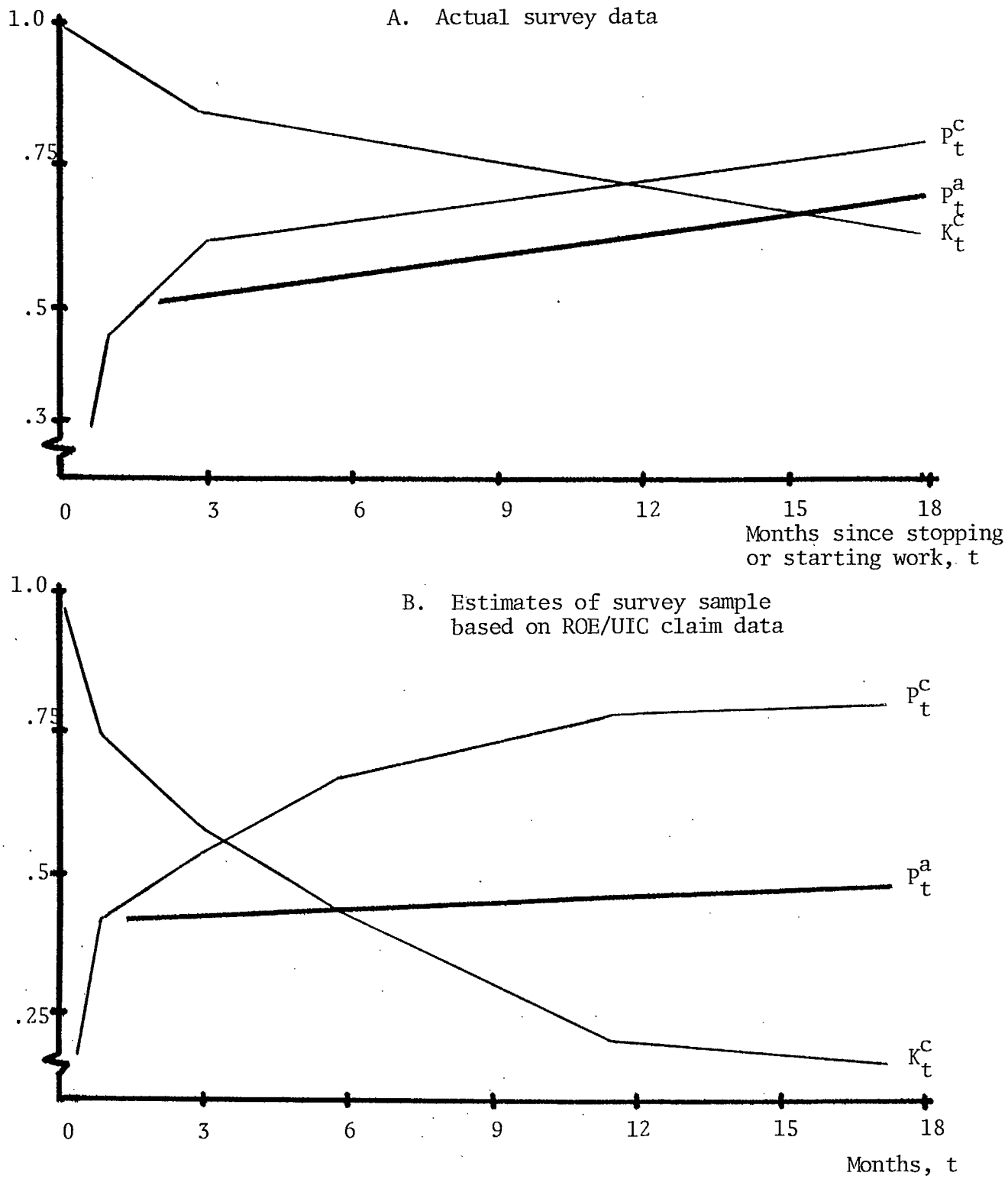
Figures 2.2 and 2.3 plot the cumulative probabilities of a worker's finding a job (P_t^c) and retaining his subsequent employment (K_t^c) for Co.X (Owen Sound) and Co.Y (Sherbrooke), respectively Note that in both case studies (P_t^c) based on the labour force tracking survey data rises more gradually in the early months after layoff (top diagrams) than it does when estimated from the ROE/UIC data (bottom diagrams). The estimates of P_t^c from the ROE/claim data were obtained from the regression results reported in Tables 2.10 and 2.11 where the

values of the independent variables were set equal to those used in the survey sample. By the same token when the estimates are based on data from the labour force tracking survey, the cumulative probability of retaining employment (K_t^c) falls more gradually in the early months after a new job has been found. In short, the ROE/claim data suggest that unemployment workers in either region generally find subsequent employment more quickly, but then retain that employment for a shorter period of time than would be predicted from the actual experience of displaced workers in the survey sample.

The different time paths of P_t^c and K_t^c based on the two data sources offset each other, however, and the resulting estimates of the probability of displaced workers being at work (P_t^a) are quite similar.[15] In the case of Co.X and the Owen Sound region P_t^a, based on the survey data, rises more quickly than when estimated from the UIC data. Eighteen months following layoff the survey data estimates that on average the Co.X workers were employed about 70 percent of the time, whereas the UIC data would have predicted about 50 percent of the time spent in alternative employment.[16] This is primarily a result of the characteristics of the Co.X workers sampled. They were among the last to be laid off and were considerably older, nearly all male, and they were more highly skilled and had experienced a higher degree of job stability than the average unemployed workers in the Owen Sound region (Table 2.2); in consequence, they were much more successful at retaining their subsequent employment. The difference between the estimates would probably not have been as great if we had available a more representative sample of workers laid off from the plant.

Figure 2.2

Probability of being at work for Co.X
(Owen Sound) Labour Force Tracking Sample

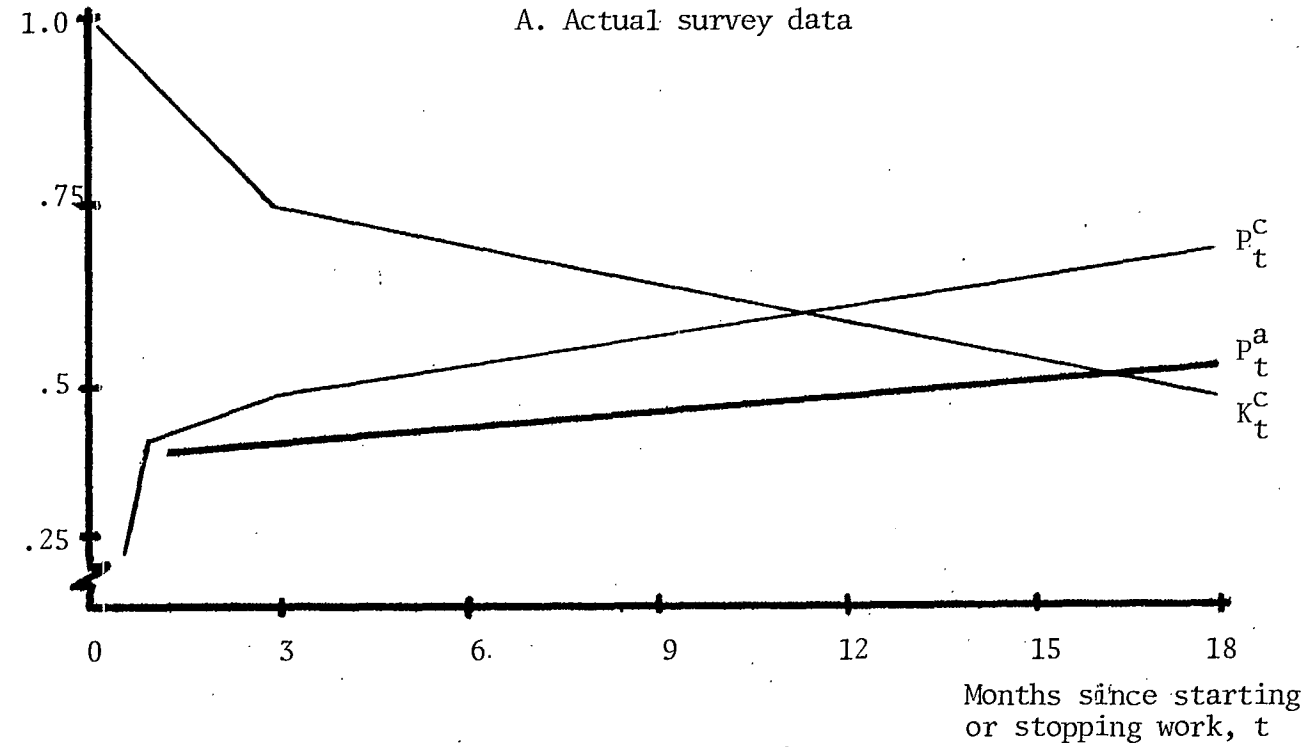


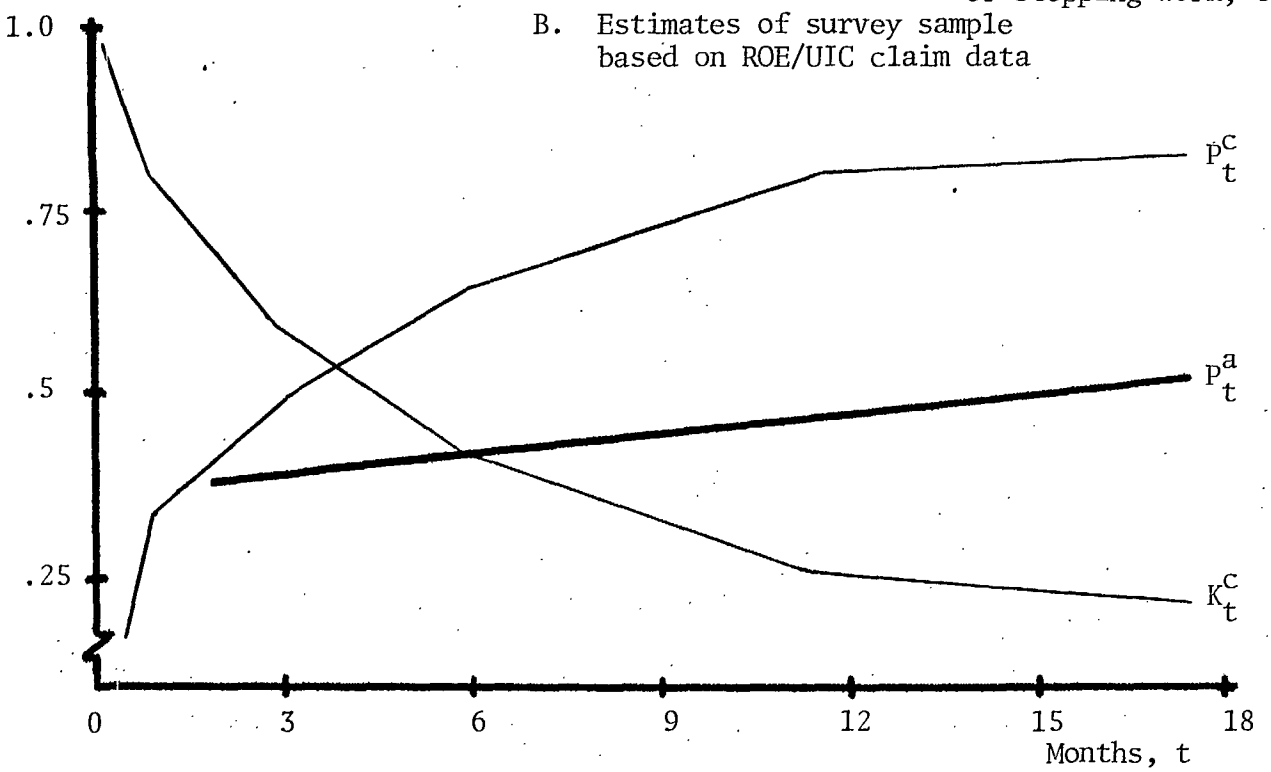
P^a_t - Probability of being at work after time, t.

P^c_t - Cumulative probability of finding work after time, t

K^c_t - Cumulative probability of keeping job for time, t.

Figure 2.3
Probability of being at work for Company Y (Sherbrooke) Labour Force Survey Tracking sample.





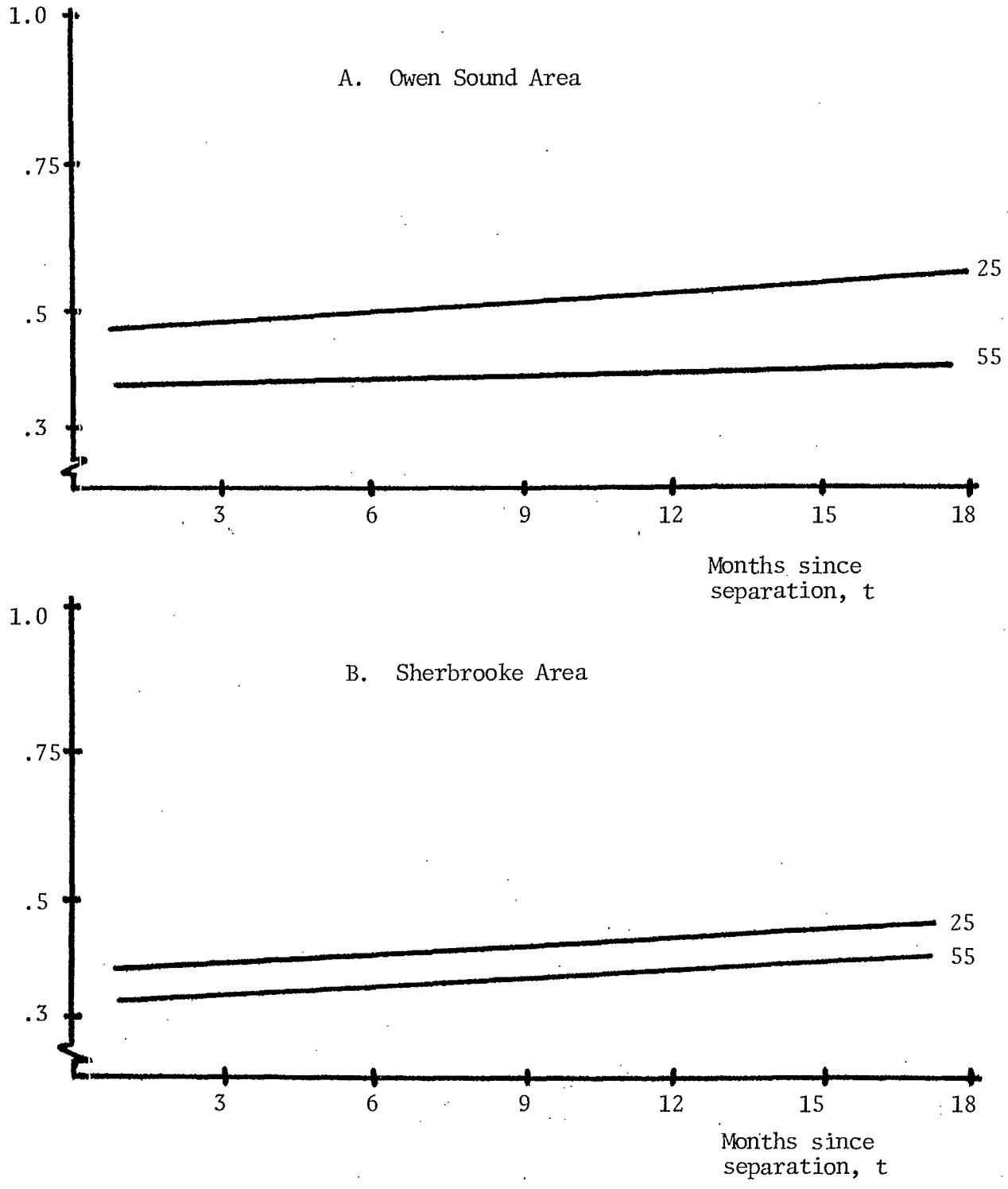
P_t - Probability of being at work at time t.
P_t^c - Cumulative probability of finding work by time t.
K_t^c - Cumulative probability of keeping job for time t.

In the case of Company Y and the Sherbrooke region depicted in Figure 2.3, the two estimates of the probabilities of displaced workers being at work at each point in time after layoff are approximately the same. About 50 percent of their time is spent in alternative employment 18 months after being laid off. These estimates are very similar to those based on the ROE/UIC claim data for Owen Sound. Since the ROE/claim data are more extensive, since our regression estimates based on these data are highly significant, and since these estimates provide us with reasonably consistent estimates of the probability of displaced workers being at work, we shall use these associated regression equations (Table 2.10, 2.11, 2.14 and 2.15) for our sensitivity analysis.

Figure 2.4 depicts the effect of age on the probability of being at work in any time period after layoff. The values of the other independent variables are determined by their averages for the samples; the unemployment rate for prime age males is set equal to 5 percent. In both Owen Sound and Sherbrooke the regression equations predict that older workers will have a lower probability of being at work than younger workers. Since older workers are more likely to have been permanently employed, or employed more steadily, and earning higher wage rates before layoff than younger workers, it would not be surprising to find that the private costs of adjustment are higher for older workers.

Skill plays a more curious role in determining the probability of being at work. As is evident from Figure 2.5, more highly skilled workers first face a lower probability of being at work, but over time

Figure 2.4
Effects of age on probability of being at work for UIC data samples

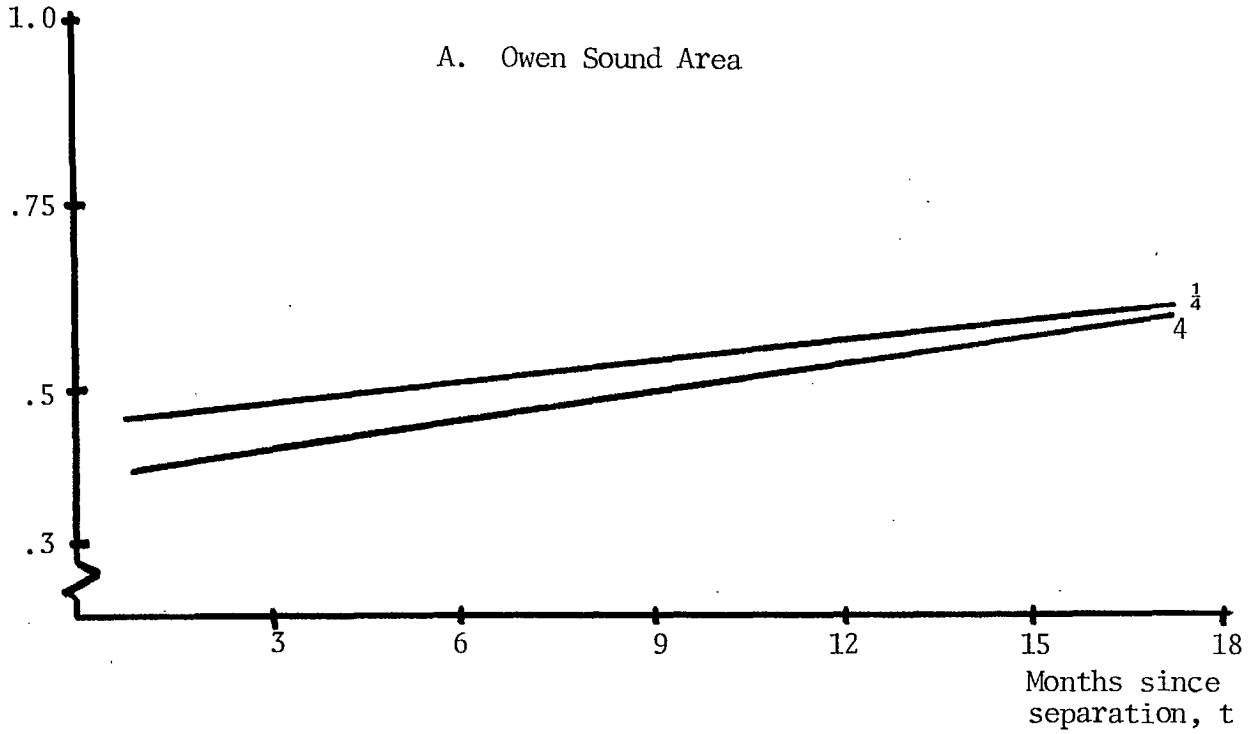


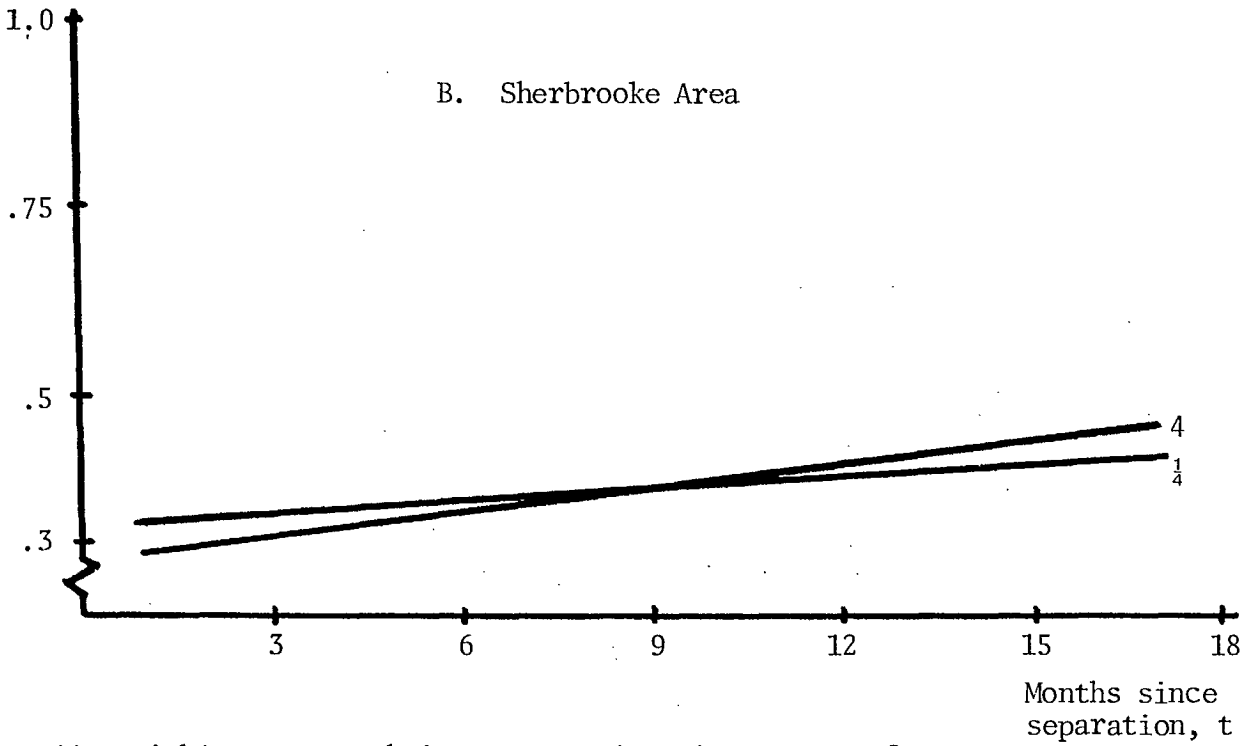
All variables are at their average sample values except:

1) Unemployment rate (Canadian prime age male) = 5%

2) Skill (SVP equivalent years)= $\frac{1}{4}$

Figure 2.5
Effects of Skill (as measured by equivalent years of specific vocational preparation) on the probability of being at work for the UIC data samples

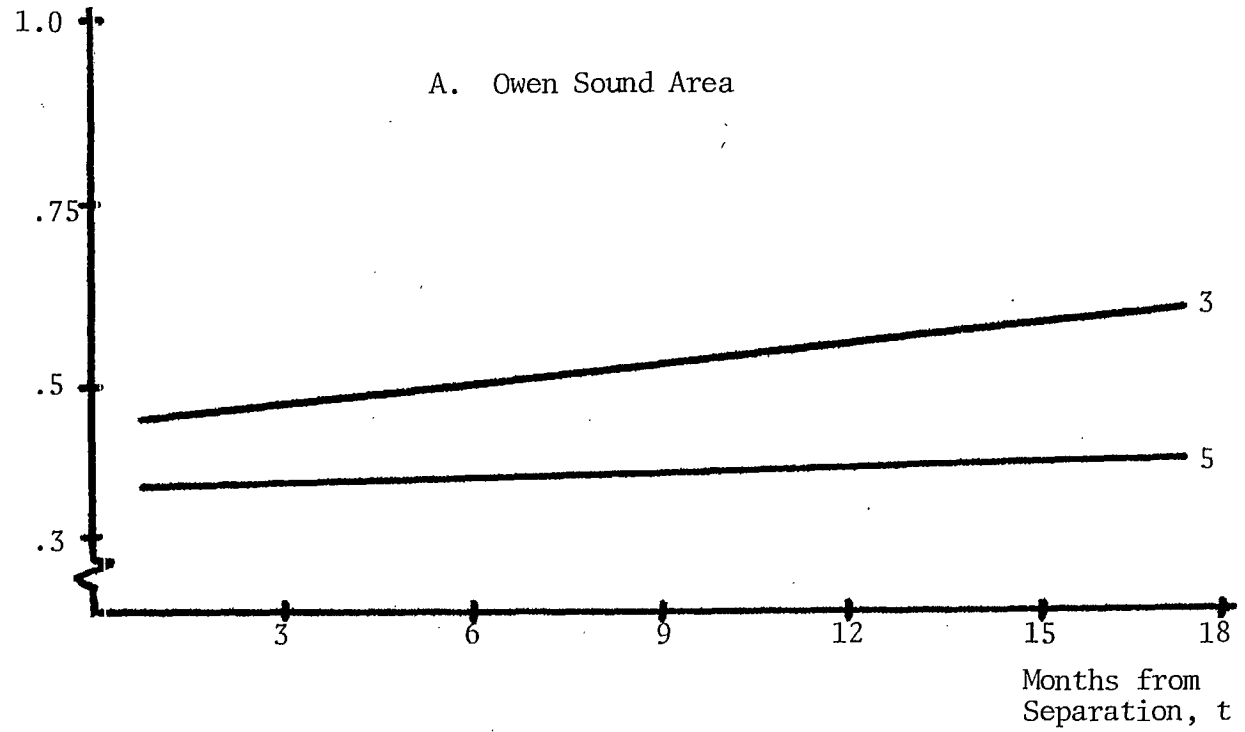


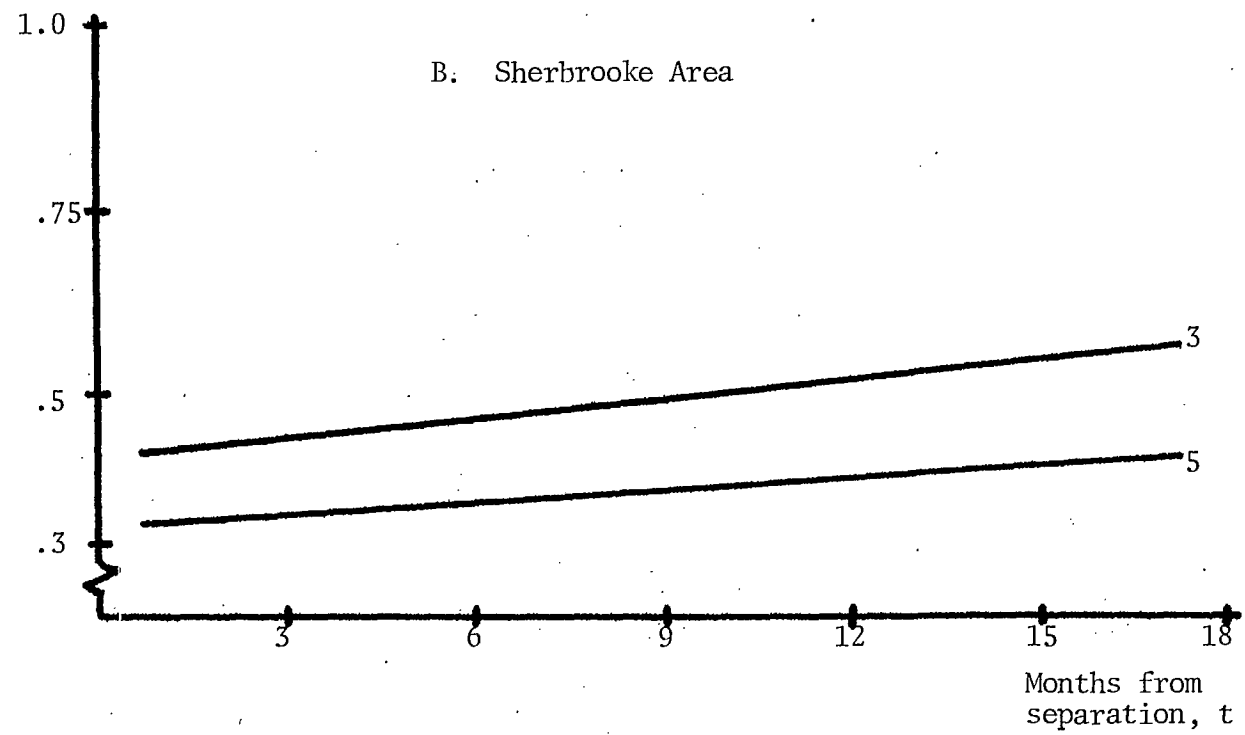


All variables are at their mean sample values except for:

1) Unemployment rate (Canadian prime age male) = 5%
2) Age = 55 years

Figure 2.6
Effects of Economic Conditions (as measured by Canadian prime age male unemployment rate) on probability of being at work for UIC data samples





All variables are at their mean sample values except for:

1) Age = 55 years
2) Skill (SVP equivalent years) = $\frac{1}{4}$

the probability rises more rapidly to become almost equal to (in Owen Sound) or greater than (in Sherbrooke) the corresponding probability (after 18 months) for less skilled workers. These results reflect our findings from the probit analysis where we learned that less skilled workers seem to have a higher probability of finding employment, but a lower probability of retaining it. Over time, the probability of retaining employment becomes more important in determining the probability of being at work, and therefore, accounts for the difference in the estimated behaviour. The differences due to skill in the probabilities of being at work do not appear to be as large as the age related differences.[17]

The economic conditions at the time of layoff and in the subsequent periods can have a major impact on the probability of being at work. Economic conditions can affect both the rate at which displaced workers find another job and whether they will later be laid off again or quit voluntarily. In Figure 2.6 we see how the probabilities of low skilled, older workers' being at work vary with different unemployment rates. When the Canadian unemployment rate for prime age males is high at 5 percent, for example, the probabilities in both regions are substantially reduced.[18]

Our estimates of the probabilities of workers' being at work are quite sensitive to both the age of the workers and the economic conditions prevailing at the time, but less sensitive to the workers' skill level. The results of our sensitivity analysis for two ages, two skill levels, and two unemployment rates are reported in Table 2.18.

Table 2.18

Sensitivity of Probability of Being at Work after Layoff (P_t^a) to Changes in Skill (SVP equivalent years), Unemployment Rate (Canadian prime age male) and Age for Regional Labour Market Samples.
(All values of P_t^a are estimates for t = 18 months)

A. Owen Sound Area
(Sample Average = .571)

Unemployment Rate	Skill	Age	
		25	55
3	4	.728	.613
	$\frac{1}{4}$	.744	.625
5	4	.593	.458
	$\frac{1}{4}$	.572	.406

B. Sherbrooke Area
(Sample Average = .544)

Unemployment Rate	Skill	Age	
		25	55
3	4	.701	.617
	$\frac{1}{4}$	.657	.579
5	4	.611	.450
	$\frac{1}{4}$	.472	.420

B. Sensitivity Analysis of Wage Rates in Alternative Employment (W^a)

The second factor which is important in the estimation of private incomes of displaced workers after layoff (I^a) is the wage rate they can expect to earn in alternative employment. In Table 2.19 we analyze the sensitivity of our estimates of alternative wages based on

the ROE/UIC data file. In the Owen Sound area it would appear that wage rates vary only slightly for different skill levels. This is the result of the very small (and insignificant) coefficient on the skill variable in the estimated regression equation.[19] The skill level difference in wage rates in the Sherbrooke area is more substantial which is due to the much larger (and significant) regression coefficient in the alternative wage equation.

Older workers tend to earn a higher wage rate in alternative employment than younger workers which no doubt reflects the value of additional years of experience. This appears to be more true in Sherbrooke than in Owen Sound. The wage rate estimates appear to be less sensitive to changes in age, however, than are the probabilities of being at work after layoff. As we shall see, this is also the case in the comparisons before and after layoff.

Table 2.19

Sensitivity of Wages in alternative Employment (W^a) to changes in Age and Skill (SVP equivalent years) for Regional Labour Market Samples.

Skill	A. Owen Sound Area		B. Sherbrooke Area	
	Age		Age	
	25	55	25	55
4	456	462	438	453
$\frac{1}{4}$	455	461	417	431

(All wages are expressed on a monthly basis in 1971 $. Corrections have been made to these data to compensate for the downward bias from using insured earnings to measure wage rates.)

One of the problems we have with our estimates of alternative wage rates from these data is that the wage rates are calculated from insurable earnings. Insurable earnings have a ceiling which is determined by the Unemployment Insurance Act. Workers whose monthly earnings are above the ceiling have just the limit recorded for the last twenty weeks of their employment. Since about a third of our UIC file in each region falls into this category, there is a downward bias to all the wage estimates. Moreover, in checking actual company personnel records it appears that even where insured earnings fall below the limit they tend to underestimate actual earnings by at least 3%. This results from occassional weeks worked that may either be over or under the insurable earnings limits. In the estimates included in Table 2.19 and later in Table 2.21 we have compensated for these downward biases by including estimates of the wage rates above the ceiling, and taking a weighted average and increasing the result by a factor of 1.03. The resultant wage estimates are still probably slight underestimates of the actual wages.

C. Sensitivity Analysis of the Proportion of Timing at Work (P^b) and the Wage Rate Before Layoff (W^b)

As is evident from Table 2.18, older workers in both areas tend to be more permanent employees. These estimates are based on the ROE/claim data, not on the labour force tracking survey. If the latter data base had been employed, then the proportion of time employed (P^b) by older workers would have been even higher. Skilled workers also spend more of their time employed before layoff although the differences are not as large as for age.

Table 2.20

Sensitivity of Proportion of Time at Work Before Layoff (P^b) to Changes in Skill (SVP equivalent years) and Age for Regional Labour Market Samples.

	A. Owen Sound Area (Sample Average = .696)		B. Sherbrooke (Sample Average = .656)	
	Age		Age	
Skill	25	55	25	55
4	.705	.794	.663	.735
$\frac{1}{4}$	.663	.746	.634	.702

The wage rates earned before layoff, estimated from the ROE/UIC data, are more sensitive to differences in age in the Sherbrooke area than they are in the Owen Sound region. This is evident from examining Table 2.21. Young workers in Sherbrooke, no matter what their skill level, appear to receive very low wage rates compared to their counterparts in Owen Sound. The differences in wage rates due to skill level are also greater in Sherbrooke than in Owen Sound.

When estimated from the ROE/UIC data base, there are only small differences in wage rates before and after layoff (Table 2.21 and 2.19). The only sizeable difference is for young workers in Sherbrooke. Otherwise, the differences in wage rates are much smaller than the differences in the probabilities of being at work before and after layoff (Tables 2.20 and 2.18).[20] It is interesting to note, however, that

the estimated wage rates after layoff are higher than they were beforehand. This would not be the case for Owen Sound if we had used the labour force tracking survey data to measure wage rates before layoff. As can be seen in Table 2.2, the wage rates earned by skilled, older workers at the Co.X plant were substantially above those estimated from the ROE/UIC data in Table 2.21. The higher wage rates paid at the Co.X plant were, in part, payment for specific skills, but they also contained quasi-rents.[21] As Co.X was unquestionably a higher wage employer in the Owen Sound area, the workers who were laid off when the plant shut down had to accept a bigger loss in private income.

Table 2.21

Sensitivity of Wages before Layoff (W^b) to changes in Age and Skill (SVP equivalent years) for Regional Labour Market Samples.

Skill	A. Owen Sound Area		B. Sherbrooke Area	
	Age		Age	
	25	55	25	55
4	433	444	395	459
$\frac{1}{4}$	436	448	376	438

(All wages are expressed on a monthly basis in 1971 $. Corrections have been made to these data to compensate for the downward bias from using insured earnings to measure wage rates).

2.3.6 Estimation of the Private Costs of Adjustment To Displaced Workers

The present value of the expected loss in private income to displaced workers is equal to the present value of their expected private incomes before layoff (I^b from equation (2.1)) minus the present value of their expected private incomes after layoff (I^a from equations (2.5) and (2.6)).[22] The expected loss per period is depicted as the shaded area in Figure 2.1.

In order to calculate the income loss, estimates of the proportion of time that a person expects to receive unemployment insurance benefits while unemployed (f) are required. The average value of "f" for all persons laid-off or resigning in a region was used. The average regional f values were estimated as the proportion of time persons on the ROE/UIC claim files collected benefits while unemployed. The value of f in the Owen Sound area was found to be .66, while that in the Sherbrooke area was .69.

Because workers at the Co.X plant in the Owen Sound area were older and more highly skilled than those at the Co.Y plant in the Sherbrooke area, it is not suprising that the present value of the expected income loss loss at Co.X is greater (Table 2.22). Before being laid off from Co.X, workers were generally employed for a greater proportion of the time and were certainly paid higher wage rates than either the Sherbrooke workers or other workers with comparable skill levels in the area. The difference in our estimates of the expected income loss at the Co.X plant are due to the differences in the two data bases used for estimation. As we indicated in Section 2.3.5 A, the ROE/UIC data yields estimates of the probabilities of

Table 2.22

Expected Income Loss per Person for Labour Force Tracking Survey Samples (1971 $)

A. Co.X (Owen Sound)

Data Source	Present Value of Income Loss over 3 years	Monthly Equivalent Payment over 3 year period
Labour Force Tracking Survey	$2,983	$88
UIC estimate of Tracking Survey Sample	$4,895	$144

B. Co.Y (Sherbrooke)

Data Source	Present Value of Income Loss over 3 years	Monthly Equivalent Payment over 3 year period
Labour Force Tracking Survey	$1,315	$39
UIC estimate of Tracking Survey Sample	$1,294	$38

Table 2.23

Sensitivity of Expected Income Loss per worker to changes in the Unemployment Rate (Canadian prime age male) and Age for Regional Labour Market Samples.

Unemployment Rate	A. Owen Sound Area		B. Sherbrooke Area	
	Age		Age	
	25	55	25	55
3	*	374	78	925
5	162	1349	360	1692

* negligibly small

(The income loss is given as the present value of the expected losses over 3 years. Skill is held constant at $\frac{1}{4}$ equivalent years. Recalls are excluded.)

being at work after layoff (P_t^a) which are lower than those based on the labour force tracking survey (Figure 2.3). There is also the problem of the downward bias in the estimation of alternative wages using the ROE/UIC data. Both of these factors contribute to the sizeable difference which exists between the two estimates for the Co.X plant.

The general point remains valid, namely: Older workers, who have job specific skills and who are receiving quasi-rents by virtue of the high wage rates paid, suffer a bigger income loss than other workers when they are laid off. This is confirmed by the sensitivity analysis for low skilled workers which is based on the ROE/UIC data and reported in Table 2.23. Older workers bear substantially heavier costs of adjustment than younger workers. Note also that the costs of adjustment are much higher at higher rates of unemployment.

Given average unemployment rates, the equivalent monthly payment to compensate for the expected private income losses would amount to about $40 per month per worker displaced from Co.Y in the Sherbrooke area and about $116 per month per worker displaced from Co.X.[23] Despite the fact that the differences in the dollar values of the compensation payments seem large, they are reasonably stable proportions of the before tax-wage rate. This will become evident in Chapter 4 where we use the estimates of the private costs of adjustment as the basis for developing alternative programme proposals for compensating displaced workers for their expected losses.

We now turn out attention away from labour and towards the possible losses incurred by owners of production facilities. The following

section (2.4) gives an overview of the issues involved in estimating the losses that may be suffered by the owners of capital assets as a result of MTN. Appendix 2.0 deals with the detail of the methods for estimating these losses.

2.4 Costs of Adjustment for the Owners of Capital Assets

Reductions in trade barriers cause the domestic selling prices of importable goods to fall and can lead to increased international competition for firms in import-competing sectors. Either of these effects will cause a decline in the return earned by capital assets, and a corresponding decline in the value of the owners' equity investment. A number of questions arise concerning the subsequent capital losses. First, are the capital losses borne by the current owners of assets in these sectors or were they borne by the previous owners? Second, are the capital losses likely to be sizeable? Third, can most trade-related capital losses be avoided? These questions must be answered in order to determine who should be compensated for any capital losses and what the magnitude of the compensation should be.

The basic problem in the estimation of any compensation payments to the owners of capital assets is to determine whether the decline in the return on the assets was expected at the time the assets were acquired. If the capital assets were purchased after the decline in the return was expected, then the previous owners, not the current owners, would have suffered capital losses. That is to say, of the previous owners sold their

assets at a lower price because of the anticipated effects of trade liberalization, they would be the appropriate recipients of any compensation payments from the government.

If capital assets were purchased before the change in market conditions was anticipated, then the current owners would bear the capital losses. The losses are realized by the current owners if the capital is sold at any point after the market begins to ancitipate the change, or when the decline in the return begins to occur. Because most firms would not have changed hands since the Tokyo round of multinational trade negotiations began, the current owners are most likely to be the ones who suffer from any decline in the value of the equity investment.

It is unlikely that all the firms in an industry will be affected equally by increased foreign competition. On the one hand, the more efficient firms might experience little, if any, reduction in sales volumes; on the other hand, marginal firms in the industry may find it increasingly difficult to compete. Most marignal firms are hampered by aging plant and equipment, outmoded technology and production techniques, an inefficient scale of operation, and high wage costs relative to productivity. As a result these firms may be forced to shut down and to liquidate their assets. Such firms will be able to continue in business only as long as trade protection is maintained.

The owners of capital assets have a big incentive to postpone any reductions in trade barriers for as long as possible. Continued protection permits the more efficient firms to avoid capital losses by

reinvesting the additional cash flow provided by protection either in other activities or in the same activity outside Canada. Although the marginal, less efficient firms have the same incentive to reinvest, continued protection affords them the opportunity to squeeze one or two years more production out of their aging capital assets. In this way capital losses can be both reduced and delayed.

There are a number of reasons for believing that the capital losses in industries affected by the trade negotiations will be either small or largely avoidable. First, the current proposal to phase in trade liberalization gradually over eight years should give the owners of the more efficient firms an opportunity to reinvest so as to avoid realizing a sizeable decline in the value of their equity investment. This investment could be made either in other activities in Canada, or as was indicated in Chapter 1.4.2, in activities in foreign countries. Second, the profits earned by the owners of marginal firms are already generally low or non-existent. This situation prevails despite the fact that their capital assets have by and large, already been written off and that some degree of trade protection currently exists. As is indicated in the accompanying appendix, the small profits of most marginal firms means that the value of the owners' equity is low even before trade liberalization begins. Accordingly, the expected capital loss will also be low.

Since some unavoidable capital losses are bound to occur, the government may still wish to compensate the owners of the assets. A methodology for estimating the MTN-related decrease in the value of the owners' equity investment is outlined in an appendix to this chapter.

It is important to recognize that the in-use value of the owners' fixed business assets before trade liberalization is not equal to their net book value which appears in the firm's balance sheets. The latter is a reflection of the historic costs of the assets, and the various accounting conventions which govern book depreciation, but indicates nothing about their ability to generate income in the future. Inflation, changes in technology and changes in tastes since the assets were purchased have combined to make the in-use or market value of the assets today very different from their net book value. It is also important to distinguish between the capital losses that occur prior to the change in trade barriers because unprofitable investments were made, and the losses that occur as a direct result of trade liberalization.

The magnitude of the unavoidable capital losses facing the owners of productive facilities depends on what happens to the firm after trade liberalization. If the firm remains in operation after tariffs are reduced, then the owners expected loss is equal to the decline in the in-use value of their equity investment. If the firm, or a plant in a multi-product firm, shuts down as a result of trade liberalization, then the expected loss equals the difference between the in-use value of the owners' equity and the net liquidation value of the assets. In either case the actual estimation of the capital losses poses several problems. The problems are explored in considerable detail in Appendix 2.0.

Footnotes

1. Fluctuations in local or regional labour market unemployment rates can largely be explained by changes in the national unemployment rate which reflect the overall demand conditions. The national unemployment rate could not be expected to explain all fluctuations in local unemployment rates. For example, a major layoff of workers could cause a large rise in the local unemployment rate while the national rate was in fact decreasing. Over time, however, the displaced workers would find new jobs, leave the labour force or move out of the region. This adjustment process would eventually bring the local unemployment rate back to its long-run relationship with the national rate (see Chapter 3). Note that the long-run average level of a local unemployment rate may be very different from the average level of the national rate. This will reflect regional differences in labour market structures that depend on the long-run movement of people between regions. Migration decisions are in turn based on the types of employment available in different regions (both wages and expected durations of employment) and other environmental factors (both physical and cultural) that would enter into the relative satisfaction an individual can derive from living in the region.

   The regressions of local unemployment rates for the Sherbrooke (Québec) and Owen Sound (Ontario) areas on national rates illustrate the dependence of the local on the national rate. The regression results are presented in the table below. Monthly unemployment rates were used. Observations run from January 1972 through August 1977.

URMC = Canadian prime age male (25-54 years old)

URC = Canadian, both sexes, 15 and above.

UROWEN = Ontario Economic Region N^{o} 58 (post 1976 definition)

URMAGX = Combined rates of urban areas (Self Representing Sampling Units) of Magog, Sherbrooke and Granby.

URMAGY = Combined urban rates of Magog, Sherbrooke, Granby, Drummondville, St. Hyacinthe and St. Jean.

The mean values for the sample rates over the 1972-77 period are as follows:

URCM = 3.99%
URC = 6.59%
UROWEN = 5.48%
URMAGX = 8.56%
URMAGY = 8.32%

The combined urban rates were used to represent the Sherbrooke area unemployment conditions because the changes in the Québec Economic Region boundary definitions in January 1976 excluded use of this data in a time series analysis.

Table 1

Regression of local unemployment rates on national unemployment rates.

A

Independent Variables	UROWEN	URMAGX	URMAGY
Constant	-.0230 (-.04)*	4.936 (5.38)	3.952 (5.26)
URCM (t)	2.114 (9.04)	2.380 (5.72)	2.121 (6.23)
URCM (t - 1)	-.845 (-3.57)	-1.563 (-3.72)	-1.181 (-3.43)
Time, t	.017 (2.23)	.013 (.98)	.019 (1.68)
R^2	.792	.517	.607
$\bar{R}^2$	.782	.495	.589
F (degrees of freedom)	81.3 (3,64)	22.9 (3,64)	33.0 (3,64)

B

Independent Variables	UROWEN	URMAGX	URMAGY
Constant	-3.150 (-3.902)*	2.240 (1.79)	1.042 (1.09)
URC (t)	1.384 (7.93)	1.731 (6.41)	1.675 (8.12)
URC (t - 1)	-.121 (-.67)	-.842 (-3.04)	-.647 (-3.05)
Time, t	.015 (1.93)	.015 (1.22)	.015 (1.56)
R^2	.743	.548	.679
$\bar{R}^2$	.731	.526	.664
F (degrees of freedom)	61.6 (3,64)	25.8 (3,64)	45.2 (3,64)

* ( ): t-statistics

These results illustrate the close relationship between local and national rates for the two regions of interest in this study. Even closer relationships exist between provincial and national unemployment rates. See for example, Frank T. Denton and Sylvia Ostry, An Analysis of Post-War Unemployment, Staff Study N° 3, prepared for Economic Council of Canada, Ottawa, December 1965. Regressing annual provincial unemployment rates against national rates and time over the 1950 through 1963 period, corrected R^2 values of over 98% were obtained for Ontario and Québec. In another study, Frank T. Denton et al, "Patterns of Unemployment Behaviour in Canada", Discussion Paper N° 36, Economic Council of Canada, Ottawa, 1975, similar regressions are reported for the 1961 through 1973 period. These gave corrected R^2 values of over 95% for Ontario and over 96% for Québec. It is therefore assumed that the use of provincial rates for areas in Ontario and Québec would yield similar results to the use of national rates. It is hoped that this assumption will be tested in later work.

2. "Employment History Survey 1977: Interviewer's Manual", prepared by Anne Clapperton and Jean Massicotte, Economic Analysis Branch, Department of Industry, Trade and Commerce, Ottawa, 1977.

3. The full labour force tracking survey sample of separations from Co.X available at the time of conducting this study contained 158 individuals. Those 17 persons who left Co.X for reasons of returning to school, maternity, illness, injury or retirement were dropped from the sample for the probit analysis.

4. In estimating the probability of finding and retaining jobs two specifications of the unemployment rate were used in all case studies, viz., the two company cases from the labour force tracking survey and the two corresponding ROE/UIC regions. The two unemployment rates were the Canadian prime age male and the local regional rates. (See footnote 1. for the exact specification of the local regional rates.) In the majority of probit runs the Canadian prime age male specification performed better. This was particularly the case with the ROE/UIC regional data where the Canadian prime age male data performed better in approximately 90% of the probit runs. Given the larger size and greater heterogeneity of the ROE/UIC samples, more weight was given to these results.

   Two performance criteria were used: (a) the level of statistical significance of the results (which included the coefficients having the expected signs) and (b) the relative size of the coefficients for the unemployment rate. On this latter criterion the Canadian prime age male unemployment rate produced a larger reaction both for a one percentage point change and for the same relative change in its rate than did the local rate. The greater relative reaction to the Canadian prime age male takes into account the difference between its average level and that of the local rate.

Based on these results the Canadian prime age male unemployment rate was reported. Although the prime age male rate performed better, it may be the case the local unemployment rate explains some aspects of the local demand for labour not captured by a national rate. To test the validity of such an hypothesis would require more sophisticated specifications than used in this study given the high degree correlation between the local and national rates. (See footnote 1.) In future work it would also be of interest to test whether or not the use of provincial unemployment rates gives intermediate results between the national and local rates or whether they actually give better results.

5. The skill level of a worker is defined in terms of the equivalent years of training corresponding to the specific vocational preparation (SVP) index for the occupational category of the worker. Four digit occupational classifications are used to determine the SVP index of the worker, and hence, the equivalent years of training. All definitions, equivalencies and classifications are based on the Dictionary of Occupations, Department of Manpower and Immigration, Government of Canada, Vol. 1-2, 1971.

6. Since we were not able to put a specific date on the change in location, except to know it occurs between jobs, any interpretation will therefore remain somewhat uncertain.

7. Note that we have more observations for probit analysis of the probability of losing a job because we count each subsequent job obtained by a displaced worker as a new observation.

8. The full labour force tracking survey sample of separations from Dominion Textiles available at the time of conducting this study contained 303 individuals. Those 95 individuals who left the company for reasons of returning to school, maternity, illness, injury or retirement were dropped from the sample for the probit analysis.

9. Given the relatively short time in which this study was conducted, we were unable to experiment with different specifications of the time intervals or independent variables.

10. The important role of temporary layoffs and recalls in the understanding of labour market dynamics and unemployment has been recognised by numerous researchers in recent years, for example, Martin Feldstein, "The Importance of Temporary Layoffs: An Empirical Analysis", Brookings Papers on Economic Activity, 3: 1975.

11. Two points of difference exist between the dummy variables reflecting the location of the worker in the labour force tracking survey and the ROE/UIC claim data:

i) Although the timing of the change in location is not precisely known in the labour force tracking survey data it is known that the location of the job changes. In the case of the ROE/UIC claim data, however, any change in location reflects a change in region in which the unemployment episode occurs and hence the UIC claim is established. For most UIC claimants it would be expected that a claim would be established in the same region as the one in which the firm from which the worker was laid off was located. Therefore, all that is known is that it likely that workers who establish successive claims in an area are probably the more stable residents of the regions. For those who do not establish successive claims in a region, it is not known whether the sequence of events is separate-claim-move-find new job or separate-move-claim-find new job.

ii) It is possible that the non-stable workers in a region who appear to command lower wages are, in fact, the marginal temporary sector migrants. It is, in fact, this type of person who would be expected to be induced to migrate by changing levels of excess unemployment as is assumed in the general equilibrium model of a regional labour market (see Chapter 3). In contrast, the persons who moved in the labour force tracking survey samples are not necessarily the marginal migrants of that region.

12. Other specifications of the proportion of time spent employed before layoff (P^b) were tested, viz., a linear and a logit-linear specification. The semi-logarithmic specification performed better than either of these. The simultaneous estimation of the wage rate before separation (W^b) and P^b should also be tested at a future date.

13. W. Oi, "Labour as a Quasi-Fixed Factor", Journal of Political Economy, 70 (1962), 538-555.

14. The time variable measures an increase in labour productivity growth of between 1 and 2% per annum. This is slightly lower than the real growth rate in wages of 2.5% in Québec as reflected by the growth from 1971 to 1976 in the average industrial/composite weekly earnings adjusted for inflation in large urban area firms. ("Employment, Earnings and Hours", Statistics Canada Catalogue 72-002.)

15. The methodology for calculating P_t^a is briefly referred to in Table 2.1, but will be described in greater detail in a technical appendix appearing ✳ under a separate cover.

16. In the short-time available for the analysis of the results of this study it was only possible to plot the short-run response of the probability of being at work after separation. More work needs to be done to model the long-run equilibrium values that the probability of being at work (P_t^a) would be expected to reach. In the long-run, the slope of the P_t^a curve would be expected to decline gradually until it reached a plateau.

17. As we indicated earlier, we have not had an opportunity to test out the interaction between variables like sex and age. There is considerable scope for further work here.

18. In footnote 1. of this chapter we report the results of regression equations which capture the relationship between the local and national unemployment rates. When the Canadian unemployment rate for prime age males is held steady at 5% the local or regional unemployment rates in Owen Sound and Sherbrooke would be estimated at 6.8% and 9.4% respectively.

19. The sensitivity analysis is based on the regression equations using the partial samples in Tables 2.12 and 2.16.

20. The fact that wages vary only slightly before and after lay off reflects the commonly held belief that wages are strickly downwards. Under these conditions most of the response to changes in labour demand will take the form of changes in unemployment. This can be seen in our study from the lower probabilities of being at work after layoff.

21. Wages at the plant had been determined according to a piece-rate system. When the company decided to convert to an hourly-rated system, it discovered that workers at the plant were earning substantially more than workers elsewhere. This was confirmed by a wage survey commissioned by the company of similar plants in nearby cities.

22. The present value of income losses was calculated using a discount rate of 4%. This represents the average private time preference for consumption. See Glenn P. Jenkins, "Capital in Canada: Its Social and Private Performance 1965-1974", Discussion Paper N^{o} 98, Economic Council of Canada, October, 1977, Chapter 6. The monthly installments are calculated as follows:

$$A = \left[\frac{r/12}{1 - (1 - \frac{r}{12})^{-12n}} \right] P$$

P = Present value of income loss (nominal $)

A = Monthly installment (nominal $)

r = Real interest or discount rate per annum

n = Number of years over which installments are to be paid

23. The estimate of $116 is halfway in between $88 and $144 from Table 2.22.

Appendix 2.0

Estimating the Change in the Value of the Owners' Equity Investment in a Firm

The capital invested in a firm consists of working capital and the net value of its physical assets. Working capital includes the firm's cash, inventories and accounts receivable less accounts payable, and its notes receivable less its notes payable. The firm's physical assets include its land, plant, buildings and equipment. This capital can be financed by the owners' equity investment and by long-term debt. Trade liberalization could adversely affect the market value of the owners' equity in the firm. If owners are to be compensated for such losses, then the market value of the equity investment before and after trade liberalization must be estimated.

The owners' equity has an in-use value before trade liberalization, and this value can be estimated in a number of different ways. In the case of public companies whose shares are actively traded on securities markets, the market value of these shares at some point of time could be employed to estimate the value of the equity. This value along with the market value of the company's debt would provide an in-use value of the total capital invested.

Such a measure has merit in that it would include a value for such intangible assets as goodwill. It would also reflect an appropriate value for any bad investments that the company may have made in the past. Yet, the method suffers from a number of serious defects. First, trade

liberalization may not affect all of the company's activities, but the market value of its shares would not permit us to separate the value of those assets which will be affected from those which will not. Second, if trade liberalization is anticipated by the market, then the value of the company's shares may already reflect the market's judgement of reduced profitability. This would produce a downward bias in any estimate of the in-use value of equity before tariff barriers are lowered. Third, if the company's shares are not widely held and actively traded, then the market may provide a poor estimate of the in-use value of the equity. Finally, trade liberalization is likely to affect many private companies, both large and small. The shares of such companies are not traded at all and hence no share price data are available to make estimates.

A second method of estimating the in-use value of the owners' equity is to employ professional appraisers to estimate the higher of the going concern, en bloc, or piecemeal liquidation value of the assets. This procedure has merit in seeking a market assessment of the in-use value of the assets. The difficulty with this method, however, is that if investors believe that trade liberalization is likely, they would not be willing to purchase the assets until after the tariff cuts are announced. This means that the method cannot really be relied on to provide an accurate estimate of the in-use value before trade liberalization takes place.

The problems associated with the two previous methods of valuation can be avoided by the use of a third method. This method attempts

to estimate the maximum that a rational investor would be willing to pay for the in-use value of the owners' equity in the absence of trade liberalization. A rational investor would not be willing to pay more for the owners' equity than the present value of the cash he would expect to earn from the firm's future operations and from the eventual liquidation of the firm's assets. This can be estimated by the discounted real net cash flow to equity from the firm's expected future operations and the discounted real net liquidation value of the firm's assets when it eventually shuts down.

One advantage of this method is that it concentrates only on those assets which can be expected to generate future income. No real monetary value, other than future scrap value, is attached to any bad investment that the firm may have made even though these assets may have a positive net book value on the company's balance sheet. This is important since the government does not wish to compensate the owners for what would have proven to be an unprofitable investment. A second advantage of this method is that it permits an individual analysis to be made of the firm's product lines and plants. It can therefore distinguish among those activities which may be affected by trade liberalization and those that may not. This is useful because it makes possible an ex ante forecast of the impact of trade liberalization on the total value of the company's capital stock.

The chief disadvantage of this method of valuation is that it

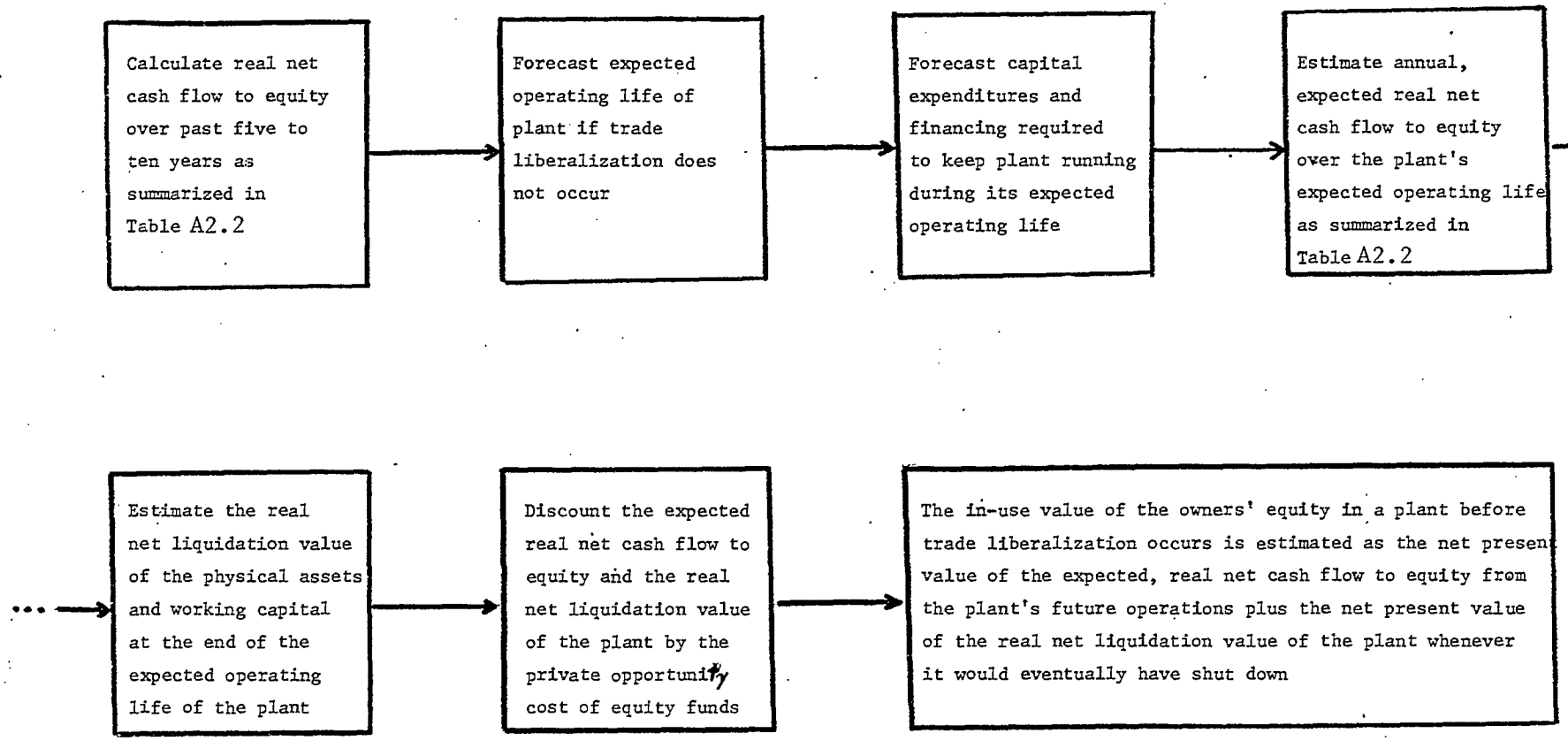
does not rely on a market assessment of the future profitability of the firm's activities. Instead, this assessment is based on the judgement of a trained analyst. The analyst must estimate the real (i.e., net-of-inflation) future cash flow from the firm's activities in the absence of trade liberalization. This can be done by extrapolating the firm's past performance into the future and adjusting its performance based on a knowledge of future market trends and other likely developments that may affect the firm.

The analysis and forecast of cash flows should be tailored to the firm in question. A larger firm may have a number of different product lines and may operate different plants in various locations. If the product lines produced in one plant are unlikely to be competitive with imported goods after trade liberalization, then the operations of that plant and its subsequent liquidation value should be examined separately. In some cases, however, increased foreign competition will have an impact on the firm's total operations and that will be the appropriate basis for the analysis. Thus, for example, smaller firms with less opportunity for diversification may face a greater risk of bankruptcy. Since the estimation of the in-use value of a single plant of a large multi-product firm poses special problems, our discussion focuses at this level, but the methodology described is generally applicable to the firm's total operations.

The steps necessary to estimate the in-use value of the owner's equity in a plant are summarized in Table A2.1 and discussed in detail in the next section.

TABLE A2.1

STEPS TO ESTIMATE THE IN-USE VALUE OF THE OWNERS' EQUITY OF A PLANT BEFORE TRADE LIBERALIZATION OCCURS



A2.1 Estimation of the In-Use Value of the Owners' Equity in a Single Plant Before Trade Liberalization

The real (i.e., net-of-inflation) net cash flow to equity for each year can be estimated by first calculating the nominal dollar net cash flow to equity as outlined in Table A2.1The annual nominal dollar values are then adjusted by an index which measures the past or expected future rates of inflation. The resulting annual real net cash flow to equity values are then discounted to estimate their net present value.

Caution must be exercised to avoid overestimating the plant's net profit and hence its net cash flow to equity before trade liberalization takes place.[2] The discussion below provides a guide to the possible sources of bias for each of the items listed in Table A2.2.

Item 1. Sales Revenue: Cash receipts from the plant's operations can be estimated by taking sales revenue minus the change in accounts receivable, and by making allowances for bad debts, prepayments, and deposits. These adjustments are usually included as part of the change in working capital (Item 12), but if data on changes in working capital are not available, the adjustment to sales revenue should be made directly. To forecast future sales revenue in the absence of trade liberalization the sales volume which is expected to occur in the light of market trends and anticipated developments should first be valued in real dollars. This is done to make explicit any forecasted changes in (real) relative prices for the plant's

TABLE A2.2

CALCULATION OF THE NET CASH FLOW TO EQUITY
FROM THE INCOME STATEMENT FOR A SINGLE PLANT

(measured first in nominal dollars then in real dollars)

	1.	Sales Revenue
Less	2.	Costs of Goods Sold
Less	3.	Overheads and Other Corporate Expenses
Equals	4.	Gross Profits (before interest and taxes)
Less	5.	Depreciation
Less	6.	Interest
Less	7.	Corporation Income Taxes
Equals	8.	Net Profit (after interest and taxes)
Plus	9.	Depreciation
Plus	10.	Deferred Taxes
Plus	11.	Liquidations
Less	12.	Change in Working Capital
Equals	13.	Net Cash Flow from Operations
Plus	14.	Proceeds from Loans
Less	15.	Repayment of Loans
Less	16.	Capital Expenditures
Equals	17.	Net Cash Flow to Equity

products. The real dollar values are then inflated to nominal dollars by the expected rate of inflation in order to calculate corporate income taxes (Item 7). Since many of the other items in the pro forma income statement forcasted for the plant are often based on estimates of the nominal dollar value of sales revenues, it is absolutely crucial that this item be predicted as accurately as possible.

Item 2. Costs of Goods Sold: The cost of goods sold varies with the quantity sold or sales revenue. Therefore, the average ratio of the cost of goods sold to sales revenue over the past five years could be used to predict the nominal dollar value of the cost of goods sold over the operating life of the plant. This can be estimated by multiplying the ratio by the annual nominal dollar estimates of sales revenue. The resulting nominal dollar estimates of the costs of goods sold can then be used in the calculation of corporate income taxes (Item 7). This procedure preserves the historical relationship between inventories and sales, and assumes the continued use of the inventory accounting convention practised by the firm. In order to avoid an upward bias to the real value of the net cash flow, it is important that the nominal value of inventories in working capital (Item 12) also rise by the expected rate of inflation used to forecast the nominal dollar value of sales revenue.

Item 3. Overhead and other Corporate Expenses: Firms may not allocate overheads and other corporate expenses directly to their branch operations, and yet if the plant were shut down these expenses would no longer be incurred. The analyst must find some appropriate means to allocate these charges to the plant; sales, general and administrative expenses, for example, could be allocated according to the plant's share of the firm's total sales revenue. There could also be cases, however, where a plant or branch operation is charged for an expense which would still be incurred even if the plant were shut down.

Item 5. Depreciation: Since depreciation does not represent a cash outflow, it is first subtracted (Item 5) to estimate net profit, and then added back (Item 9) to estimate the net cash flow from operations. More important than book depreciation, is the measurement of the capital cost allowance used to calculate taxable income and corporate income taxes (Item 7) for the plant's operations. Capital cost allowance and corporate income taxes are calculated on an integrated basis for the firm, and depending on the financial accounting procedures, may not be allocated back to specific plants. If the firm were forced to liquidate one of its plants, the effect on the capital cost allowance pool would depend on the firm's other assets in that category. This is one reason why a plant cannot be studied in isolation from the firm especially when it comes to analyzing the effects on tax revenues.

Item 6. Interest, Item 14. Proceeds from Loans, Item 15. Repayment of Loans:

Since we are concerned with the net cash flow to equity, the proceeds of all past and future loans are counted as cash inflows at the time they occur whereas interest payments and loan repayments are cash outflows. In order to estimate the net cash flow to equity for a specific plant, therefore, some portion of the firm's debt payments must be attributed to the plant. Although specific capital investments may be financed at the time by a new debt issue, equity's share of the investment grows as the debt is repaid. The best procedure, therefore, is to assume that the average ratio of debt and equity of the entire firm applies to any additional capital acquisitions made for the plant.

Any future capital expenditures made for the plant in the absence of trade liberalization must be first forecast in real dollars and then inflated to nominal dollars by the expected rate of inflation. This is because both the capital cost allowance and the amount of financing required for the proposed capital expenditure must be based on nominal dollar estimates. Also, this procedure ensures that the nominal dollar cash flow items are forecasted with a consistent rate of inflation across all cash flow items.

Item 7. Corporation Income Taxes: One of the chief reasons for seeking accurate estimates of capital cost allowance and interest expenses is to

generate good estimates of future corporation income taxes from the plant's operations. This is an important step in the overall estimation of the in-use value of the owners' equity because inflation causes real taxable income and corporation income taxes to rise over time, and thus reduces the real value of the net cash flow to equity. Inflation increases the nominal value of gross profits (Item 4) over time, but the nominal values of capital cost allowance and interest expenses do not rise in a similar manner. The nominal value of taxable income thus rises faster than the rate of inflation, and causes the real values of taxable income and corporate income taxes to increase. Inflation thus reduces the in-use value of the owners' equity.[3]

If the plant has been running losses which reduce both the taxable income of the firm and the taxes which it must pay on the income from its other operations, then the in-use value of the plant to the firm will be higher than the net cash flow to equity in the plant taken by itself. The reduction in the real value of other tax payments should be added to the real value of the net cash flow to equity in order to measure the maximum value that the owners place on their equity investment in the plant before trade liberalization occurs. It should be noted that if the plant runs a bigger loss after trade liberalization, or if the owners suffer a capital loss on the liquidation of the plant which provides correspondingly bigger tax offsets, then these should be included in the estimates of the in-use value of the equity after the tariff barriers are reduced.

Item 12. Change in Working Capital: It is important that adjustments be made to working capital items to reflect the expected rate of inflation built into the forecast of the nominal dollar value of sales revenue. This can be accomplished most easily by assuming that the nominal values of the various items in working capital maintain their historical relationship to nominal sales revenue. This procedure is quite valid for accounts receivable. It is also acceptable for accounts payable if the costs of goods sold are forecast as a fraction of the nominal dollar value of sales revenue (Item 2). However, it is less likely that physical inventories would increase proportionately to quantities sold so that if sales were expected to rise, the actual percentage increase in the nominal dollar value of inventories might not be the same. Maintaining a constant ratio between the nominal values of working capital and sales may not be completely accurate, therefore, but it does serve to avoid the upward bias in the net cash flow to equity which would result from holding the nominal value of working capital constant.

Item 16. Capital Expenditures: If additional capital expenditures would be incurred in the absence of trade liberalization, then these expenditures must be included in the forecasted net cash flow. The discussion of Item 6, indicated that these expenditures should be forecasted first in real dollars and then translated into nominal dollars at the expected rate of inflation. This procedure avoids the problem of different implicit expec-

tations of inflation built into the cash flow estimates. The firms in the industries likely to be most seriously affected by trade liberalization have had fairly low profit margins, and it is doubtful that many of them would be planning major investment programmes in the absence of trade liberalization. Nevertheless, some minor capital expenditures may be warranted from the company's point of view and should be included in the analysis.

The in-use value of the owners' equity in the absence of trade liberalization consists of the present value of the expected real net cash flow to equity and the present value of the real net liquidation value of the assets when the plant eventually closes down. Therefore, to complete our estimation of the in-use value, we need to know:

a) the length of time that the plant would remain in operation in the absence of trade liberalization,

b) the net real liquidation value of the assets when it shuts down, and

c) the appropriate discount rate for calculating the present values. We shall consider each of these points in turn.

a) Length of Life of Plant

Since many of the firm's operations directly affected by trade liberalization may not have been highly profitable in the past, it is difficult to know how long they would have survived even if current effective rates of protection were maintained. In such cases it would be reasonable

to assume that the remaining life of the plant would not exceed five to ten years. Longer forecasts of cash flows should not be made unless the operation is clearly supermarginal.

In the Canadian textile industry, for example, effective tariff rates have not fallen appreciably since the Kennedy Round of trade negotiations, but the industry is still facing increased foreign competition.[4] The Textile and Clothing Board recommended the imposition of quotas to increase the effective level of protection, and quotas recently had to be established to protect Canadian footwear producers.[5] Although many firms in these industries have some product lines which could remain competitive in the absence of trade liberalization, there is little doubt that these firms would have to shut down at least part of their operations over the next few years. The expected operational life of most plants and firms must be estimated in the light of market trends and other developments.

b) Real Net Liquidation Value

Whenever increased foreign competition would force the plant to shut down its operations, the assets of the plant must be liquidated at the higher of their en bloc or piecemeal values. If, in the absence of trade liberalization, the plant could operate for an additional five years, then the value of the assets should be calculated five years hence. Since these predictions are often difficult to make, it is frequently necessary to estimate the market values of the assets based upon their

remaining economic life. Estimates of scrap value could be obtained from the company or from professional appraisers. Both market and scrap va- should be measured in real dollars.

The market value of the working capital should be added to the liquidation value of the assets. Cash can be excluded from this calculation if only one of the firm's plants is under examination, but cash must be included if the entire firm is going to close. The market value of accounts receivable should reflect the probability that many of these accounts will not be paid. Inventories of materials and finished goods can be liquidated at their distress market value. All of these market values should be measured in real dollars.

Accounts payable and notes payable from the plant's operations as well as the principle outstanding on any debts attributable to the plant can be paid from the proceeds of the liquidation. Since the owing at the time of liquidation will be measured in nominal dollars, it is necessary to deflate this amount by the expected rate of inflation in order to compute the real value of the plant's outstanding debt. The real costs of liquidation including fees, commissions and site restoration, where necessary, should also be subtracted from the real market value of the assets. If the firm can write-off any losses from liquidation against gains from its other operations, then the real value of the taxes saved should be added to the market value of the assets in order to estimate the real net liquidation value of the plant.

c) The Private Discount Rate

The owners of the plant can be expected to try to maximize the amount of compensation they claim as a result of trade liberalization. Since, as we argued in Chapter 1.4.2, their expected loss can be measured by the difference between the net present value of the owners' equity before and after trade liberalization, the equity owners will try to make this difference appear large. To this end they have an incentive to minimize the risks the plant would have faced without trade liberalization, and to argue for a lower discount rate which raises the in-use value of the owners' equity before trade liberalization. They also have an incentive to emphasize the risks associated with the continued operation of the plant after trade liberalization and to argue for a higher discount rate which lowers the in-use value of the owners' equity after tariff barriers are reduced.

In order to avoid such biases and yet still ensure fair compensation to the owners of productive facilities, the average supply price of equity funds can be used as the appropriate discount rate. The average real rate of return to equity across all sectors of the Canadian economy over a ten year period has recently been estimated at 6.6%.[6] This estimate is a very reliable measure of the supply price of equity funds and thus of their long-run opportunity cost. The advantages of using this figure as the discount rate to calculate net present values are that it ensures equal treatment of all owners of productive facilities and avoids inter-personal comparisons of the evaluation of risks. Fairness in the

compensation paid is thus based not on the cost of equity capital for the firm, which depends on its capital structure and on its owners' perceptions of risk, but on the average opportunity cost of equity capital, which reflects the average debt-equity ratio and an ex post measure of the risks faced by all industries in Canada. The owners of the plant are thus left as well off as the average investor in Canada.

To illustrate the importance of taking proper account of the effects of inflation on business, reference is made to the rates of return on equity which have been estimated by industry for the years 1965-74. The first set of estimates in Table A2.3 shows the rates of return increased during 1972-74 in response to the higher rates of inflation. The second set of estimates have been adjusted for economic depreciation and inflation, and thus measure real rates of return on equity. The years 1972-74 no longer show as large an increase in the rates of return on equity.

Table A2.3

Private Rates of Return to Equity in Selected Industries

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	Average
1. Reported Rates of Return on Equity											
Leather Products	3.91	11.20	7.14	7.01	6.14	4.04	11.18	8.46	12.76	17.85	8.97
Textile Mills	10.31	9.67	5.47	6.01	8.54	0.41	6.99	8.49	14.04	17.93	8.79
Clothing Industries	5.65	5.79	7.37	7.69	8.46	5.64	8.27	12.67	14.68	14.41	9.16
Electrical Products	11.05	11.58	8.16	7.60	9.55	3.84	8.07	10.33	12.00	14.68	9.69
Total Manufacturing	12.46	12.10	9.57	9.75	10.59	6.81	9.09	10.52	16.10	18.20	11.52
2. Adjusted Rates of Return on Equity (a)											
Leather Products	2.24	8.67	7.79	6.18	5.02	3.66	8.92	6.62	10.17	12.81	6.99
Textile Mills	5.69	5.64	3.34	3.94	5.67	1.76	4.64	4.87	8.23	9.89	5.37
Clothing Industries	5.29	5.19	7.23	7.10	8.02	5.32	7.73	11.45	13.08	13.08	8.35
Electrical Products	7.69	8.64	6.64	6.38	7.88	3.71	6.50	8.28	9.51	10.78	7.60
Total Manufacturing	8.39	7.96	6.65	7.34	7.89	5.11	6.49	7.34	10.72	10.80	7.87

(a) Adjusted for economic depreciation and inflation.

Source: Glenn P. Jenkins, Capital in Canada: Its Social and Private Performance 1965-1974, Discussion Paper N° 98 (Ottawa: Economic Council of Canada, 1977), Tables E-1 nad E-3

A2.2 Estimation of the In-Use Value of the Owners' Equity in a Single Plant which Continues Operating After Trade Liberalization

Reductions in Canadian tariff and non-tariff barriers could reduce the in-use value of the owners' equity in a plant in an import-competing industry for three reasons:

a) the real net cash flow to equity could decrease,

b) the expected operating life of the plant could be shorter, and

c) the real net liquidation value of the assets could fall.

Each of these possibilities will be examined in turn.

Reference is made again to Table A2.2 to see why the net cash flow to equity will likely be lower after trade liberalization. Since the reduction in tariff barriers lowers the domestic (gross-of-tariff) price of imported goods, the price received and/or the quantities sold from the plant will probably decrease. Either of these factors could lower sales revenues (Item 1).

In order to maximize the amount of compensation claimed, the managers of the plant will have an incentive to make the decrease in expected sales revenue appear as large as possible. Hence, the analyst must guard against a downward bias in his forecasts. One way of minimizing the bias is to assume (unless the plant managers have good reasons to the the contrary) that the quantities sold will remain unchanged and that only prices will fall. The percentage decrease in price could then be set equal to the percentage reduction in effective protection. This approach could

be the starting point for further negotiations with the company.

If the quantities sold are expected to remain unchanged and only prices fall, then this would minimize the number of subsequent changes to the expected net cash flow to equity. Expected future sales revenue (Item 1) would of course be lower. Overhead and other corporate expenses (Item 3) and working capital (Item 12) attributable to the plant could be reasonably forecast by multiplying the relevant historical unit percentages by the new predictions of sales revenue. It is less likely, however, that the firm would be able to reduce its labour and material inputs and still be able to produce the same quantity of output. Hence, unless subcontractors were also specialized and therefore willing to reduce their prices (which would probably happen in the clothing and textiles industries), the value of the costs of goods sold (Item 2) would probably not change much after trade liberalization.[8] Since capital cost allowances and interest expenses (Item 6) also remain fixed in nominal dollars, the nominal dollar value of taxable income and corporate income taxes (Item 7) will decrease.[9] After deflating for the expected rate of inflation, the net present value of the real net cash flow to equity, and hence the in-use value of the assets, will be lower after trade liberalization occurs.

If lower effective protection and increased foreign competition cause both prices and quantities sold from the plant do decrease, then the plant will require less labour and material inputs. How many of these inputs can be released will depend on the plant's production techniques.

In some cases an across the board percentage decrease in input quantities may occur, but this is not always so. If the amount of compensation to be paid to owners of production facilities is estimated after trade liberalization has had its impact, then there should be some data on employment and material usage and a measure of the costs of sales. In order to get an ex ante estimate of the compensation which could be paid, however, it may be necessary to use industry experts to predict the likely value of the costs of goods sold.

The analyst should always be mindful of the incentive the firm has to maximize the amount of compensation it claims. Company managers will try to emphasize the serious consequences of trade liberalization by predicting that quantities sold are likely to decrease drastically, but at the same time they anticipate their costs will remain relatively unchanged. Since rational plant managers would generally try to maximize profits by reducing their workforce and purchased inputs in response to a reduction in sales, the situation may not be quite as bleak as the company would like to portray. For this reason predictions coming from the company should be checked whenever possible with independent experts.

Since the rates of return on equity in those marginal firms most likely to be affected by trade liberalization are generally below average, further reductions in profitability will undoubtedly shorten the expected operating life and lower the real net liquidation value of the plant when it finally shuts down. The net liquidation value will decrease

because the market value of specialized machinery and equipment will now be lower, unless it is moveable and can easily be shipped abroad. If the owners of the equity receive the cash value of the plant sooner than would have occurred in the absence of trade liberalization, we can assume that cash is invested and earns a rate of return equal to the private discount rate (6.6%). In other words, we assume that the owners are not better off just because they receive the cash earlier.

The expected loss to the owners of the equity investment in the plant would be equal to the difference between the in-use value of the plant before and after trade liberalization. As we have seen, the in-use value of a plant which continues operating after trade barriers are reduced is likely to be lower because of the decrease in the net present value of the real net cash flow to equity, a shorter expected operating life, and a fall in the real net liquidation value of its physical assets.

A2.3 Estimation of the Costs of Adjustment for the Owners of a Plant which is forced to Shut Down as a Result of Trade Liberalization

If a plant is forced to shut down as a result of trade liberalization, then the expected loss would be equal to the difference between the in-use value of the plant's assets and their net liquidation value. One of the difficulties with any programme to reimburse the equity owners for their loss is to ensure that the shutdown is indeed trade related. Another difficulty is that a policy of compensation could encourage the managers to run the plant into the ground, to squeeze as much income as

possible out of the plant in the short run, and then to seek a larger amount of compensation from the government because of the lower net liquidation value of the physical assets.

In order to avoid this latter problem, any compensation programme should be careful to specify a "valuation day" for all companies affected by trade liberalization (however identified). The value of the assets after tariff and non-tariff barriers are reduced could then be calculated as of the valuation day which should be on or shortly before the date on which the programme is announced. In this fashion income generated by the assets after valuation day would be included in the value of the firm and would reduce the amount of compensation that has to be paid.

As long as a firm remains in operation, it is assumed to be generating a stream of gross profits sufficiently large to cover interest expenses and amortization of the debt. If trade liberalization results in the closing of only one plant of a multi-product firm, but the rest of the firm continues to operate, then the investment of the debt-holders is probably not in jeopardy. If the total activities of the firm become unprofitable, however, then the liquidation value of the assets may not be sufficient to compensate the debt-holders, and some consideration should be given to ensure that the debt-holders receive the market value of their investment.

As we indicated earlier, the real net liquidation value of a plant is the higher of the market or scrap values for the physical assets, plus the expected value of receivables, plus the market value of inventories,

less payments to creditors and debt-holders less the costs of liquidation, all deflated for the expected rate of inflation. In some cases the company may have good data on these values, but independent appraisers should also be consulted. Any reduction in other taxes payable by the firm as a result of capital or income losses from the liquidation of the assets should also be included in the proceeds. As we indicated earlier, this calculation may require a careful examination of the impact of liquidation on the company's capital cost allowance pool. A decrease in other taxes raises the return to the owners from liquidating the plant, and hence reduces the amount of compensation which need be paid.

A2.4 Costs of Adjustment for Foreign-owned Plants Affected by Trade Liberalization

In Chapter 1.4.2 we stated that the purpose of compensating workers who lose their jobs or the owners of productive facilities who experience a reduction in the in-use value of their equity investment is to redistribute some of the benefits from trade liberalization to those who are adversely affected by it. As long as the redistribution of benefits is received by other Canadians, then all Canadians aggregated together are better off by the efficiency gains resulting from reduced tariffs; the compensation policy is intended to prevent any particular group of individuals from being made worse off than before trade liberalization. Yet, the question arises as to how foreign owners of production facilities in Canada are to be treated.

If foreign-owned firms are compensated to the same extent as Canadian companies and if these funds remain in Canada, then they will continue to generate tax revenues which benefit Canadians. If the funds paid to foreigners are repatriated, however, Canadians have given away part

of the benefits of trade liberalization and are thus worse off. Since much of the foreign equity investment in manufacturing industries was stimulated by Canadian tariffs then it is reasonable to presume that trade liberalization will induce foreign firms to repatriate a higher proportion of their earnings in the future. Does this imply that foreign-owned firms should receive no compensation?

The average real rate of return on U.S. direct investment in Canadian industries has been estimated at 7.1% which is approximately equal to the average real rate of return on all equity investment in Canada (6.6%).[10] In other words, the supply price of foreign capital is roughly equal to the supply price of equity capital in Canada. Since the existing foreign investment in Canada must be viewed as a sunk cost, and hence non-incremental, it is not in Canada's best interests to have that capital earn a rate of return greater than 7.0%. By the same token Canada might have difficulty in attracting foreign equity investors in the future if the government discriminates unduly against foreign investment.

We therefore propose the following compromise. If the government adopts a policy of compensating owners of productive facilities for the decrease in the in-use value of their equity investment as a result of trade liberalization, then the compensation should not raise the rate of return on foreign-owned equity above 7.0%. This is not to suggest that the government guarantee foreign owners a 7.0% return, but rather that the

compensation payments should not give foreign owners a greater than 7.0% return. In effect this policy would mean that a foreign-owned firm, which expected to earn less than a 7.0% real rate of return before trade liberalization occurred, would be treated just like a company owned by Canadian residents.[11] Since most firms which are likely to be affected most severely by reductions in Canadian Tariffs have below average real rates of return on equity and thus fall into this category, there would be no need for the government to treat foreign owners differently. When the foreign-owned firm expects to earn a real rate of return in excess of 7.0% per year in the absence of trade liberalization, the compensation offered by the government should be reduced accordingly.[12]

In Chapter 1.4.2 it was suggested that as a result of lower effective protection the plant managers of Canadian owned firms in import-competing industries may also have an incentive to invest abroad in the same activity rather than to diversify into new products. In this sense there is probably not much difference between the expected behaviour of Canadian and foreign-owned firms because both could invest compensation payments from the government into their operations abroad. When Canadian firms invest abroad, all Canadians are potentially worse off because of the loss of tax revenues that otherwise would have been collected. The only way that all Canadians could be better off as a result of the foreign investment is if the net-of-tax rate of return on operations abroad were higher than the gross-of-tax of social rate of return foregone in Canada. The social rates of return for some of Canada's import-competing industries were presented

in Table 1.1. If the latter conditions prevailed, then there might be an efficiency argument for subsidizing foreign investment. The subsidy would be unnecessary and cost ineffective, however, because firms would already have sufficient incentive to invest abroad. Equity considerations would also make a subsidy undesirable because Canadian taxpayers in general would not want to subsidize the specific Canadian investors who are already benefiting from the higher rates of return abroad.

Notes to Appendix 2.0

1. Graham Glenday and John C. Evans, "Inflation and Investment Analysis", prepared for the Enterprise Development Branch, Department of Industry, Trade and Commerce (May, 1978).

2. Small privately owned companies pose a special problem in estamating net cash flows to equity. The owners of these small firms often pay themselves salaries which do not reflect a true measure of their opportunity cost. Salaries to owners should be added back in to measure the true cash flow to equity.

3. Glenn P. Jenkins, Inflation: Its Financial Impact on Business in Canada, Ottawa: Economic Council of Canada, 1978.

4. Economic Council of Canada, Looking Outward - A New Trade Strategy for Canada, (Ottawa: Information Canada, 1975): 136-7

5. Bernard Portis and John M. White, "Government Assistance to the Canadian Footwear and Tanning Industries", An Independent Report prepared for the Government of Canada, October 1977.

6. Glenn P. Jenkins, "Capital in Canada: Its Social and Private Performance 1965-1974", Discussion Paper No. 98, Ottawa: Economic Council of Canada, 1977, Table 2-5.

7. Plant owners and managers, for example, sometimes claim that they can perform very efficiently if protection is continued, but that without protection, they perform very badly. In point of fact the economic incentives they face are precisely the opposite.

8. It is implicitly assumed that the trade unions in these industries would not reduce their wage demands in order to maintain the owners' profit margins. If there were good reasons to believe that wages would rise less quickly over time, then the costs of sales could be adjusted accordingly.

9. Note that if the plant were profitable before trade liberalization, but started to run losses afterwards, then the firm might be able to take advantage of the losses by reducing its taxable income from other operations. Any tax offsets should be included in the in-use value of the owners' equity in the plant.

10. John C. Evans and Glenn P. Jenkins, "An Economic Evaluation of Foreign Financing of Investments in Canada", a paper prepared for the Department of Regional Economic Expansion (April 1977), Table A-1.

11. Caution must be exercised in estimating the decrease in the value of the net assets employed. A foreign-based multinational company could continue to service the Canadian market from its U.S. plants and thus might not suffer any decrease in total sales. In such a case no compensation should be paid.

12. Note that if foreign-owned firms expect to earn a rate of return in excess of 7.0% even after trade liberalization occurs, we do not advocate taxing away the excess returns. Even if we do not recommend preventing foreign-owned firms from earning above normal returns, we see no reason why the government should add to them.

CHAPTER 3

DETERMINANTS AND ESTIMATES OF THE ECONOMIC COSTS OF ADJUSTMENT

3.1 Introduction

In this Chapter we shift our focus away from the costs of adjustment to specific individuals injured by a change in government tariff policy, and examine instead the costs of labour adjustment to the economy as a whole. The economic costs differ from the private costs of adjustment in a number of ways.

First, the costs of adjusting to reduced trade barriers for the economy as a whole are in general not equal to the sum of the private costs to the specific individuals injured. The economic costs are measured in terms of the economic externalities foregone when factors of production are displaced, not by the change in private income flows.

Second, the value of the economic externality forgone as a result of displacing workers is measured as the difference between the social value of the output of labour with and without the loss of the job opportunities that leads to the layoff of workers. The social value of the output of labour is the dollar value to all Canadians of the employed and unemployed (or leisure) time of labour. If the job opportunities were to be maintained indefinitely, then the contribution of this employment to the economy would equal the gross-of-tax compensation paid to labour. If the layoff occurs, then the social value of the output of labour in these jobs is lost. At the same

time, however, changes in the amounts of time labour spends employed and unemployed occur in response to the layoff. The social value of these changes in labour activity represents the social opportunity cost of retaining workers in these jobs. When workers are displaced, therefore, the economy is made worse off by the loss of any positive externality associated with the employment of labour in these jobs.

Third, the dynamic response of the labour market over time to layoffs may differ from the unemployment experience of the workers actually displaced. We thus estimate the social opportunity cost of labour using both a partial equilibrium and a general equilibrium model of labour response. The partial equilibrium model measures the social opportunity cost of displaced workers based on the unemployment/employment experience of only the workers directly affected by the decline in employment. The general equilibrium model incorporates into the estimation of the social opportunity cost of labour any externalities in the rest of the labour market which are attributable to the layoffs. We would expect, for example, that the workers laid off by the decling firm would compete with other members of the labour force for jobs and thus increase the duration of unemployment of these other people. The general equilibrium model also captures the externalities from induced labour migration, changes in the labour force participation, and indirect employment effects as a result of changes in spending.

The magnitude of the labour externality is important for policy purposes. Trade liberalization results in a decline in the

price that domestic producers can receive for commodities exposed to greater foreign competition. Firms producing these commodities can be expected to close, contract or at least experience a lower expansion rate than otherwise would have occurred. The resultant loss of job opportunities and associated layoffs lead to the loss of the labour externality that would have been earned through maintaining the level of operations of affected firms. Therefore, even though the owners of a firm may want to reduce or stop operations because their financial returns are driven below their opportunity cost of capital, the government may want to assist the firm to remain in business in order to prevent the loss of the labour externality. In other words, it is possible that although the rate of return received by the equity holders in the firm may drop below what they can receive in alternative investments, from the perspective of the economy as a whole the labour externality may raise the social rate of return to a sufficiently high level to make it economically more efficient for the government to assist the firm to stay in business rather than to let it close.

The minimum subsidy that a firm requires to keep it in business is the transfer payment that would raise the financial rate of return to the equity holders from their capital investment in this firm to at least what they could earn in alternative investments. The maximum subsidy that the government should consider paying the firm is the social value of the net externality generated by the operation of the company. If the only externality is the positive labour exter-

nality, then the magnitude of the labour externality from delaying the layoff of workers (see Chapter 4.4 for examples of such estimates) forms the maximum amount of government assistance justifiable on the grounds of improving economic efficiency. If the net externality of the operations is in fact negative (or, in other words, the continued operation of the firm would result in a net economic cost), then the firm should be allowed to close and other re-employment promoting programmes should be considered. (See Chapter 4.)

A large negative externality can arise from the subsidization of firms receiving continued effective tariff protection (even after the completion of the MTN). Keeping firms in business that are still protected encourages the expanded domestic production of goods which could be imported at a lower cost to the economy. The negative externality in this case is measured by the foregone tariff revenue with an adjustment for the social opportunity cost of foreign exchange. This negative externality from continued protection should be subtracted from the positive externality of keeping jobs in place. The net externality of keeping a protected firm in business is thereby reduced (as is the maximum subsidy). In fact, if the remaining level of effective protection is sufficiently high, then the net externality may be negative, and hence remove the justification on economic efficiency grounds of assisting the firm.

Other distortions in markets in which a firm operates can also generate economic externalities through differences between the

dollar amounts a firm receives or pays for goods or services and their social opportunity costs. In general, any subsidization of the inputs or outputs of a firm (such as through effective tariff protection) results in negative externalities if its operations are expanded. Conversly, taxes (such as sales taxes) result in positive externalities when output is expanded. If any firm of industry is experiencing taxation or subsidization rates that differ markedly from the average for all industries, then these should be incorporated into any analysis of whether or not government assistance resulting in expanded production can be expected to be efficiency positive or negative.

The format of Chapter 3 is as follows: Section 3.2 contains an outline of the partial equilibrium model used to estimate the social opportunity cost of labour. An overview of the general equilibrium model used to measure the labour externality is provided in Section 3.3, but the detailed specification of the equations is left to an appendix. In Section 3.4 we estimate the labour externality using both the partial and general equilibrium models applied to the two case studies examined in Chapter 2. These estimates provide us with a measure of the economic costs of labour adjustment in the two regions. In Section 3.5 we examine in greater detail how the economic costs of adjustment for a region change when effective protection is not reduced to zero. This chapter provides the empirical foundation for some of the policy recommendations contained in Chapter 4.

3.2 Measurement of the Economic Costs of Labour Adjustment Using a Partial Equilibirum Model

In the partial equilibrium model of labour market adjustment displaced workers remain unemployed, retire from the labour force, or over time find alternative employment. The social opportunity cost of retaining these workers in their current employment, therefore, is a weighted sum of the social opportunity costs of those who remain unemployed, enter early retirement, or become re-employed. We examine each of these opportunity costs in turn.

When a group of N workers is released from a firm, a proportion (R) are expected to choose early retirement, a proportion $(1-R)P_t^a$ to be at work in alternative employment, and a proportion $(1-R)(1-P_t^a)$ to be unemployed at a point in time (t) after layoff. The workers who are successful in finding and retaining alternative employment generate a product with a value at least equal to the gross-of-income tax wage (W^a) they earn. For those who would find alternative employment, wage is the social opportunity cost of retaining this labour in the declining industry.

The social opportunity cost of workers who remain unemployed is the non-monetary value of the leisure they would have to give up to accept alternative employment.[1] As was outlined in Chapter 2, the non-monetary value of leisure (V^a) can be estimated from the worker's trade-off between labour market and non-labour market activities.

In a competitive labour market where there is no involuntary unemployment, or if people could choose the number of hours or weeks

they work each year, the net-of-tax wage rate would be equal to the value of unemployment compensation net of taxes plus the value of leisure.

$$W^a (1-t) = UIC (1-t) + V^a \qquad (3.1)$$

where W^a = the gross-of-tax wage in alternative employment;

UIC = the Unemployment Insurance benefits based on the insurable earnings before lay-off.

t = the marginal personal income tax rate that a worker pays on his incremental income. When the worker decides to give up leisure in order to earn extra income from employment, he pays additional taxes equal to the marginal tax rate times his incremental income;

V^a = the non-monetary value of leisure time.

The wages in some labour markets are not competitive because minimum wage laws and collective-bargaining agreements have raised wages above their market clearing levels. In consequence the value of employed time is higher than unemployed time; the net-of-tax wages earned from work will then be equal to some multiple of the values of unemployment benefits and leisure enjoyed when not at work. This relationship can be expressed as:

$$W^a (1-t) = B(f\ UIC(1-t) + V^a) \qquad (3.2)$$

where B = a coefficient which reflects the value individuals place on working rather than being unemployed. In a competitive labour market B is approximately equal to one. When the wage rate is set above the competitive rate, then $B > 1$. Thus B will depend in part on the union-non-union wage differential and the percentage of workers covered by collective bargaining in the area;

f = the proportion of time that a person expects to receive unemployment insurance while unemployed.

Given the value of B, we can solve equation (3.2) for the non-monetary value of leisure after layoff:

$$V^a = \frac{W^a(1-t) - Bf\ UIC\ (1-t)}{B} \qquad (3.3)$$

Note that the social opportunity cost of unemployed workers is the non-monetary value of leisure time which is measured net of the unemployment insurance benefits received by workers while they are unemployed. Whereas unemployed workers may be receiving unemployment insurance payments which are a private benefit from being unemployed, these payments are not included in the social opportunity cost of labour. The reason is that these payments represent a transfer of income from the general tax payer to unemployed workers, and hence, are not a social cost.[2] Therefore, although we included the change in unemployment insurance benefits as part of the net private income loss to displaced workers in Chapter 2, we do not include it as part of the social opportunity cost of unemployed workers. The only role for net-of-tax unemployment insurance benefits is in the estimation of the social opportunity cost of labour is in the non-monetary valuation of leisure time as in equation (3.3).

As the time since layoff increases the probability of workers' being at work also increases. In Chapter 2, the probabilities

of displaced workers' being at work at any point in time was estimated from the combined probabilities of workers' finding and retaining employment over time. Their changing state of employment also alters their social opportunity cost. For those workers who have not retired, the social opportunity cost of labour can be estimated at each point in time by weighting the gross-of-tax wage rate (W^a) and the non-monetary-value of leisure (V^a) by the proportions of people that are expected to be in each state,

$$\text{SOCL of displaced workers still in the labour force at time t} = N(1-R)\ (P_t^a W^a - (1-P_t^a)\ V^a) \qquad (3.4)$$

where P_t^a = the probability that workers of a particular type are at work at time t after having been laid off.

The probabilities of being at work after layoff and the alternative wage rates can be estimated from the data obtained either from the labour force tracking survey or from the ROE/UIC records. Both data bases were described in some detail in Chapter 2.

For the workers who choose early retirement their private situation in retirement must be at least as satisfactory as their private alternatives if they remained in the labour force. The social opportunity cost of retired workers may be less than their private opportunity cost if they can obtain their pension benefits only by stopping work. In this case these retirement benefits make the retired person willing to retire at a point when the non-monetary

benefits he enjoys from retirement are still less than the private income he would generate if he continued working. The difference between these two magnitudes is equal to the additional income he obtains only if he stops working. The social opportunity cost of retaining a worker in an activity, if his next best alternative is early retirement, is his private opportunity cost if he were to remain in the labour force, less the pension benefits that are tied to his stopping work.

$$\begin{array}{l}\text{Social Opportunity} \\ \text{Cost of Retired Workers}\end{array} = NR\left(P_t^a W^a (1-t') + (1-P_t^a)(UIC\ (1-t') + V^a)\right) - \text{Pension Benefits} \qquad (3.5)$$

The social opportunity cost of retaining the group of N workers in the declining activity at a point in time is equal to the sum of equations (3.4) and (3.5).

To estimate the potential loss in economic welfare created by laying off workers, the social opportunity cost of labour must be compared with the social product generated if they were retained their present activity. In a competitive economy the social value of employed workers' time is equal to the gross-of-income tax wage rate they are paid. The social value of their unemployed time is equal to the value of leisure before being laid off. The value of the social product of labour before layoff can thus be written as follows:

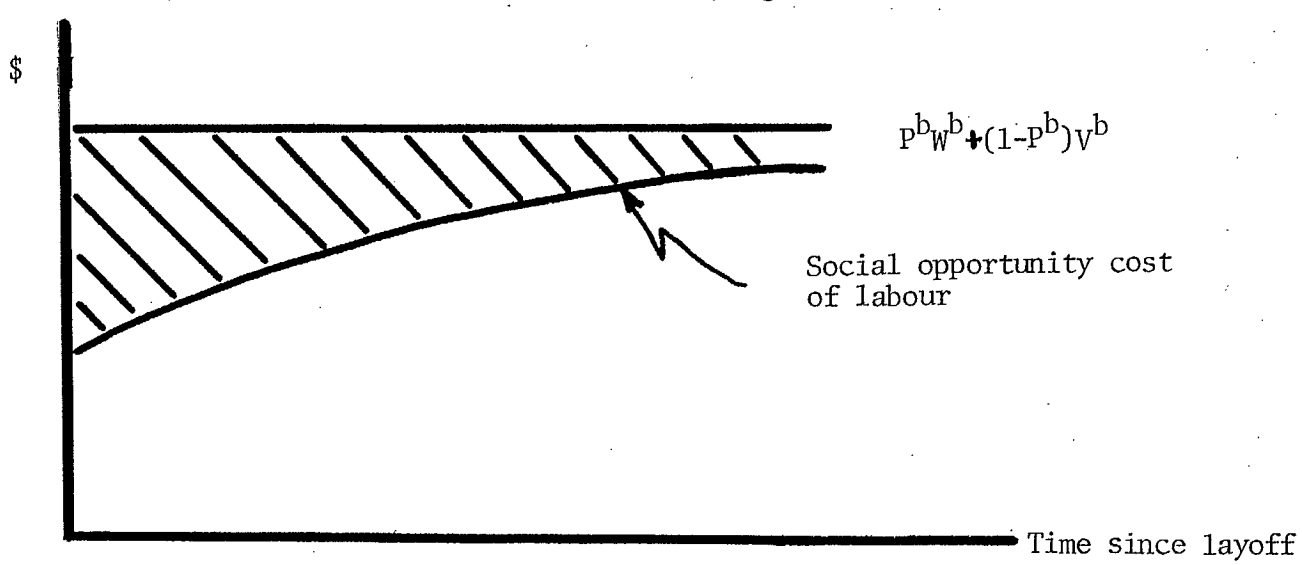
$$\begin{array}{l}\text{Social Product of} \\ \text{Labour before} \\ \text{Layoff}\end{array} = P^b W^b + (1-P^b)V^b \qquad (3.6)$$

where the superscript "b" indicates before layoff.

The loss in economic welfare that arises from the layoff of workers is measured by the difference between equation (3.6) and the sum of equations (3.4) and (3.5). This labour externality is illustrated by the shaded area in Figure 3.1. The present value of this shaded area represents the maximum amount that the government could pay to retain these workers in their current employment, and at the same time not reduce the economic welfare in the country (assuming for the moment that no other externalities are generated by the expanded operation of the firm).

Figure 3.1

The Negative Economic Externality of Laying-Off Workers



The partial equilibrium model usually generates estimates of the efficiency loss of displacing workers which are biased downwards. The reason is that this model fails to take account of the repercussions of the layoffs on other workers and on employment

opportunities in general. The partial equilibrium model does provide reliable estimates of the economic loss under the following conditions:

a) Displaced workers and workers already unemployed are poor substitutes in employment.

b) The adjustment of the demand and supply of labour comes about mainly through changes in wage rates.

c) Adjustment to labour market disequilibrium does not come about through worker migration.

d) When the labour market is in equilibrium, unemployment is either frictional or voluntary.

When these conditions do not hold for layoffs in a regional labour market, then a general equilibrium model is required to capture the other repercussions. In the next section we outline a labour market simulation model which has been designed for this purpose.

3.3 Economic Costs of Adjustment for a Regional Labour Market

In the previous section a partial equilibrium model is presented in which the costs of laying off labour are measured as the difference between the social value of the product of the laid-off workers before and after separation. For a general equilibrium estimate of the economic costs of displacing labour, however, it is not sufficient to include the costs only for those actually laid-off. A simulation model has been developed, therefore, to capture the costs of all the repercussions of layoffs for a regional labour market.[3]

In the partial equilibrium model the social opportunity cost of displaced labour is estimated as the weighted average of the social values of the employed and unemployed time of the workers who remain in the labour force and the leisure time of early retirees. In the simulation model the social opportunity cost of displaced labour is also measured as a weighted average of the social values of time, but in this model it is the weighted average of the social opportunity cost of the time of those individuals who are caused to change their supply of labour services to the regional labour market. Such persons include added outmigrants, non-participants in the labour force, workers in newly created jobs, early retirees, and persons losing their jobs through multiplier effects. Over time the combined effect of these adjustments will restore the equilibrium in the regional labour market. It is, in fact, the social value of the time of those individuals who are finally induced to adjust their supply of labour to the region, thereby bringing the labour market back to equilibrium, that determines the social costs of laying off labour.

In the simulation model the labour force in a region is divided into distinct groups according to two criteria.[4] First the labour force is divided into a permanent and temporary sector. The permanent sector consists of those persons who because of their choice of occupation and personal attributes hold jobs which run continuously on a full-time basis. By contrast persons in the temporary employment sector hold jobs that do not provide continuous employment. Temporary sector workers experience periodic spells of unemployment on account of the seasonal or cyclical nature of their employment and their low seniority, or as a result of their lack of skills specific to a firm. These two sectors contain groups of workers with quite different employment and unemployment experiences. The workers who are continuously in the temporary sector are of particular interest in that it is this group that contains the marginal workers whose labour supply behaviour leads to adjustments in the regional labour market in response to disturbances such as a plant shut-down.[5]

The second structural characteristic of the regional labour force which we take into account is the division of total employment into base and secondary sectors. Workers are placed in the base sector if they are involved in the production of goods and services the demand for which is determined by economic conditions exogenous to the region. In the long-run the income derived from base sector activities is independent of local economic conditions. The production of exported goods is an example of a base sector activity.[6] Secondary sector activities are those which depend on local economic conditions. The provision of services to local residents would fall into the secondary sector.

The division of the labour force into base and secondary sectors is important for two reasons. First, the simulation model has been developed to trace the effect of exogenous disturbances on a regional labour market.

This includes incremental changes in the employment opportunities in the region as would arise out of the growth or decline of a base sector activity. The effects of trade liberalization resulting from the MTN will cause a decline in the level of production in some base sector industries and, hence, the displacement of base sector workers.

The second reason for identifying the base sector of the labour force is that it allows the introduction of multiplier effects. The contraction or closure of firms in the base sector leads to a loss of both wages and profits in the region. This decline in regional income and spending will have adverse effects on the demand for secondary sector activities leading to a gradual reduction in secondary sector jobs. With a deterioration in employment opportunities in the local economy some individuals will decide to migrate out of the region taking with them their earnings and transfer payments. This leads to further reductions in local income spending and employment.[7] These losses of wages, capital income (to the extent that it would have been spent in the local region) and government transfer payments are somewhat reduced by the pension benefits received by early retirees, welfare payments received by non-participants in the labour force, increased UIC payments going to the additional workers unemployed, and any wage income from newly created jobs. A long-run labour income multiplier between base and secondary sector activities is incorporated into the model to estimate the gradual loss over time of secondary sector jobs from the change in base sector income.[8]

The simulation model for a regional labour market is general equilibrium in nature. The model defines the long-run equilibrium state towards which the regional labour market moves whenever it experiences a perturbation such as a decline in job opportunities. The model also incorporates all the adjustment mechanisms by which the labour market returns to its equilibrium state. These include the interactions among regional labour markets within a country that occur through migration as well as the intra-regional dynamics such as regional multiplier effects and changes in labour force participation.

3.3.1 Adjustment Mechanisms in the Simulation Model

The primary determinant of the long-run equilibrium state of a regional labour market is taken to be the equilibrium employment rate, PEQ, in the temporary sector. PEQ can be viewed as a structural variable. Its role, however, arises out of the long-run dynamics of regional labour market interactions. Over time in the absence of exogeneous disturbances the movement of people between regions leaves the structure of labour markets relatively stable (at least over the 10 to 20 year time horizon of concern here). The stability of different regional labour market structures is reflected in the long-run average regional unemployment rates that persist at different levels relative to the national unemployment rate.[9]

Migration will eventually sort people out according to their preferences and the spectrum of economic opportunities they face. Migration decisions are based on the satisfaction that can be derived from the types of employment opportunities (both wages and expected durations of employment) and environmental factors (both physical and cultural) in a particular region relative to all other regions. In terms of future responses by the regional labour market to a perturbation, PEQ plays a key role in reflecting the economic opportunities available to the marginal temporary sector migrant as well as in determining the number of additional workers that will migrate into or out of the region.

The secondary determinant of the long-run equilibrium state of a regional labour market is the long-run average labour force participation rate, REQ. Because the channels through which a labour market can adjust to a loss of job opportunities include early retirement and changes in labour force participation, the long-run participation level in the region must also be predicted. In the model, both of the equilibrium values, PEQ and REQ, are assumed to remain constant over time.[10]

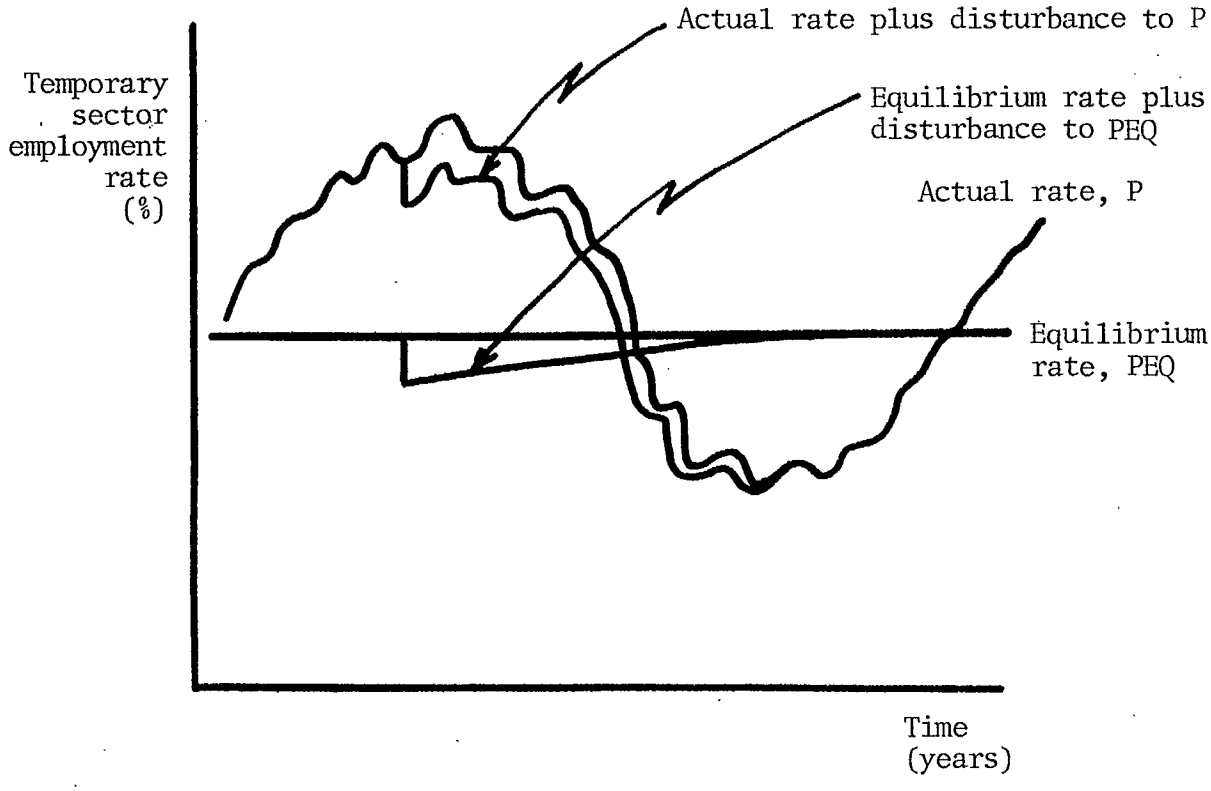
In the simulation model it is assumed that the regional labour market adjusts to any pertubation as though the region were in its equilibrium state before this pertubation.[11] (See Figure 3.2) In the normal course of events labour market conditions will fluctuate in response to numerous positive and negative economic forces and disturbances. The loss of jobs due to trade liberalization represents an additional disturbance. In order to separate out the adjustment response to this particular pertubation it is assumed that its effect is additive. The regional labour market will tend to move back towards its equilibrium state in the same manner that would have been expected if the labour market had been in its long-run equilibrium state when this pertubation occurred.

For the purposes of estimating the labour externality resulting from labour displacement it is assumed that the regional labour is in its equilibrium state when labour is laid off. The regional labour market equilibrium state is set up as follows. Given the population size, the size of the labour force is determined by REQ. Based on the average size of the temporary sector, the labour force is split into permanent and temporary workers. All permanent workers have permanent jobs, by definition. Given the average duration of unemployment, a temporary sector worker can expect to experience in the presence of the long-run average unemployment rate in the region, the man-years of labour available in the temporary sector can be divided into man-years of employment and unemployment.[12] The labour force is then further split into base and secondary sectors.

Once this equilibrium labour market structure has been determined the adjustment mechanisms that return the labour market to its equilibrium state can be considered. The adjustment response to the displacement of base sector workers and the subsequent loss of secondary sector jobs from the multiplier effects of the loss of base sector income occur through a number of channels.

Figure 3.2

Response of Regional Labour Market to an Exogenous Disturbance



A. Migration

Interregional migration plays an important role in any regional response to changes in unemployment conditions. During any period there is generally a continual flow of migrants into and out of a region. A deterioration in the unemployment conditions in a region will be expected to induce more potential outmigrants to leave and simultaneously to discourage persons who otherwise would have migrated into the region from doing so. An increase in the regional unemployment rate due to a loss of jobs can therefore be expected to result in additional net outmigration compared to the net flows that otherwise would have occurred. All these added out-migrants are assumed to have been induced to leave the temporary sector of the labour force. If people migrate directly from the permanent sector, their jobs are assumed to be filled by temporary sector workers which in turn induces added in-migration into the temporary sector.[13] This chain reaction has the same net result as if the migration had occurred only from the temporary sector. The migration response enters the simulation model as a linear relationship in which the number of out-migrants in any period is taken to be proportional to the size of the temporary sector labour force and the difference between the equilibrium unemployment rate and the actual unemployment rate. In other words the number of outmigrants depends on the excess amount of unemployed time in the regional labour market at that time.

B. Changes in Labour Force Participation

A deterioration in regional labour market employment conditions

will induce in the short-run some marginal temporary sector workers to leave the labour force. As the region begins to recover, however, these potential participants will be encouraged to re-enter the labour market. Changes in labour force participation thus play the role of a shoch absorber in the over the short-run they reduce the unemployment rate, but in the long-run the participation rate returns to its equilibrium level which implies the return of most of the discouraged workers back into the labour force. In the model the participation rate is assumed to be negatively related to the unemployment rate. Changes in the number of participants, therefore, depend on the changes in the unemployment rate.[14]

C. New Job Creation

The release of workers into a tight regional labour market can be expected to result in a more rapid expansion of jobs than otherwise would have occurred. Job search is a two way process. Workers are looking for suitable jobs, and employers are seeking suitable workers. In a region experiencing rapid economic growth employers face greater difficulty in finding workers with the right skills. An increase in the unemployment rate through the displacement of workers can thus result in the employer finding suitable employees earlier. "New jobs" can therefore be interpreted as employment episodes starting sooner. There may also be longer employment episodes to the extent that employers find better trained and more productive workers whom they would be more reluctant to lay off in the future.[15] The new job creation response enters the simulation model in the same manner as migration. New job creation is assumed to increase with any excess unemployment in the region over the equilibrium level.

D. Early Retirement

When a plant shuts down a proportion of the older workers may choose to enter retirement. This will be at an earlier time than would have been expected to occur if the plant had not shut down. The increase in unemployment in the region may also induce some other workers to retire given their reduced employment prospects. Early retirement is conceptually similar to a change in labour force participation except that it is taken to be an irreversible decision. Early retirees enter the model as a proportion of the displaced workers.

The overall rate of adjustment and the relative importance of the different channels will depend on the characteristics of the regional labour market at the time of layoff. If a region is undergoing rapid economic growth, for example, new job creation would be expected to be more important than in a slow growth region. Another region with an older than average labour force and a high proportion of secondary income earners can be expected to show relatively high early retiree and labour force participation responses but slower than average migration responses.

3.3.2 The Labour Externality and the Social Opportunity Cost of Displaced Workers

Having established how a regional labour market can be expected to adjust to the loss of base sector jobs, it is now possible to outline the method of estimating the efficiency loss from displacing labour. The efficiency loss is equal to the present value of the difference between social value of what the displaced workers would have been expected to produce if retained in their jobs and the social opportunity cost of this employed time. Assuming that the wages that the workers would earn if retained in their present activities equal the value of their marginal product, then the social value of their output in these activities equals the gross of tax wage bill. The social

opportunity cost of retaining workers in a declining firm is equal to the social value of the activities which would be undertaken if they were released. The loss of employed time has been shown to have a number of consequences for a regional labour market. It can be expected to result in more unemployed or leisure time, more out-migration, changes in labour force participation, earlier retirement, new jobs being created and jobs being lost in the secondary sector. It is the social value of time of the persons involved in these activities that determines the social opportunity cost of retaining workers in their jobs. The simulation model, therefore, has to keep account over time of the changes in man-years involved in these activities and then value the change in time in each activity at the appropriate social value. The adjustment mechanisms described above allow the changes over time in man-years in these activities to be predicted. The estimation of the social opportunity cost of each of these activities is outlined below.

The fundamental determinant of the social opportunity cost of labour is the competitive supply price at which workers of a particular type will make themselves available for employment in a region.[16] It is important, however, to include all the distortions due to taxation, unionization or unemployment insurance programmes that may affect the net income a worker can expect to receive through supplying labour to a region.[17] Moreover, any externalities that are involved in workers' supplying labour to a particular region should also be included in estimating the social opportunity cost of labour.

A. Social Opportunity Cost of Leisure

It is assumed that all the added unemployed time is leisure time

or time not involved in market activities. The value of leisure time can be estimated from the workers' trade-off between labour-market and non-labour-market activities as was discussed in Section 3.2,

$$V = \frac{W(1 - t) - B\ f\ UIC(1 - t)}{B} \qquad (3.3)$$

where W = the average temporary sector real gross-of-tax wage

B. Social Opportunity Cost of a Migrant

If migration is allowed between regions then the long term monetary differentials will reflect the fact that there are differential costs of living and/or certain environmental advantages or disadvantages between the regions. These wage differentials represent the different private supply prices that workers require to induce them to work in these regions.[18] In the simulation model it is the marginal migrant in the temporary sector who is of chief concern. In the presence of taxes, unemployment, and unemployment insurance benefits the private supply price of labour in a region cannot be taken to be the wage rate, but it is rather the dollar value that the marginal migrating worker places on an average unit of his time. This will include the net-of-tax wage for the proportion of the time that he is working, plus the net-of-tax income he receives from unemployment insurance benefits for the proportion of time when he is unemployed, plus the non-monetary value of leisure to the worker when he is unemployed. The supply price of a migrant (S_M) can be expressed as follows:[19]

$$S_M = PM.\ WM(1 - t'_M) + (1 - PM)\left[\overline{f_M}\ UIC_M(1 - t'_M) + \overline{VM}\right] \qquad (3.7)$$

where PM = the proportion of time that a potential migrant can expect to be working in the region;

WM = the gross-of-tax wage the migrant can expect to receive;

UIC_M = the Unemployment Insurance benefits received when not working;

f_M = the proportion of time while unemployed that the person expects to be able to collect UI benefits;

t'_M = average personal income tax;

VM = the non-monetary value of leisure time experienced by the potential migrant in the region.

It is important to note that the supply price of the same potential migrant is generally different in the region from which he is migrating than in the region to which he is moving, while his level of utility in both regions is approximately equal. If we define equation (3.7) as the supply price of a potential migrant in the region, then the supply price of the same migrant in another region can be written similarly as follows:

$$S_O = PO.\ WO(1 - t'_O) + (1 - PO)\left[f_O\ UIC_O(1 - t'_O) + VO\right] \quad (3.8)$$

where the symbols refer to the same variables as in (3.7) but here they refer to some other region "O".

Subsituting equation (3.3) for the value of leisure (VM) in equation (3.7) yields the supply price of a migrant in a non-competitive labour market prior to the consideration of any externalities that are caused by the migration of labour:

$$S_M = PM.\ WM(1 - t'_M) + (1 - PM)\left[f_M\ UIC_M(1 - t'_M) + \frac{WM(1 - t) - B\ f_M\ UIC_M(1 - t)}{B}\right] \quad (3.9)$$

In an economy which allows for labour mobility all the externalities created by the process of labour migration should be included in the measurement of the social opportunity cost of labour obtained through migration.

A potential migrant in the region will cause a welfare loss equal to the income taxes that would have been generated if he had moved to the other income area. This loss is offset by a welfare gain equal to the amount of any unemployment insurance payments that would have been paid to the person while living in the other region. This net externality (E) is given by:

$$E = PO.\ WO\ t'_O - (1 - PO)\ f_O\ UIC_O(1 - t'_O) \qquad (3.10)$$

This is an additional welfare cost to the society resulting from retaining a potential migrant in a region. The addition of this externality to the private supply price of labour gives the social opportunity cost of retaining a migrant in the region (SOCM), namely,[20]

$$SOCM = PM \cdot WM(1 - t'_M) - (1 - PM)\left[f_M\ UIC_M(1 - t'_M) + \frac{WM(1 - t) - B\ f_M\ UIC_M(1 - t)}{B}\right] + PO.\ WO.t'_O - (1 - PO)\ f_O\ UIC_O(1 - t'_O) \qquad (3.11)$$

C. Social Opportunity Cost of Non-Participants

When unemployment conditions worsen some persons in the temporary sector labour force will decide to leave the labour force. Such a person would feel that the value of non-market activities and any welfare payments received while out of the labour force would be greater than or equal to the full income that would be expected from wage income, unemployment insurance benefits and the value of leisure while in the labour force. From the perspective of the economy as a whole, however, it is the resource cost of the non-participant's time that is relevant. The welfare payments are transfers

and not resource costs from an economic perspective. Given the inequality described above between the non-participants full income in and out of the labour force, the social opportunity cost of the time of the marginal non-participant (SOCN) can be expressed as follows:

$$SOCN = PN.\ WN(1 - t'_N) + (1 - PN)\left[f_N.\ UIC_N(1 - t'_N) + \frac{WN(1 - t) + B\ f_N\ UIC_N(1 - t)}{B}\right] - \text{Welfare payments} \qquad (3.12)$$

where the symbols have the same meanings as in (3.3) and (3.7) above, but in (3.9) they refer to the labour market prospects of the potential non-participant, "N".

D. Social Opportunity Cost of Early Retirees

As with the marginal non-participant, early retirees must feel that their full income in retirement (including any benefits received upon retirement) must be at least as high as the income that could be expected remaining in the labour force. Hence, the social opportunity cost of the time of an early retiree (SOCR) can be given as:

$$SOCR = PR.\ WR(1 - t'_R) + (1 - PR)\left[f_R\ UIC_R(1 - t'_R) + \frac{WR(1 - t) + B\ f_R\ UIC_R(1 - t)}{B}\right] - \text{Pension Benefits} \qquad (3.13)$$

where the symbols have the same meanings as in (3.3) and (3.7) but in (3.10) they refer to the labour market prospects of the early retiree, "R".

E. Social Opportunity Costs of New Jobs and Lost Secondary Sector Jobs

If labour markets are competitive then the gross-of-tax wage can be taken to equal the marginal social value of employed time.[21] Hence, the social opportunity cost of both the expansion of production through new job creation and the loss of secondary sector employment can be taken to equal the gross-of-tax wages they earn in these jobs.

Combining these estimates of the social opportunity costs of different marginal labour market activities with the induced changes in the time spent in these activities over the adjustment period, the social opportunity cost of the workers retained in their jobs can be estimated at different points in time from their potential layoff date. The present value of the difference between the social product of these workers retained in their jobs (i.e., the gross-of-tax wage bill) and the social opportunity cost of this employed time equals the positive externality, or potential economic benefit of preventing their lay-off.[22] Estimates will now be presented of this labour externality.

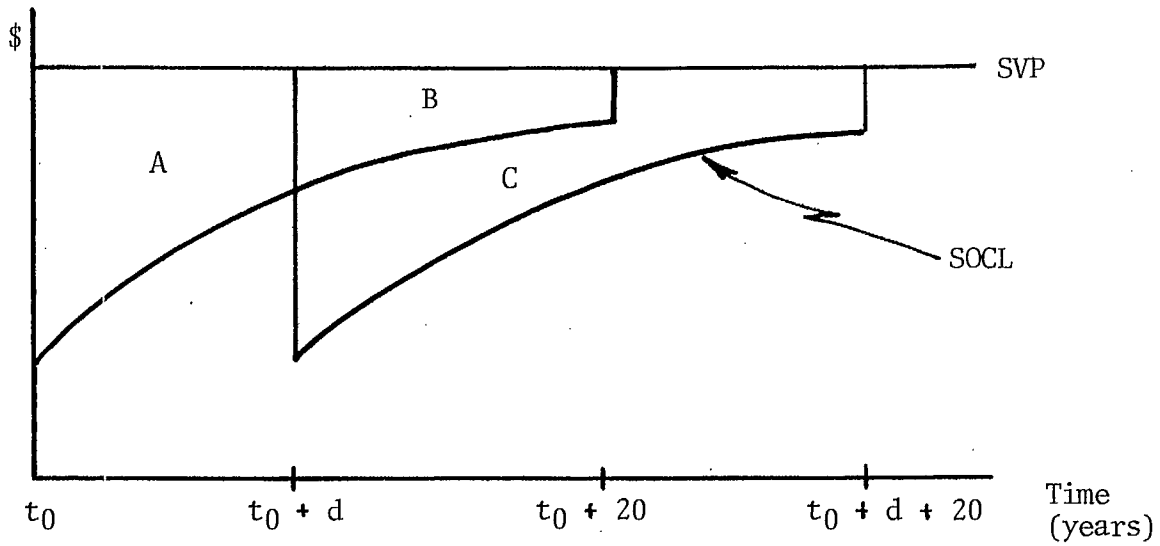
3.4 Case Studies of Economic Costs of Adjustment

In this section estimates of the gross economic cost associated with the displaced labour that was generated by the closure of the Company X (Owen Sound) plant and those that would be expected in the Company Y (Sherbrooke) plant were to close, are presented. Using the simulation model, estimates are made of the present value of this foregone labour externality generated over a 20 year period from the time of displacement. It is the saving of this labour externality through keeping the firm in business by means of government assistance that can be counted as a gross economic benefit for Canada. The full amount of the labour externality can be counted as a social benefit only if the jobs offered by this plant can be expected to be saved for at least this 20 year period. It is important to note that if the employment opportunities were saved for only 10 years, then the gross efficiency gain would be reduced. The amount of this reduction depends on the present value of the foregone labour externality when the workers are actually laid off.[23] A simple model is used to illustrate this point.

The gross economic benefit of delaying the layoff of workers is shown in Figure 3.3. If labour is laid off in year t_0, then the foregone labour externality is the present value in t_0 of the areas A and B. If the layoff is delayed only by d years to $(t_0 + d)$, then the gross economic benefit is reduced by the present value in t_0 of the gross economic cost of laying off the labour in $(t_0 + d)$, viz., the present values of areas B and C. The present value of this reduction in economic benefit will decrease as the delay, d, is lengthned. A further decrease will also occur if the labour market conditions in

Figure 3.3

Labour Externalities When Layoff is Delayed



where: SVP = Social value of product of labour if retained in jobs ($ per year)
SOCL = Social opportunity cost of labour ($ per year)

Now,

Present value (PV) in t_0 of forgone labour externality when layoff is in t_0,

$E_{t_0}(t_0)$ = PV(Area A) + PV (Area B)

Present value in t_0 of forgone labour externality when layoff is in $(t_0 - d)$,

$E_{t_0+d}(t_0)$ = PV(Area B) + PV(Area C)

Hence,

Gross economic benefit of delaying layoff by d years

$$= E_{t_0}(t_0) - E_{t_0+d}(t_0)$$

$$= E_{t_0}(t_0) - \frac{E_{t_0+d}(t_0 + d)}{(1 + r)^d}$$

where: r = social opportunity cost of capital (10%)

time $(t + d_0)$ are such that the gross economic costs of displacement, $E_{t_0 + d}(t_0 + d)$, are higher. If the gross economic cost of displacing a worker now is $20,000, for example, and if this negative externality as of the time of delay remains unchanged over time, then the present value of accrued gross economic benefits from delaying the layoff for:

5 years is $7,600,
10 years is $12,300,
15 years is $15,200.

In other words, there are increasing gains from delaying a layoff, but if the present value of loss as of the time of layoff remains constant, then these gains rise by a declining amount.[24] The possibility that less than the full amount of the labour externality may be saved by some policy intervention to prevent layoffs should always be factored into any evaluation of such a policy.

In presenting estimates of the labour externality in the following section, the sensitivity of these results to changes in other parameters values in the estimating models will be discussed. Estimates will be given for both the partial and general equilibrium models.

3.4.1 The Case Study of Company X in the Owen Sound Area

In October 1975, the Company X closed down its plant in the Owen Sound area. This shut-down was phased over a two year period with about 40% of the jobs being cut in the first year and the remainder in the second year.

During 1973 and 1974 this plant had been providing about 450 man-years of employment. About 83% of this employment was on a permanent full-time basis. The remaining 17% of the work was done by temporary employees who nevertheless constituted 31% of the annual labour force. Hence, these temporary workers were employed by Co.X only 45% of the time in any one year.[25] Further descriptive statistics of the Co.X workers are presented in Section 2.3.1.

The personnel data of the Co.X company provided information on the type of base sector jobs that were being lost in the regional labour market as well as the characteristics of the workers. The next step is to develop a description of the regional labour market which suffered this loss of jobs. The initial equilibrium structure of the regional labour market for the Owen Sound region (the region covered by the Owen Sound UIC District Office) was estimated for 1973 to give the pre-layoff conditions. The actual values used in the simulation model are given in Table 3.1.[26] The labour force participation rate of the potentially active population was taken to be 59%. Over the five year period from 1972 through 1976 on the average 15% of the labour force were found to be in the temporary sector. At the average unemployment rate prevailing over this period the average duration of unemployment was estimated at 20 weeks. With each person in the temporary sector experiencing an average of 1.2 unemployment episodes per person, the amount of unemployed time in the regional labour market was estimated at 3,375 person-years. This implies a temporary sector unemployment rate of 45.9% with a corresponding overall unemployment rate of 6.9% The

Table 3.1

The Initial Structure of the Owen Sound Regional Labour Market.

Population (15 years and over)	83,000
Total Labour Force (persons)	48,970
Permanent Sector (persons)	41,620
Temporary Sector (persons)	7,350
Unemployment (person-years)	3,375
Base sector (persons)	32,222
Secondary sector (persons)	16,748

equilibrium temporary sector employment rate, PEQ, was taken as 54.1%.[27]

The labour force was further divided in base and secondary sectors; 65.8% were estimated to hold base sector jobs. Estimates were then made of the net-of-tax wage income and the capital income that was being enjoyed by the region from these base and secondary sectors. Along with estimates of the amounts of income transfers being received by the region through unemployment insurance benefits and other government transfers, income multipliers were calculated for the region. The long-run income multiplier (the ratio of total income to base sector income) was found to be 1.5; while the long-run labour income multiplier was estimated to be 1.3. This labour income multiplier implies that a $1.00 change in base sector income in the region will eventually result in a $0.30 change in secondary sector net-of-taxes wage income. Given the average wage rate in the secondary sector, an estimate can therefore be made of the effects of changes in base sector income on secondary sector employment.

Using the above data in the simulation model, estimates were made of the forgone labour externality or gross economic cost suffered by the Owen Sound region through the loss of the Co.X jobs. These results are summarized in Table 3.2. In present value terms, the forgone labour externality per worker laid-off is about $25,000 over the 10 years following layoff and about $32,000 over 20 years. Both figures are expressed in constant 1971 dollars.

Inspection of Table 3.2 reveals a number of interesting points. First, even when a wide range of adjustment rates is assumed for the regional labour market to regain its equilibrium conditions, at least three quarters of the labour externality in present value terms is suffered within the first 10 years.

Second, the labour externality is not very sensitive to either the overall response rate or the mix of adjustment mechanisms over the ranges for these values shown in Table 3.2.[28] A number of interrelated factors ought to be borne in mind in evaluating this result. From Table 3.3 it can be readily seen that the social opportunity cost of labour rises as the labour market recovers from the disturbance, thereby reducing the size of the forgone externality per year. In the long-run, however, a gap persists between the social value of the output of labour that would have resulted from the retention of these jobs (SVP) and that which occurs in their absence (SOCL). An increase in the overall response rate would therefore reduce the labour externality in the early years, but not that which is suffered in the long-run.

Varying the relative importance of the adjustment channels affects the labour externality through the differences in the weights attached to the social values of time involved in these activities. The smaller the differences among the social opportunity costs of migrants, non-participants, retirees and

workers in new jobs, the less important is the mix of adjustment mechanisms. The greatest difference in these social opportunity costs exists between the relatively high value for new jobs created and all the others. The higher the new job creation response, therefore, the higher is the social opportunity cost of retaining workers in their jobs, and the smaller the labour externality. Further empirical analysis of the magnitudes of the new job creation response would be needed to justify any higher values for "c" for the Owen Sound region then those assigned in this study. It is anticipated that new job creation would play an important role only in very tight labour markets.

The labour externality does depend to a demonstrably large degree on the size of the distortions in the labour market and the types of jobs lost. Most of the distortions in a labour market can be readily determined. These include the distoritons due to taxes and unemployment insurance benefits. Others are more difficult to estimate. These include the effects of unionization and minimum wage laws. A coefficient, B, (see equation (3.3)) was therefore introduced to take account of the latter effects. Although a value of 1.2 for B is reasonable based on existing empirical data,[29] the sensitivity of the results to this variable were checked. The lower the value of B, the higher is the social value of leisure time (see Section 3.2), and hence, the higher the social opportunity cost of increased unemployed time, migration, non-participation, and retirement. As can be seen from Table 3.2 reducing B to unity results in an approximately 10% decrease in the labour externality. In general, the reduction of the magnitudes of distortion will decrease the forgone labour externality in most labour market situations.

Table 3.2

Sensitivity of Forgone Labour Externality to Changes in Simulation Model Parameters for Company X (Owen Sound)

1971 Dollars

Parameters Changed (a)	Time from start of layoff (years)			
	10		20	
	Total Externality (Millions)	Externality per worker (c) (Thousands)	Total Externality (b) (Millions)	Externality per worker (Thousands)
Base case (d)	13.57	25.04	17.05	31.45
b = .75, c = 0 RI = 0, RII = 0	13.80	25.45	17.75	32.74
b = .4, c = 0 RI = 0, RII = 0	15.38	28.38	19.51	36.00
b = .55, c = 0 RI = -.07, RII = -.13	14.56	26.86	18.64	34.38
b = .35, c = .1 RI = -.10, RII = -.20	13.94	25.71	17.48	32.24
b = .3, c = .05 RI = -.04, RII = -.08	14.97	27.62	18.82	34.72
B = 1.0	12.05	22.23	15.21	28.06
K = 1.0	11.34	20.92	14.31	26.39
GRMPL = .02	14.59	26.92	19.34	35.68

(a) All parameters remain the same as those in the base case (see (d)) except for those changes indicated.

(b) The total externality is the present value of the gross efficiency gain from retaining 542 workers employed in their existing jobs for a further 20 years. Future gains are discounted at the social discount rate (10%).

(c) The externality per worker is the total externality divided by 542 workers. The externality per man-year of employment saved would be 20.5% higher since these workers received only 450 man-years of employment.

(d) Base case:

B = 1.2
K = 1.3
GRMPL = 0
b = .45
c = .1
RI = -.07
RII = -.13

where: B = coefficient reflecting the added value individuals place on working rather than being unemployed owing to other distortions in the labour market such as unionization;
K = long-run labour income multiplier;
b = migration response coefficient (proportion of excess unemployment reduced per year by migration);
c = new job creation coefficient (proportion of excess unemployment reduced per year by new job creation);
RI, RII = lagged coefficients giving the participation response to changes in the overall regional unemployment rate.
GRMPL = growth rate in the productivity of labour per year.

Table 3.3

Change in Labour Externality and Social Opportunity Cost of Labour over Time for Workers Displaced from Company X (Owen Sound)

Year	Time since Layoff (years)	Labour Externality (a) / Wage Bill	SOCL (b) / SVP
1974	0	.879	.163
1975	1	.827	.187
1976	2	.705	.307
1977	3	.634	.377
1978	4	.614	.396
1979	5	.579	.431
1984	10	.477	.531
1989	15	.445	.562
1994	20	.431	.573

The ratios in this table are estimates for the Base Case parameter values.

(a) The forgone labour externality is the gross efficiency loss that is expected to be generated per unit of time at each point in time after layoff. The wage bill is the gross wages that would have been paid to the displaced workers if they had been retained in their jobs.

(b) The social value of the product of the labour (SVP) is that which would have been generated if the workers had been retained in their jobs. SVP is the value of their employed and unemployed time. The social opportunity cost of the labour (SOCL) is the social opportunity cost of both the employed and unemployed time of the displaced workers. It is assumed that the workers receiving temporary employment from the firm held no other jobs in each year they were employed by the firm.

Table 3.4

Labour Externality Associated with the Loss of Permanent and Temporary Jobs in Company X (Owen Sound)

Externality per worker (a) (Thousands 1971$)		
Time since layoff (years)	10	20
Permanent jobs	31.56	40.27
Temporary jobs	12.35	14.76
All jobs	25.04	31.45

(a) Base case parameter values

The type of job lost plays a major role in determining the size of the forgone labour externality.[30] The first aspect if the wage rate. The Co.X workers were earning about $30 per week (1971$) more than the average temporary sector worker. The Co.X workers were able to command relatively high specific rents in their jobs.[31] The closure of Co.X resulted in the loss of these added earnings.

The second characteristic of a job is its degree of permanency. The loss of permanent jobs has a considerably greater cost than the loss of temporary jobs. This is shown in Table 3.4. The labour externality per temporary sector worker laid off is only about a third of that of laying off a permanent worker. The source of this difference is two fold. First temporary workers generally are unable to command any job or firm specific rents, and second the laying off of a temporary worker adds less unemployed time to the regional labour market. The Co.X personnel records for 1974 revealed that persons working 40 weeks or less in the year earned an average of $125 per week compared to the $144 per week for those working over 40 weeks. And as has been stated above, temporary workers (those working 48 weeks or less in the year) were only employed for about 46% of the time in any year.

A third point illustrated in Table 3.2 is the extent of the multiplier effect (K) on the labour externality. The inclusion of the multiplier in the simulation model increases the labour externality approximately 20%. Regional base sector multipliers can be regarded as giving upper limits rather than mean estimates of the multiplier effects.

Any income leakages into the region as a result of induced price reductions, for example, would dampen the full effect of the income multiplier.

Finally, if productivity of labour is expected to increase over time (GRMPL), then the labour externality will be larger. Any proportional or exponential increase in productivity, and hence in wages, will result in an increase in the absolute size of the externality per year. A 2% increase per year in labour productivity sustained over a 20 year period can be taken as an upper limit to expected productivity increases.[32] The compounding nature of such an increase results in the present value of the labour externality being relatively higher over the 20 year period compared to the zero labour productivity growth cases.

The estimates of the present value of the foregone labour externality from the loss of base sector jobs using the simulation model can be taken as an upper limit. This model attempts to include the social cost of all the repercussions of labour displacement on the regional labour market. A conscious effort was also made to bias any assumptions taken in the direction of increasing the estimated gross ecomonic cost. The partial equilibrium model (see Section 3.2) by contrast can be taken as a lower limit in that it is based on the assumption that the labour displacement has no effect on the employment opportunities experienced by other workers in the region. Hence, it analyzes the adjustment process only of the workers actually laid-off.

The negative labour externality from the loss of the Co.X jobs was estimated using the partial equilibrium model for two samples of workers. Based on the

personnel data for Co.X, the present value of the foregone externality per worker (including early retirees) generated over a five year period was calculated to be $9,950 (1971$).[33] The estimates of the wages received in alternative jobs and the probability of being at work at different times after layoff were based on the wage and re-employment models developed for the Owen Sound area ROE/UIC claim data (see Section 2.3.3) given the personal characteristics of the Co.X workers. A second estimate was made for the labour force tracking survey sample of Co.X workers. The forgone externality per worker (including early retirees) was calculated to be $8,740. Given the better re-employment experience of the Co.X workers than for the equivalent workers estimated from the Owen Sound ROE/UIC claim data, (see Section 2.3.5) this lower estimated of the externality for the labour tracking survey sample is consistent with expectations.

The partial equilibrium model uses the same data base as the labour income loss model developed in Chapter 2. The sensitivity of the partial equilibrium estimate of the labour externality to changes in the age or skill of the worker of the unemployment rate could therefore be analyzed in a similar manner to the sensitivity analysis performed on the income loss estimates (see Section 2.3.5).

3.4.2 Case Study of Company Y in the Sherbrooke Area

The company Y plant in the Sherbrooke area is still in operation. An estimate is made, therefore, of the gross economic cost that would be associated with the displacement of labour if the plant were in fact caused to shut-down as a result of reduced protection from international competition. As the methodology is basically similar to that for the Co.X case (see Section 3.4.2), the emphasis is placed on highlighting the differences between the two cases.

The hypothetical closure of the company Y plant is assumed to occur over 1977 and 1978 with 30% of the jobs being lost in the first year and the remainder in the second year. Based on the personnel data for the plant for 1975 and 1976, it was estimated that 1,200 man-years of employment would be lost. As some 86% of this employment represented permanent jobs, a total of 1,395 workers would be laid-off of which 26%, or 368 workers, would be receiving temporary employment. In other words, each temporary worker would on average be working only 47% of the year for company Y.

The equilibrium structure of the regional labour market was estimated for 1976. The Sherbrooke region was taken to consist of the Sherbrooke and Granby UIC District Office regions. The structure of the labour market is given in Table 3.5. The labour force participation rate in the region was estimated to be 58%. Based on data for the period 1972 through 1976, the average proportion of the labour force in the temporary sector was 25%.

With an average duration of unemployment of 23 weeks and 1.23 unemployment episodes per temporary sector worker per year, the amount of unemployed time in the region per year was calculated to be 19,200 man-years. This implies a temporary sector unemployment rate of 54.2% (and hence an equilibrium employment rate, PEQ = 45.8%) and an overall unemployment rate of 13.5%.

Table 3.5

The Initial Regional Labour Market Structure for the Sherbrooke Area.

Population (15 years and over)	244,200
Total Labour Force (persons)	141,640
Permanent Labour Force (persons)	106,230
Temporary Labour Force (persons)	35,410
Unemployment (person-years)	19,200
Base sector (persons)	87,109
Secondary Sector (persons)	54,531

The base sector of the labour force was estimated to comprise 61.5% of the workers. Given the net wage and capital income earned by persons in the region from base and secondary sector activities and the net exogenous government income transfers into the region, regional base income multipliers were estimated. The long-run total income multiplier was found to be 1.4 and the long-run labour income multiplier 1.3.

The major difference between the Owen Sound and Sherbrooke area labour markets is in the temporary sector. The Sherbrooke area has a larger temporary sector with a higher unemployment rate. This implies that for a change in the unemployment opportunities, in the long-run a larger net migration

response will be expected for the Sherbrooke area. This has the further implication that although the social opportunity cost of a migrant in Sherbrooke is lower owing to the greater proportion of unemployment time expected in the temporary sector, the social opportunity cost of a permanent job is raised by the greater number of migrants that would eventually be expected to respond to any loss in jobs.

Estimates of the labour externality that would be expected to be generated by the closure of the company Y plant are presented in Table 3.6. This table also gives the sensitivity of the labour externality to changes in certain simulation model parameters.[34] Table 3.7 shows the recovery path of the regional labour market from the loss of jobs in terms of the relative size of the labour externality at different times following the plant closure. Table 3.8 shows the difference in the labour externality per worker between laying off workers receiving temporary as opposed to permanent employment.

The general pattern of the results is basically the same as those for the Co.X case, but there are a few points of difference worthy of comment. First the labour externality per worker is some 20% lower for the Co.Y case then the Co.X case. The major source of this difference is the smaller gap between the gross wages being earned by the Co.Y workers and the average temporary sector worker in Sherbrooke. In the Co.y case this gap is only about $11 per week compared to the $30 per week for the Co.X case. Investigation of the Co.Y personnel records for 1976 shows that the permanent workers in the Co.Y plant were unable to command high specific

rents like their counterparts in the Co.X case. The average gross wage for the permanent workers (those employed for more than 48 weeks in the year) in the Co.X plant in 1976 was $118 per week whereas the average for temporary workers was $104 per week which is almost equal to the average temporary sector wage estimated at $103. In the Co.X case both the temporary and permanent workers were paid higher than the average temporary sector workers.

A second point of interest was the effect of the lower temporary sector employment rate (PEQ) in the Sherbrooke area compared to the Owen Sound area. By lowering the amount of unemployment in the region (X) in Table 3.6 to 16,000 man-years, PEQ is raised to 54.8% and the overall unemployment rate drops to 11.2%. This approximately 20% increase in PEQ results in a 5% decrease in the expected labour externality. This decrease comes about through the increased migration and new job response rate in the region. These adjustments are assumed to respond to the size of the temporary sector and the difference between PEQ and the employment rate prevailing after the labour layoff. The temporary sector size is left unchanged by the decrease in X, but for the same loss of employed time the change in the temporary sector employment rate will be larger the smaller is the initial amount of unemployed time. Although raising PEQ in this manner reduces the cumulative net outmigration that will be required to return the labour market to its equilibrium state, the response rate is faster, and hence, the social opportunity cost of the displaced labour is higher in the years immediately following layoff.

Two estimates of the labour externality for the company Y

case were made using the partial equilibrium model. Based on the personnel records and using estimates of the re-employment experience these workers would expect based on the Sherbrooke area ROE/UIC claim data (see Section 2.3.4), the present value of the forgone labour externality over a five year period would be $5,387 per worker (including retirees). Estimates based on the labour force tracking survey sample of Co.Y workers (see Section 2.3.2) gave $4,839 per worker (including retirees). As expected, these two estimates are relatively close, but lower than those for the Co.X case and considerably lower than the general equilibrium estimates. As with the Co.X case, the sensitivity of these partial equilibrium estimates to changes in the personal characteristics of the workers (e.g., age) and labour market conditions (e.g., unemployment rate) can also be shown.

Table 3.6

Sensitivity of Forgone Labour Externality to Changes in Simulation Model Parameters for the Company Y Case (Sherbrooke)

1971 Dollars

Parameters Changed (a)	Time from start of layoff (years)			
	10		20	
	Total Externality (Millions)	Externality per worker(c) (Thousands)	Total Externality (b) (Millions)	Externality per worker (Thousands)
Base case (d)	28.76	20.61	35.26	25.27
b = .7, c = 0 RI = 0, RII = 0	29.26	20.97	36.84	26.40
b = .4, c = 0 RI = 0, RII = 0	31.14	22.32	40.42	28.97
b = .4, c = .1 RI = -.06, RII = -.14	28.35	20.32	34.82	24.95
b = .35, c = .05 RI = -.02, RII = -.04	28.64	20.53	36.59	26.52
b = .5, c = 0 RI = -.06, RII = -.14	30.99	22.21	39.23	28.11
WO = 112	28.68	20.55	35.14	25.18
B = 1.0	22.81	16.35	28.96	20.76
K = 1.0	22.51	16.13	27.46	19.68
X = 16,000	25.82	18.50	33.47	23.99
GRMPL = .02	29.66	21.26	39.21	28.10

(a) All parameters remain the same as those in the base case (see (d)) except for those changes indicated.

(b) The total externality is the present value of the efficiency gain from retaining 1,395 workers employed in their existing jobs for a further 20 years. Future gains are discounted at the social discount rate (10%).

(c) The externality per worker is the total externality divided by 1,395 workers. The externality per man-year of employment saved would be 16% higher in that these workers received only 1,200 man-years of employment.

(d) Base case:

X = 19,200 man-years
WO = $103 per week
B = 1.2
K = 1.3
GRMPL = 0
b = .5
c = .1
RI = -.03
RII = -.07

where: X = man-years of unemployment in the region in the initial year (1976)
WO = gross-of-tax wage that a potential migrant would expect to receive in other regions;
B = coefficient reflecting the added value individuals place on working rather than being unemployed owing to other distortions in the labour market such as unionization;
K = long-run labour income multiplier;
GRMPL = annual growth rate in the productivity of labour;
b = migration response coefficient (proportion of excess unemployed time reduced per year by out-migration);
c = new job creation coefficient (proportion of excess unemployed time reduced per year by new job creation);
RI, RII = lagged coefficients giving the participation response to changes in the overall regional unemployment rate.

Table 3.7

Change in Labour Externality and Social Opportunity Cost of Labour over Time for Workers Displaced from Company Y (Sherbrooke)

Year	Time since Layoff (years)	Labour Externality (a) / Wage Bill	SOCL (b) / SVP
1977	0	.876	.177
1978	1	.844	.169
1979	2	.747	.265
1980	3	.671	.339
1981	4	.615	.394
1982	5	.564	.445
1987	10	.423	.583
1992	15	.377	.628
1997	20	.362	.643

The ratios in this table are estimates for the Base Case parameters.

(a) The forgone labour externality is the gross efficiency loss that is expected to be generated per unit of time at each point in time after layoff. The wage bill is the gross wages that would have been paid to the displaced workers if they had been retained in their jobs.

(b) The social value of the product of the labour (SVP) is that which would have been generated if the workers had been retained in their jobs. SVP is the value of their employed and unemployed time. The social opportunity cost of the labour (SOCL) is the social opportunity of both the employed and unemployed time of the displaced workers. It is assumed that the workers receiving temporary employment from the firm held no other jobs in each year they were employed by the firm.

Table 3.8

Labour Externality Associated with the Loss of Permanent and Temporary Jobs in Company Y (Sherbrooke)

Externality per worker (a) (Thousands 1971$)		
Time since layoff (years)	10	20
Permanent jobs	24.36	30.56
Temporary jobs	8.64	9.51
All jobs	20.22	25.01

(a) Base case parameter value.

3.5 Negative Externalities of Continued Production if Effective Protection is not Reduced to Zero

The value of the labour externality is the key determinant of the financial assistance that the government can offer a weak firm to keep it in operation and still ensure that resources are allocated efficiently. This presumes that there are no other negative externalities associated with the continued operation of the firms receiving assistance. This assumption will not hold if multinational trade negotiations do not reduce the effective tariff protection to zero. In this case the remaining protection could create a negative externality if the government assistance encourages increased output of goods whose resource cost to the economy exceeds the economic cost of importing the goods. A negative externality from continued protection should be subtracted from the positive labour externaltiy of keeping jobs in place, and hence, from the amount of the government assistance offered.

If a positive level of effective protection for a commodity remains after the completion of the implementation of the multinational trade negotiations, the domestic price for that good will exceed its world price (or c.i.f. price). The domestic price determines the level of output that domestic producers are willing to sustain.[35] The economy, however, always has the option of importing more of the good rather than using domestic resources in its production. The cost to the economy of importing the good is the social value of the foreign exchange
The social value of the foreign exchange per unit imported equals the world (or c.i.f.) price corrected for the difference between the social

opportunity cost of foreign exchange and the market exchange rate.[36] From the perspective of the economy as a whole, therefore, added domestic production should be encouraged only if the social opportunity costs of the domestic resources consumed are less than the social value of the foreign exchange cost of importation. The social opportunity cost of domestic production is found by correcting the private domestic producer's costs for any externalities. This includes the labour externality as shown in Section 3.4. The social value of the foreign exchange is found by reducing the domestic producer's sales collections by the tariff revenues that would have been collected if the goods had been imported, and then correcting the result by the social opportunity cost of foreign exchange adjustment. This corrected difference equals the negative externality resulting from continued protection.

Since the MTN will not reduce all tariffs to zero, and since certain sectors will probably receive exemptions from tariff reductions, positive levels of effective tariff protection can be expected to persist after the MTN.[37] Any incremental production of goods in these protected sectors will result in negative externalities. Although giving assistance to failing firms to keep them in operation may generate positive economic benefits by delaying layoffs, these benefits could be completely offset by the negative externalities of continued protection. This reduces the amount of assistance justifiable on economic efficiency grounds. In some cases it may even mean that there are net economic benefits from allowing firms to close rather than maintaining them in business.

A simple model is now derived for a firm that is receiving effective tariff protection. This model shows the net efficiency gain from incremental production by this firm.

Let P = domestic price of the good, which is also equal to the marginal private cost of domestic production

X = quantity of good produced

L = quantity of labour used in production

W = gross wage rate

SOCL = social opportunity cost of labour

K_L = labour's share of value of total output

E_S = social opportunity cost of foreign exchange

E_M = market foreign exchange rate

T = effective rate of protection still in effect after trade liberalization, expressed as a proportion of the world price.

If it is assumed that all labour produces goods and that no externalities are generated by the use of material inputs other than those related to tariffs and quotas, then the net benefit of increased domestic production as a result of continued protection depends on the social cost of domestic production and the social cost saving through not importing the good. Costs are defined to be:

Resource cost of domestic production per unit of output (allowing for positive labour externality)

$$= -\left(P - \frac{L}{X}\,(W - SOCL)\right)\frac{E_S}{E_M}$$

$$= -P\left(1 - K_L\,\left(1 - \frac{SOCL}{W}\right)\right)\frac{E_S}{E_M} \qquad (3.13)$$

Cost saving per unit of output of not importing good $= \frac{P}{1 + T} \frac{E_S}{E_M}$ (3.14)

Net benefit per unit of output of domestic production (3.13) + (3.14) $= P \left(\frac{1}{1 + T} - 1 + K_L \left(1 - \frac{SOCL}{W}\right)\right) \frac{E_S}{E_M}$ (3.15)

Equation (3.13) indicates that the resource cost per unit of increased domestic production is equal to the marginal cost to the firm (P) less the labour externality, which is measured by labour's share of the per unit cost (K_L) times the labour externality (W - SOCL) expressed as a fraction of the wage rate. Since all these goods produced by labour are assumed to be tradeable, then the resource cost must be increased by the premium on foreign exchange $(\frac{E_S}{E_M})$ which would have been earned if the goods had not been used domestically.

The resource cost of imported goods is measured by the social value of the foreign exchange which is required to purchase them. Since P is the gross of tariff price to domestic consumers, then $(\frac{P}{1 + T})$ in equation (3.14) measures the world price or foreign exchange which must be paid per unit. The social value of the foreign exchange is once again captured by $(\frac{E_S}{E_M})$.

The net benefit per unit of the increased domestic production as a result of continued protection is estimated by the cost saving of not importing minus the resource cost of the increased domestic production. This is seen in equation (3.15). This net benefit per unit from added domestic production can also be expressed as the sum of two externalities,

viz., the negative externality of a tariff protected good ($P\ (\frac{1}{1-T} - 1)\ \frac{E_S}{E_M}$ and the positive externality from the added output from the employ of labour ($P\ K_L\ (1 - \frac{SOCL}{W})\ \frac{E_S}{E_M}$). Note that the higher is the remaining level of effective protection, the lower the net benefit of domestic production becomes. In other words, the less the reduction in trade barriers, the lower is the subsidy that can be justified on efficiency grounds to maintain it in business. Put another way, the efficiency cost of the remaining tariff protection is reduced by the fact that labour earns a positive externality.

We can illustrate this argument by assuming some realistic values for the variables.

Let $K_L = .3$

$\frac{SOCL}{W} = .6$

$\frac{E_S}{E_M}^{38} = 1.15$

According to (3.15),

if T = 0, then the net benefit = .138P

= .1 " " " " = .034P

= .136 " " " " = 0

= .2 " " " " = -.054P

This numerical example illustrates the sensitivity of the net benefit of added domestic production to the remaining level of effective tariff protection. If tariff protection had been completely removed in this example, then the net benefit per unit of increased domestic production

would have been equal to 0.138P. If the remaining tariff protection exceeds 13.6% of the domestic price, then added domestic production leads to a net economic loss for the economy.

This decrease in the net benefits of domestic production because of continued effective protection has direct relevance to the policy options outlined in Chapter 4. If a weak firm is to be retained in business after trade barriers have been lowered by means of government assistance, such as with a Loan Foregiveness Policy (see Section 4.4), then the positive labour externality of retaining workers in their jobs will be reduced by the negative externality created by any remaining effective protection the firm may still be enjoying. The resulting reduction in the possible economic benefits that can be attained from keeping a still protected firm in business, lowers the maximum amount of any assistance the government should offer a firm. In some cases, in fact, continued protection may even make it undesirable on efficiency grounds to offer the firm any assistance at all to keep it in business.[39]

If firms are not assisted to maintain their output, then the re-employment of workers displaced by trade liberalization can be promoted by means of Employment Subsidy Programmes (such as the one suggested in Section 4.3). If a firm receives a wage subsidy for hiring a displaced worker but this firm is still enjoying a positive level of effective protection, then the social value of the contribution that this worker can make to the economy will be reduced. It is, therefore, justifiable on efficiency grounds to offer lower wage subsidies to those firms still

experiencing protection after the MTN trade policy changes have been implemented.

In Chapter 2 the theory and estimation of the private income losses that workers and capital owners directly affected by trade liberalization can expect to suffer is presented. In this chapter the economic costs associated with the loss of job opportunities is estimated for using both a partial and a general equilibrium model. Delaying the layoffs of workers by assisting firms can create gross economic benefits. These benefits can be partially or totally offset, however, by negative externalities generated by the added output of the firm. This is particularly true for firms still receiving positive levels of trade protection. In Chapter 4 the empirical estimations of private income losses (Chapter 2) and economic costs (Chapter 3) are incorporated into a number of trade adjustment assistance policy options.

Footnotes

1. A.C. Harberger, "On Measuring the Social Opportunity Cost of Labour", in Project Evaluation (London: The MacMillan Press, 1972), Chapter 7.

2. The institutional framework within which this income transfer occurs is fairly complex. For example, when the number of unemployment insurance recipients declines, there may not be an actual reduction in the unemployment insurance premiums paid by employed workers. According to the formula which determines the funding of unemployment insurance benefits, nevertheless, the payments out of general tax revenues could be reduced and thus taxpayers in general will be better off. The important point is the fact that one group's loss is another group's gain and that these income transfers do not constitute a social cost. Any social costs associated with the unemployment insurance system relate to changes in labour supply incentives it creates in the labour market. If the introduction of a UI system or changes in its regulations result in a change in the amount of income that can be received from an additional amount of time worked, then changes in economic welfare will result. The amount of these changes is neither conceptually nor numerically the same as the income transferred.

3. A full description of the technical details of the dynamic simulation model is given in an appendix appearing under a separate cover.

4. A region, as used here, is similar to a commuting area. The regional labour market would be defined as the labour force in the area in which the unemployment conditions would be affected by the workers being laid-off from a firm. It would include the residential areas of these workers plus those areas to which these workers would be willing to commute regularly. In practice the regional labour markets are defined in terms of one or more UIC District Office Regions. For example, the Owen Sound area is given to Do 558 while that for Sherbrooke by DOS 427 nad 436. The definition of these regions and the concordance of the various data sources on a regional basis is dealth with in an appendix appearing under a separate cover.

5. The division of a labour market into permanent and temporary sectors is not a simple matter. At any point in time the division of labour into these two sectors is a result of the simultaneous solution of both the supply of and the demand for labour. Workers are willing to take on jobs given the expected wages and amount of time they will be employed. Jobs are available given the types of industries in the region and the demand for their products. The following breakdown of workers and jobs can help clarify the situation.

		Job Type	
		Permanent	Temporary
Worker type	Permanent	I	II
	Temporary	III	IV

Permanent Worker: A worker who has both the preferences and the skills and personal attributes for permanent employment given the prevailing employment opportunities.

Temporary Worker: A worker who either has preferences for and/or skills and/or personal attributes resulting in temporary employment.

Permanent Job: A job that supplies employment for at least a year.

Temporary Job: A job that supplies less than a year of employment at a stretch due to seasonal, cyclical or other fluctuations in demand.

Group I: Permanent workers in permanent jobs form the bulk of employment in the economy, but will form less of the labour force in that more persons are generally required to fill temporary jobs than the person-years of employment these jobs offer.

Group IV: Temporary workers in temporary jobs probably form the next largest group.

Groups II and III: These two groups bring out the difference between a cross-sectional perspective of viewing a labour market at a point in time and a time series view of tracking individual workers or jobs over time. Workers may fall into groups II and III because of life-cycle effects (old and young workers tend to experience more temporary employment than prime age workers, for example) or exogenous factors such as permanent workers unexpectedly being laid-off. When viewing a regional labour force problems arise if the experience of the workers is not known in other regions. For example, a worker may be able to gain permanent employment in one region but temporary employment in another, or be employed in one region but reside and experience unemployment in another region.
If the temporary sector of a regional labour market is defined as the average number of temporary workers in the region per year, then groups II and IV and part of III will be identified If the temporary sector is defined as all workers who experience more than one substantial unemployment spell (more than 4 weeks, say) in their lives, for example, then groups III and IV will be idendified if a long enough time period is used, whereas parts of groups IV and III will be identified if a limited time period (5 years, say) is used. The smaller groups II and III, the less will be the difference between using either method. The smaller the amount of interregional migration, the smaller will be the problems of regional boundary cut-offs. Ultimately a stock-and-flow model is required to analyze the long-run structure of a labour force. Given 5 years of ROE/UIC claim data on a regional basis, the first method was used. This probably gives a slight over-estimate of the size of the temporary sector, but also includes some permanent workers who probably have better re-employment experiences.

6. The methodology used for dividing the labour force into base and secondary sectors will be fully described in an appendix under a separate cover that deals with the base income multipliers used in this study. It is important to note, however, the concept of a base sector economic activity. Using the same concepts as in international trade therody, it can be seen that a region is faced by a "world" price for tradeable goods. In that the level of production of these goods in the region will generally be too small to affect this world price, producers of tradeable (importable and exportable) goods always have the option of buying or selling these goods outside of the region. Therefore, the level of activity in a tradeable goods industry will be independent of the regional economic situation. The notion of tradeable goods is more general than that of traded goods or exported goods often used in base sector definitions of exogenously determined activities.

7. J. Vanderkamp, "The Effects of Outmigration on Regional Employment", Canadian Journal of Economics, (November, 1970)

8. The concepts and estimation of the base income multipliers are detailed in an appendix appearing under a separate cover.

9. See Chapter 2, footnote 1.

10. In this study the equilibrium values, PEQ and REQ, are assumed to remain constant over the period of interest. A further level of sophistication could be included in the model to aloow PEQ and REQ to follow the secular trends caused by the economic development or decline that a region may be undergoing. It should also be noted that the assumption of constant PEQ and REQ would not be expected to be reasonable in cases of non-marginal changes in regional employment conditions. For example, if a region were to lose over 15-20% of its job opportunities through a plant closure, larger changes and costs would be anticipated than the marginal ones assumed in the simulation model.

11. This concept is expanded upon in Appendix 3.0.

12. The equilibrium temporary sector employment rate, PEQ, is the ratio of the normal amount of unemployed time in the region and the normal size of the temporary sector labour force.

13. The theory of the role of unemployment in controlling migration flows has been applied by J.R. Harris and M.P. Todaro, "Migration, Unemployment and Development: A Two Sector Analysis", American Economic Review, (March 1970); A.C. Harberger, "On Measuring the Social Opportunity Cost of Labor", in Project Evaluation, (London and Basingstoke: The MacMillan Press Ltd., 1972), Chapter 7; and Gary S. Fields, "Labour Force Migration, Unemployment and Job Turnover", The Review of Economics and Statistics, LVIII, 4, November 1976.

14. Lawrence H. Officer and Peter R. Andersen "Labour Force Paricipation in Canada", Canadian Journal of Economics, II, 2, (May, 1969); Peter S. Barth, "Unemployment and Labour Force Participation", Southern Journal of Economics, (January, 1968); Belton M. Fleisher and George Rhodes, "Unemployment and Labour Force Participation of Married Men and Women: A Simultaneous Model", The Review of Economics and Statistics, (1976); William G. Bowen and T.A. Finnegan, "Labour Force Participation and Unemployment" in Employment Policy and the Labour Market, Ross, A.M. (Ed), Berkley: University of California Press, (1965)

15. An example of higher skilled workers who normally experience more permanent employment who retained their new jobs longer than the average temporary sector worker is the case of those workers laid-off from the Co.X (Owen Sound). (See Section 2.3.5.)

16. A.C. Harberger, Project Evaluation, op. cit.

17. John C. Evans, "The Social Opportunity Cost of Labour in Canada", unpublished Ph.D. dissertation, University of Chicago (March, 1978), Chapter 1.

18. The following industrial composite weekly wages for large firms in some Ontario urban areas in 1976 illustrate the wage differentials that can exist in different regions:

Sudbury:	$259.11 per week
Toronto:	$228.10 per week
Owen Sound:	$192.15 per week

(See: Employment, earnings and hours, Statistics Canada, Catalogue 72-002 monthly.)

19. In many empirical studies of interregional migration the relative magnitudes of the overall unemployment rate and the average income level in the two regions are identified as the major determinants of migration. However, these two variables, which are averages for the whole region, may not be descriptive of the unemployment rate or earnings experience of the average potential migrant. We would expect that these regional variables would tend to understate the unemployment experience of the average migrant and overstate the income he can expect to earn in his home region. For the calculation of the social opportunity cost of labour in a region where migration can occur we need to determine the unemployment rate and the earnings experience of the people in the labour market who are potential migrants. In this model the potential migrants who are expected to be influenced by these economic variables are identified with the members of the temporary sector of the labour market who have the personal characteristics of the average migrant. Therefore, the unemployment rate of the temporary sector and the average earnings of individuals in this sector are the key parameters used in the determination of migration and the social opportunity cost of labour for the region. See for example, T.J. Courchene, "Interprovincial Migration and Economic Adjustment", Canadian Journal of Economics, (November, 1970); J. Vanderkamp, "Migration Flows, Their Determinants and Effects of Return Migration", Journal of Political Economy, (September/October, 1971).

20. An alternative derivation for the social opportunity cost of retaining a migrant which gives the same final result is the sum of the following items:

i) Social opportunity cost of labour in the region if no migration exists:

$$PM.WM + (1 - PM)VM$$

$$\text{or } PM.WM + (1 - PM)\frac{WM(1 - t_M) - B.f_M UIC_M(1 - t_M)}{B}$$

ii) Net increase of income tax collections by society following a relocation in a high income area:

$$PO.WO.t'_O - PM.WM.t'_M$$

iii) Saving of unemployment insurance payments to society from the movement to the high income area:

$$(1 - PM)f_M UIC_M(1 - t'_M) - (1 - PO)f_O UIC_O(1 - t'_O)$$

21. The assumption that the wage bill of the firm equals the value of the contribution of labour does not require that labour markets be perfectly competitive but it does require that employers have no monopsony power in hiring up labour. If employers have no market power in the labour market, then they can be expected to hire-up labour up to the point that the wage rate that they have to pay in order for labour to be willing to work for them equals the incremental contribution of labour to the value of the product of the firm.

22. The present value is calculated by discounting future cash flows at the social discount rate which has been estimated at 10%. See Glenn P. Jenkins, "Capital in Canada: Its Social and Private Performance 1965-1974", Economic Council of Canada, Discussion Paper Nº 98, October 1977, Chapter 6.

23. Recognition of this possible reduction in the labour externality is important when evaluating policies that are aimed at saving employment opportunities such as the Loan Forgiveness Policy (see Section 4.4).

24. It is assumed here there is a zero growth rate in labour productivity. If there is a greater than zero growth in labour productivity then the gains from the delay of layoffs will be reduced in that future economic losses will be increased.

25. The breakdown of Co.X workers and jobs into permanent and temporary ones is done as follows. From the personnel records of the company it was found that prior to the decline in employment, 69% of the workers employed by Co.X in a year filled permanent jobs. These permanent jobs, however, represented 83% of the person-years employed by Co.X in a year. Co.X provided some 450 man-years of employment per year. Permanent workers did 374 person-years (or 83%) of this work; temporary workers did the remaining 76 man-years. Co.X employed some 542 workers per year. The 374 permanent workers constituted 69% of this labour force while the remaining 168 workers received temporary employment. These temporary workers, therefore, worked on average for 76/168 or 45% of the year for Co.X.

26. The details of the methodology used in estimating the equilibrium structure of the labour market will be given in the appendix appearing under a separate cover that deals with the dynamic simulation model.

27. The regional labour force and employment is broken down into permanent and temporary sectors as follows. On average the Owen Sound region was found to have a labour force of 48,970 workers. Based on the analysis of the ROE/UIC cliam data records it was estimated that on average 7,350 (or 15%) of these workers received temporary employment in a year. Each of these temporary workers experienced 1.2 unemployment episodes per year and each episode lasted an average of 20 weeks. The average amount of unemployed time in the region a year was estimated, therefore, to be (1.2)(20/52)(7,350) = 3,375 person-years. The overall average unemployment rate equals (3,375/48,970) or 6.9%, while the temporary sector unemployment rate equals (3,375/7,350) or 45.9%. The temporary sector equilibrium employment rate (PEQ, therefore, is 54.1%.

28. From Appendix 3.0 it can be seen that the overall response rate will be at least 30-40% and could be as high as 90%; a 70-75% response rate was assumed in the base case. A relatively high participation response was assumed based on (i) actual regression results of regional participation rates against lagged regional unemployment rates, and (ii) the relatively old age structure of the population and labour force in Owen Sound compared to the Ontario as a whole. In 1971, the percentage 55 years and over:

	Ontario	Owen Sound
Population (15 and over)	23.1%	33.0%
Labour Force	16.3%	20.6%

An indication of the regional migration pattern of temporary sector workers in Owen Sound can be gained from the regional distribution of UIC District Offices in which UI claimants in Owen Sound also established claims during the 1972-76 period:

Percentage of claims in region	
Owen Sound	85.7%
Neighbouring Ontario DOs	6.4%
Other Ontario DOs	5.4%
Other Provinces	2.5%

29. John C. Evans, "Social Opportunity Cost of Labour in Canada", op.cit., Appendix C.

30. When job losses are referred to it is important to note that a job is a simultaneous result of supply and demand for labour. This is reflected by both the employment time the job provides and the wage rate that a worker of specific skills can command for that employed time. The wage bill reflects both the time and the wage rate, and hence, indirectly reflects the attributes of the workers actually being laid-off. In other words, the wage bill that would have been paid to displaced workers is a better reflection of the loss to the economy than the person-years of employment lost.

31. From the labour force tracking survey sample of workers for Co.X (Owen Sound) it was found that on average these workers lost about $15 per week through having to take up new jobs.

32. A 2% per annum growth rate in labour productivity implies a doubling of real wages in about 35 years.

33. Extension of the time horizon beyond 5 years adds little to the labour externality. In some cases the social value of the displaced labour regains its value prior to layoff in less than 5 years.

34. Appendix 3.0 discusses the overall regional labour market response rate. A value of 70% was assumed for the Sherbrooke area base case. Regression analysis of the regional participation rate response to changes in the level of the lagged regional unemployment rate showed the response to be significantly lower in Québec than Ontario. In 1971 the Ontario participation rate was 62.1% whereas the Québec rate was 52.9%; in 1976 these rates were 63.5% and 58%, respectively. A lower participation rate implies fewer second income earners per family and hence more pressure for those in the labour force to remain there to maintain household income levels. A lower weight was therefore given to the participation response in the Sherbrooke area. The population and labour force age structures in Sherbrooke are very similar to the Québec averages.

    An indication of the regional migration pattern for the Sherbrooke area temporary sector workers is given by the distribution of UIC District Offices at which Sherbrooke area claimants also established claims during the 1972-76 period.

Percentage of claims in region	
Sherbrooke Area DOs	82.2%
Neighbouring Québec DOs	12.4%
Other Québec DOs	3.9%
Other Provinces	1.4%

    More workers in the Sherbrooke area at any point in time can be expected to have worked outside of the area than is the case for the Owen Sound area (see footnote 23). The Sherbrooke area also displays a higher degree of intra-provincial migration than does the Owen Sound area.

35. Effective tariff protection has the same production effect as a domestic production subsidy. Tariffs, however, unlike production subsidies, also raise the prices of domestically produced and imported goods to consumers. The welfare costs of a tariffs therefore exceeds the welfare costs of subsidies.

36. Glenn P. Jenkins, "Theory and Estimation of the Social Cost of Foreign Exchange Using a General Equilibrium Model with Distortions in All Markets", paper prepared for Department of Regional Economic Expansion, Ottawa, 1976.

37. Estimates of effective rates of protection for Canadian industries are contained in two recent studies. B.W. Wilkinson and K. Norrie, Effective Protection and the Return to Capital, Ottawa: Economic Council of Canada, 1975; Roma Dauphin, The Impact of Free Trade in Canada, Ottawa: Economic Council of Canada, 1978.

38. Glenn P. Jenkins,"Theory and Estimation of Social Cost of Foreign Exchange", op cit.

39. There is a further potential negative externality that can arise from the continued protection. Trade barriers tend to induce a higher level of domestic production than would be expected in their absence. This can also result in capital owners receiving higher rates of return on their investments. To the extent that the capital is owned by foreign residents and that these added earnings from capital are repatriated (i.e. they are not captured by taxation or are not reinvested in Canada), the Canadian economy suffers an added loss. Therefore, the continuation of protection after trade liberalization can result in the perpetuating this loss of capital rents and, hence, when the government is considering giving assistance to a foreign-owned firm to keep the workers on the job, this potential efficiency loss should be factored into the evaluation. (See Glenn P. Jenkins, "Capital in Canada: Its Social and Private Performance 1965-1974", Canada, Discussion Paper No. 98, Ottawa 1977, Chapter 5).

Appendix 3.0

Regional Labour Market Response Rate

In this appendix a simple model is developed to estimate the overall rate at which a regional labour market responds to disturbances in its level of employment. As has been shown, there is a significant long-run relationship between the local or regional labour market unemployment rate and the national unemployment rate (see Chapter 2, footnote 1). This relationship is illustrated in Figure 3.1A. Here N* and L* are the long-run trend or equilibrium values of the national and local unemployment rates, respectively. N_t is the actual national unemployment rate at time t, and L_t is the local unemployment rate that would be expected when the national rate has the value of N_t in terms of the following relationship:[1]

$$L_t = a + b_1 N_t + b_2 t \qquad (1)$$

where L_t = local unemployment rate in year t;

N_t = national unemployment rate (here the Canadian prime age male rate) in year t.

In Chapter 3 a simulation model is developed that predicts the dynamic response of a regional labour market to be an exogenous disturbance in its unemployment conditions. In this model it is assumed that the market recovers its equilibrium conditions as determined by a linear response function. Moreover, it is assumed that the market resonds as if the regional labour market would have been in its long-run equilibrium state without the disturbance. This is illustrated in Figure 3.2A. At time "t_0" the labour market experiences a pertubation due to plant shut-

Figure A3.1

The Relationship Between the Local and National Unemployment Rates

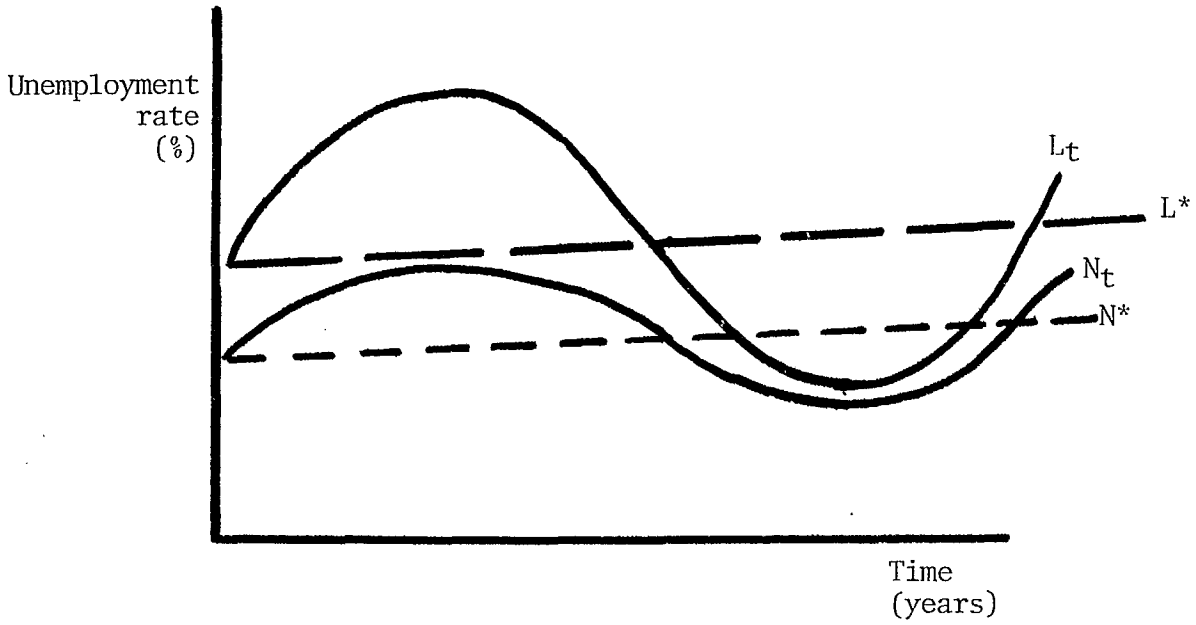
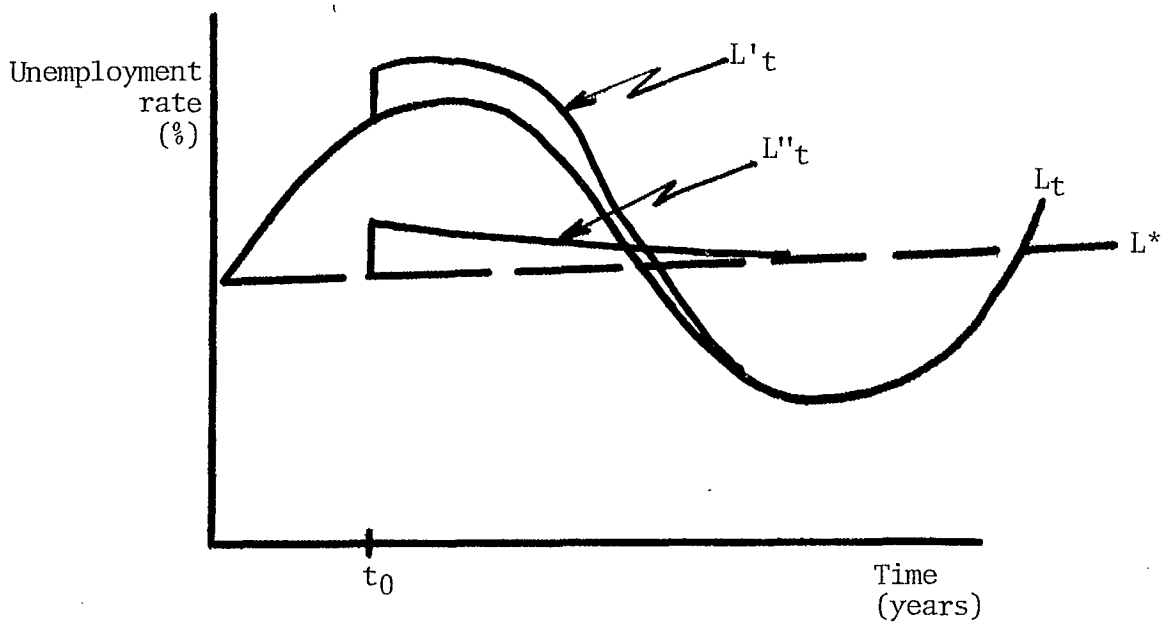


Figure A3.2

The Response of a Regional Labour Market to an Exogenous Disturbance in the Unemployment Conditions



down, for example. The local unemployment rate rises from L_{t_0} to L'_{t_0}. Now L'_t is the observed local unemployment rate while L''_t is the equivalent value that the local employment rate would have risen to if the labour market had been on its long-run equilibrium path, L^*. Based on the assumptions of the model, the following relationships should hold:

$$L'_t = L_t + b_3 (L'_{t-1} - L_{t-1}) \qquad (2)$$

$$\text{and } L''_{t-1} - L^* = L'_{t-1} - L_{t-1} \qquad (3)$$

Expression (2) shows how the regional labour responds to a disturbance in a linear fashion. The deviation $(L'_t - L_t)$ from the undisturbed path of the unemployment rate (L_t) is reduced by a fraction $(1 - b_3)$ each year. Given that the labour market is assumed to respond as if the same disturbance had occurred about the long-run trend L^*, substituting (3) into (2) gives:

$$L''_t = L^* + b_3(L''_{t-1} - L^*) \qquad (4)$$

and hence,

$$L''_t - L''_{t-1} = (1 - b_3)(L^* - L''_{t-1}) \qquad (5)$$

Now equation (5) approximates the response functions assumed in the simulation model where the number of persons leaving the regional labour force through migration, say, between $(t - 1)$ and t is taken to be proportianal to the size of the temporary sector labour force in $(t - 1)$ and the difference between the long-run temporary sector employment rate, P^*, and the one-year lagged rate, P_{t-1}. If it is assumed that the regional total and temporary sector labour forces remain approximately constant, then (5) can be transformed to:

$$X''_{t-1} - X''_t = -(LT)(1-b_3)(P^* - P_{t-1}) \qquad (6)$$

where X''_t = Number of man-years of unemployment in year, t;

LT = Size of temporary sector labour force; and

$(X''_{t-1} - X''_t)$ = Amount of unemployed time reduced from (t - 1) to t.

Now $(X''_{t-1} - X_t'')$ is conceptually equivalent to the amount of unemployed time eliminated by labour market adjustment. It is important, however, to notice that $(X''_{t-1} - X_t'')$ will be an underestimate based on (5) in that migration or non-participation reduce both the number of unemployed and the size of the labour force and, hence, result in smaller changes in the unemployment rate than would be the case if the labour force size stayed constant. Any estimate of $-(1 - b_3)$ based on a specification like (5) can be considered an underestimate.

In order to estimate the magnitude of $(1 - b_3)$, actual observed unemployment rates have to be used. This is done by transforming (5), making use of (1), (2) and (3), to give an equivalent expression:

$$\begin{aligned} L'_t - L'_{t-1} &= a - ab_3 + b_2 + b_1N_t - b_1b_3N_{t-1} - (1 - b_3)L'_{t-1} \\ &= A + BN_t + CN_{t-1} + EL'_{t-1} \end{aligned} \qquad (7)$$

Hence a miminum estimate of the overall response coefficient, $-(1 - b_3) = E$, can be gained by estimating (7). Table 3.1A gives the results of ordinary least squares regression estimates of (7). Annual unemployment rates for the period 1972 through 1977 were used. N(t) is the annual Canadian prime age male unemployment rate. In equation I, L'(t) gives the annual unemployment rates for 9 Economic Regions in Ontario. In Ontario the constant was

Table A3.1

Regression results of change in local unemployment rate on local and national unemployment rates.

	I	II	III
Constant	- -	3.667 (1.61)	1.086 (.649)
D	- -	-4.771 (-1.41)	.762 (1.67)
N(t)	1.697 (9.94)*	1.263 (2.73)	1.766 (5.56)
D.N(t)	- -	1.03 (1.55)	- -
N(t - 1)	-1.257 (-6.33)	-1.710 (-3.26)	-1.382 (-3.36)
D.N(t - 1)	- -	.587 (.682)	- -
L'(t - 1)	-.275 (-2.84)	-.294 (-1.67)	-.389 (-3.16)
D.L'(t - 1)	- -	-.095 (-.37)	- -
$\bar{R}^2$	.725	.557	.556
F (degrees of freedom)	47.1(2,33)	9.5(7,40)	15.7(4,43)
Observations	36	48	48

* ( ): t-statistics

found to be not significantly different from zero. In Equations II and III, a dummy variable was introduced to separate out the response of Québec regions to disturbances in the local unemployment rates. L'(t) in these equations is the local unemployment rates in 5 regions in Québec and 7 regions in Ontario. These unemployment rates were constructed by taking the weighted averages of the unemployment rates for clusters of urban areas in the two Provinces. The unemployment rates were used for those urban areas that form Self-Representing Sampling Units.

The results of the regressions in Table 3.1A tend to support the general structure of the simulation model developed in Chapter 3. The coefficient for N(t), N(t - 1) and L'(t - 1) all have the expected signs and are statistically significant. Based on the use of a dummy variable to split off the Québec variables, the hypothesis that Québec regional labour markets respond at a different rate to Ontario ones can be rejected. These regression results also show that regional labour markets on average tend to reduce any deviation from their equilibrium unemployment rates (as determined by the national rate) by at least 30 to 40% per year.[2]

Caution should be used in interpretting these results as being accurate estimates for any particular labour market in Ontario and Québec. The data base is limited to a period of five years and as a result a combined cross-section-time-series formulation had to be used. Lower response rates were thus expected than in a pure time-series analysis.

In the simulation model the overall labour market response occurs

through a number of channels: migration, changes in labour force participation, early retirement and marginal new job creation. The model described above only attempts to estimate the combined adjustment response. The division of the overall response among the various adjustment mechanisms requires a model that would simultaneously estimate the different response rates. A simultaneous model is required due to the interactions between the different mechanisms. Any observed change in an unemployment rate is the combined result of all adjustment mechanisms and not merely one. For example, when local participation rates are regressed on lagged local unemployment rates to check for a long-run discouraged worker effect, significant negative coefficients are found, but these coefficients are larger than would be expected. Net out-migration in response to higher than average unemployment rates, for example, could reduce the participation rate by removing disproportionately more persons from the regional labour force than the potential working population. Not all of the apparent change in the participation rate would be due to changes in labour force participation in such a case.

A fall-back alternative to the simultaneous estimation of the relationships between the unemployment rate and the different labour market adjustment mechanisms is to make separate estimates of the effects of the unemployment rate on these mechanisms and then simulate their combined effects for different time paths of the unemployment rate. The work by Denton has taken this approach.[3] The model of labour market dynamics includes the month-to-month transition rates

between being employed, unemployed and out of the labour force as a function of the unemployment rate. From simulation experiments conducted with this model for Canada as a whole, the order of magnitude of the effect of the unemployment rate on the participation can be estimated.[4] The simulation experiments for 1973 labour market conditions estimate that if the unemployment rate were to rise from 3 to 7 percnet over the period of year, then the annual average participation rate would fall from 59.6 to 59.5 percent. If the unemployment rate were to persist at the 7% level, then the participation rate would decline further to 58.4 percent. In the long-run (over 3 years) according to this model a percen tage rate can be expected to result in a 013 percentage point decrease in the participation rate in Canada.

Given that the major purpose of the simulation model in this study is to estimate the size of the negative economic externality due to the displacement of workers, sensitivity analysis is employed as a short-run solution. Variations in both the overall response rate and the division of this response between the different adjustment mechanisms is used to check the sensitivity of the presnet vlaue of the externality to changes in these parameters. The further development of models to explain the nature of long-run regional labour market responses would be valuable both in gaining more accurate estimates of the efficiency losses from labour displacement and in developing a deeper understanding of intra- and interregional labour market behaviour.

Footnotes

1. Martin Feldstein and Brian Wright, "High Unemployment Groups in Tight Labour Markets", Discussion Paper Nº 488, Cambridge: Harvard Institute of Economic Research, June 1976; Frank T. Denton and Sylvia Ostry, An Analysis of Post-War Unemployment, Staff Study Nº 3, Ottawa: Economic Council of Canada, December 1964; Frank T. Denton, Christine H. Feaver and A. Leslie Robb, "Patterns of Unemployment Behaviour in Canada", Discussion Paper Nº 36, Economic Council of Canada, Ottawa, 1975.

2. T. Nicolaus Tideman, "Defining Distressed Areas", Discussion Paper Nº 79; Program on Regional and Urban Economics, Harvard University, February 1973. Using a similar formulation to (7), though derived within a different conceptual framework, monthly adjustment response rates for local unemployment rates in the U.S. were estimated based on time series data. If R_M is the monthly adjustment response rate, then the annual response rate

$$R_A = R_M - R_M (1 - R_M) - \ldots\ldots\ldots - R_M (1 - R_M)^{N-1}$$

$$= 1 - (1 - R_M)^N$$

R_M values clustered within the 0 to .4 range. For $R_M = .2$, $R_A = .93$.

where R_A = annual response rate;
N = number of months, i.e., $N = 12$ for R_A to give annual rate.

3. Frank T. Denton, Christine H. Feaver and A. Leslie Robb, The Short-Run Dynamics of the Canadian Labour Market, Ottawa: Economic Council of Canada, 1976.

4. Ibid, Chapter 9.

CHAPTER 4

COSTS OF ADJUSTMENT AND THE DESIGN OF ADJUSTMENT ASSISTANCE PROGRAMMES

4.1 Introduction

The previous chapters considered the costs of adjustment both for the individuals directly affected by the policy changes and for the economy as a whole. In this chapter the concern is with the policy options for trade adjustment assistance. These policy options fall into two categories: income compensation policies and re-employment promotion policies. The specific policy alternatives that will be discussed are a Direct Income Compensation Programme for Displaced Workers and re-employment promotion programmes through an Employment Subsidy Programme and a Loan Forgiveness Policy as part of the Enterprise Development Programme.

The Direct Income Compensation Programme seeks to restore the expected loss in private incomes for those workers who lose their jobs because of trade liberalization. There are two justifications for such a programme. The first is based on considerations of fairness or equity to workers injured by government policy changes. Fairness can be achieved by ensuring that workers receive income levels equivalent to what they would have expected to receive if trade liberalization had not taken place. Such compensation is designed to make these workers indifferent to the policy change and to redistribute some of the social benefits of trade liberalization to those who suffer losses. In this way, everyone is

made at least as well off on average as they previously expected.

A second justification relates to Canada's ability to achieve trade liberalization. Trade barriers serve to protect the incomes of those engaged in the domestic production of protected commodities. An income compensation programme as part of an overall trade adjustment assistance package would serve the same purpose and can be viewed as a direct alternative to continued trade protection.[1] Therefore, it could remove much of the domestic opposition to trade liberalization on the part of trade unions and manufacturers' associates whose members' incomes are being put in jeopardy.[2] To the extent that the degree of trade liberalization is no greater with a compensation programme in place than without it, the programme can be viewed as compensating those who do not have sufficient political influence to prevent the loss of their protection. But if the extent of trade liberalization is increased as a result of a reduction in effective political opposition, then compensation can be viewed as a vehicle that enhances Canada's ability to achieve trade liberalization. The linkage between the political sensitivity of certain sectors to freer trade and the decision to reduce the barriers to trade in these sectors is therefore weakened. Less domestic opposition gives Canada's representatives at the Multinational Trade Negotiations (MTN) more bargaining freedom and power. It would no longer be necessary, for example, to bargain away improved Canadian access to a foreign market in order to gain an exemption for any sector from a general tariff reduction

or the removal of non-tariff barriers. An income compensation policy, therefore, permits the government to be fair to potential losers and to enhance Canada's bargaining position in the MTN to gain increased access to foreign markets.[3]

The justification for a re-employment promotion policy is based on other considerations. The adjustment to changes in trade conditions results in transitional costs to the economy. The value of the output of the economy is reduced to the extent that displaced factors of production experience higher levels of unemployment during the transition period and/or they can contribute less to the value of production in their alternative employment as reflected by the lower wages they earn. The merit of re-employment promoting provisions within a trade adjustment assistance programme stems from their ability to reduce the efficiency losses of adjustment by more than the value of the resources they consume. For example, a retraining programme can result in benefits from getting a worker re-employed sooner, at a higher wage, or for a longer time than otherwise would have occurred. These benefits, however, should exceed the social opportunity cost of the real resources consumed by the retraining programme in order to have a net benefit for society. As will be shown below, under certain circumstances these efficiency gains can also be achieved by transfer payments as opposed to the consumption of real resources. The maintenance of a firm in business by means of lump sum grants would be such a case.

These two types of adjustment assistance, income compensation and re-employment promotion, should be regarded as being distinct and separable. Both the concepts and calculations to estimate the amounts of money involved and the actual implementation of these two types of policy should be kept independent with only a few exceptions. These exceptions relate to the possible linkages that may exist between these two types of policy. One such linkage is that an income compensation policy could affect the re-employment behaviour of displaced workers, and hence, have an impact on the economic costs of adjustment. Where it has no effect on the re-employment behaviour, an income compensation policy can be said to be efficiency neutral. Where re-employment is discouraged, it is efficiency negative, i.e., the economic costs caused by the displacement of workers is greater than it otherwise would have been. Such effects could be caused by tax-back provisions, that attempt either to recapture the compensation expenditure or to limit the workers' future earned income (see Section 4.2.4). Compensation should be provided in as neutral a fashion as possible.

A second linkage results from programmes that are primarily aimed at worker re-employment but also reduce the expected income loss as a by-product. If as a result of any such programme (manpower or wage subsidy programmes, for example) a worker gets a job sooner, at a higher wage or for a longer period that he otherwise would, then the expected income loss will be reduced. Furthermore, an efficiency oriented policy of assisting firms to remain in operation rather than close down results in the maintenance of the income levels of the workers retained in employment. In this latter case it is both justifiable and administratively easy to exclude wor-

kers, who do not in fact lose their jobs, from being eligible for income compensation. In the former case, the re-employment policy affects the workers only after their actual layoff. Therefore, the a priori identification of workers who will benefit from these policies and the estimation of the amount by which they will benefit may be sufficiently difficult and costly to argue against any reduction in the amount of compensation payments. Moreover, attempts to tax back any compensation payments on a post hoc basis to offset the benefits received from a re-employment programme can also be administratively costs as well as being efficiency negative. What is clear from the above, however, is that an effective re-employment promoting programme for trade affected workers will go part of the way towards achieving the goals of an income compensation programme. As such, it does represent a limited alternative to a direct income compensation programme.

Before moving on to the details of specific policy options it is appropriate to preface these with some comments on the approach taken to policy design in this study. Its three basic features are as follows:

a) First, it is recognized that Canada already has a number of programmes designed to assist with the adjustment of capital and labour to changing market circumstances as well as programmes aimed at income maintenance. These range from the Adjustment Assistance Board under the Enterprise Development Programme through a number of industry specific programmes to

Unemployment Insurance Compensation. The policies recommended in this study are additions or improvements to existing programmes

b) Second, an attempt is made to place the policy options within a sound economic framework. This allows:

   i) the policies to be so directed as to keep private incentives consistent with public goals;

   ii) the basic parameters of the policies to be identified; and

   iii) estimates to be made of the costs and benefits involved.

c) Finally, it should be recognized that a full implementation analysis has not been carried out on these specific policy options. While the economic principles give direction, the empirical results illustrate the magnitudes of the parameters and the past experiences of adjustment assistance programmes in developed countries indicate errors to be avoided, more attention can well be given to the details of their administrative feasibility and costs. Any realistic political constraints should also be incorporated into adjustment assistance policies. At a minimum the suggested policies are presumed to be economically sound and not administratively infeasible.

The following sections cover the details of the specific policy options recommended: A Direct Income Compensation Programme for Displaced Workers (4.2), and Employment Subsidy Programme (4.3), and a Loan Foregiveness Policy (4.4). Each policy option is first introduced by an outline of its

essential features. The details of the policy are then discussed. The final section (4.5) deals with the application of the economic framework to a few other adjustment assistance policy instruments not covered under the specific policy recommendations.

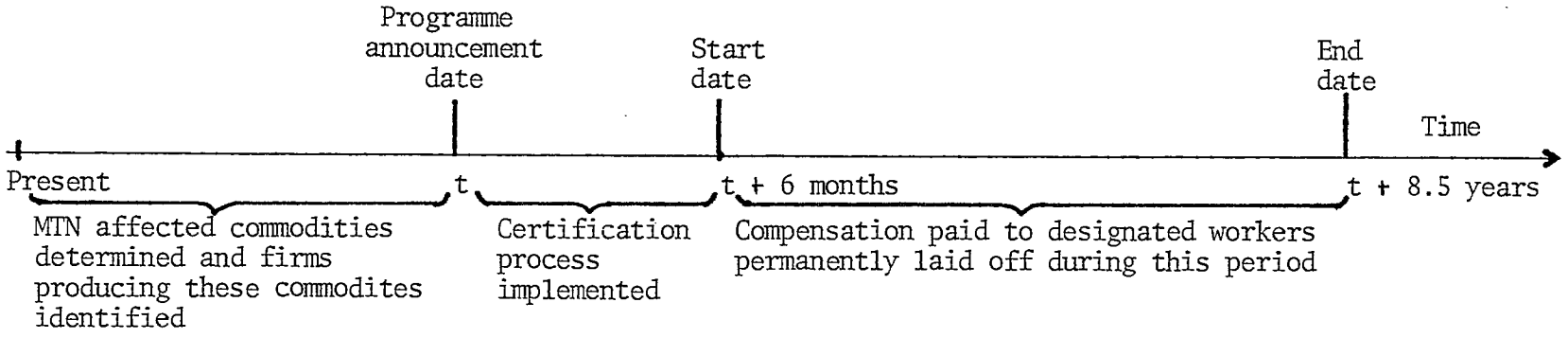
4.2 Direct Income Compensation for Displaced Workers

4.2.1 Policy Outline

Income compensation should be paid to workers permanently laid off during a specified calendar period from plants producing commodities which will experience significantly lower levels of effective protection as a result of the Multinational Trade Negotiation agreements. Workers will be designated as being eligible for compensation if they started working for the firm at least 6 months prior to the start date of the programme and if they are directly involved in the production or sale of the specified commodity. Income compensation will be paid in monthly payments over a 3 year period at a level estimated on an ex ante basis to be equivalent to the present value of the income loss expected to be suffered by the worker who is displaced from employment with a designated firm. Payments will be calculated as a percentage of the average monthly gross wage earned over the 20 weeks preceding permanent layoff. The percentage compensation rate will vary according to the age of the worker and the prevailing unemployment rate of Canadian prime age males (or other appropriate provincial unemployment rate). Payments of compensation will be made monthly starting in the second calendar month after layoff. Any worker will be eligible only once for compensation payments. These payments will be terminated if a worker

Figure 4.1

A Time Line of the Proposed Sequence of Events in the Implementation of the Direct Income Compensation Programme



is rehired within 6 months of the date of separation by the firm with which the worker was employed as of the start date. Executive control of the programme will be within the Department of Industry, Trade and Commerce. The delivery of programme benefits will be administered by the Department of Employment and Immigration. A time line indicating the proposed sequence of events for implementing this programme is given in Figure 4.1.

4.2.2 Eligibility Criteria and the Certification Process

Major problems in the implementation of trade ajdustment assistance programmes in other countries have arisen out of post hoc attempts to certify laid off workers as being eligible to receive programme benefits. These problems have been compounded by overly rigorous eligibility criteria. An example would be the requirement that workers could be declared eligible only if it could be shown that they lost their jobs as a direct result of ghe government action of lowering trade barriers. Furthermore, the workers would have to have had a lengthy attachment to the firm and/or industry. It is extremely difficult to analyze whether or not a particular individual or group of workers would not have been laid off if the government had not taken a certain action such as dropping a tariff rate. In a dynamic market situation, numerous causes can contribute to a layoff. The extreme example of this type of programme was the trade ajdustment assistance provisions of the United States 1962 Trade Expansion Act which resulted in very few firms and workers being declared eligible and long delays in the provision of benefits.[4] Is is very probable that workers and firms that were in fact eligible for benefits were excluded.

To circumvent these problems the following eligibility criteria and certification process are suggested:

a) Commodities which will experience significant absolute reductions in their effective protection should be designated as MTN affected.[5] As proposed in Figure 4.1, all decisions on the potential effects of trade liberalization should be made prior to the announcement date. Those sectors that are expected to suffer the largest cut-backs should be identified. All workers directly involved in the production of these commodities on the date of the announcement of this programme (i.e., 6 months before the start date) will be designated as being eligible for income compensation if they are permanently laid-off any time between the start date and some future date marking the end of the effects of trade barrier reductions. The start date will correspond to the timing of the reduction of protection for a commodity or such time ahead of this data as to include anticipatory layoffs. The end date will depend on the rate at which tariff reductions are phased-in. An eight year phase-in period is the present proposal.

b) Lists of the Social Insurance Number of the designated workers at firms producing these commodities will be compiled and kept on file at the Department of Industry, Trade and Commerce.

c) Where firms also produce commodities considered to be unaffected by the MTN, only those workers whose continued employment depends on the level of production of designated commodities will be declared eligible.[6]

d) Workers in firms producing material inputs for the production of designated commodities may also be certified as being eligible on the same basis as stated above. Care should be taken that only

those suppliers of domestic producers whose continued survival is closely linked to the production of the designated commodities are included.

This procedure is based on the premise that although it is difficult to determine the causality of a firm having to lay off a worker, it is known that a reduction in the profits received by firms from the manufacture of MTN affected commodities will lead to the laying off of workers. It is recognized that in contrast to the post hoc certification process criticized above, the method suggested here will increase the probability of paying compensation to workers who do not in fact lose their jobs as a result of trade liberalization. It is felt that this is a lesser error both because of its favourable income distributional effects and because a more liberal income compensation policy is more likely to lead to reduced political opposition to trade liberalization, the increased implementation of which would lead to the improved well-being of all Canadians.

This ex ante certification procedure will place the burden on IT&C in making the critical judgements as to which commodities or commodity category will be designated as being MTN affected and then in undertaking the subsequent identification of their producers. This procedure has two advantages aside from avoiding the problems of the post hoc procedures. First, the prior designation of workers limits the number who could potentially benefit from this programme. This puts a lid on the programme budget. Second, the administrative procedures of the Employment Subsidy Programme (4.3) are closely linked to those of the Income Compensation Programme; for the wage subsidies to have any effect on promoting the re-employment of workers there must be a minimum of delay in their certification.

The provision to limit eligibility to this programme to those workers producing designated commodities on the announcement date arises out of the rationale for the programme. The government is compensating workers injured by its actions, and hence, restoring them to their expected income levels. In setting up trade barriers the Government has allowed industries and communities to develop behind these protective walls. Workers have taken up employment in these industries expecting to establish careers in them. This certification procedure ensures, therefore, that those workers who face a risk of being injured by the effects of the MTN, as well as those with the greatest potential loss, will be eligible for compensation. This group will contain the stable, high seniority workers who could be earning specific rents in these jobs that they would not regain in alternative employment opportunities. The loss of jobs before the programme start date will not likely be a result of the MTN. Any workers joining the firms after the announcement date will be taking a voluntary decision to take up employment in an industry that is subject to the risk of contraction. These workers can be assumed to have accepted the expected income loss which would accompany any subsequent layoff. Such losses are therefore no longer in the domain of public responsibility. There would naturally be an obligation on the programme administrators to ensure that the programme is well publicised. It is felt that the political incentives behind such a programme would ensure that this would happen. Knowledge of this rationale for the eligibility criteria is also important if the government is to be capable of defending itself against later pressures to

to have workers made eligible for benefits retrospectively. Political pressures can also lead to unjustified budgetary escalations for such a programme.[7]

If and when workers are premanently laid-off, they would be required to notify the Department of Employment and Immigration of this fact. They would have to submit a copy of their Record of Employment to confirm their eligibility and establish their compensation rate. Firms would be required to notify the government if they rehire designated workers whom they had employed as of the announcement date. Firms would have incentives to comply with such a regulation if the Employment Subsidy Programme was also in place because the firm would want to be eligible for a wage subsidy..

This certification process can be summarized as follows:

i) Select MTN affected commodities.

ii) Establish which firms produce these commodities.

iii) Set start and stop dates for the programmes.

iv) Designate the workers in these firms that are directly involved in producing these commodities as being eligible for income compensation payments.

v) Check eligibility of designated worker applying for compensation and establish compensation payment rate.

vi) Mail out monthly compensation payments over the following 3 years unless a firm indicates that the worker has been rehired within 6 months from layoff

The recommendation that the Department of Industry, Trade and Commerce has executive control over this programme even though it has the appearances of being a "Labour", or "Manpower", or "UIC" programme, arises out of the need to determine the eligibility and certification

process and from the direct role ITC plays in trade and industrial policy. A department such as that of Employment and Immigration would be better suited to programme delivery given their experience and existing bureaucratic structures and functions.

4.2.3 Estimation of Compensation Payments

Based on the results of the estimation of the losses of full income suffered by the persons in the two labour force tracking survey cases and by the average temporary sector worker as represented by the two ROE/UIC claim regional labour market samples (see Chapter 2), it appears that a simple schedule of compensation rates can be set up. This schedule would determine the compensation payments as a percentage of the laid-off worker's gross average monthly wage over the previous 20 weeks.[6] Payments would be made in monthly installments over a 3 year period such that they are equivalent to the present value of expected income loss over the 3 year period following separation. Table 4.1 shows the results for the two labour force tracking survey cases. From these results it would appear that the order of magnitude of the average compensation rate would fall between 10 and 15% of the prior gross-of-tax monthly wage. The reasons why these bounds are probably quite reasonable is that Co.X and Co.Y samples represent polar cases. The former contained older and relatively highly paid and permanent workers; the latter consisted of younger and relatively low paid and more temporary workers.

The use of the monthly installment method discourages workers from quitting in order to pick up a seemingly large lump sum payment which may be spend to a disproportionately large extent on luxury consumer durables. This method also allows termination of the payments if it turns out that the permanent layoff was actually a temporary one. Delaying the initial payment to the end of

the calendar month following layoff also discourages such "resignation" behaviour and gives the government time to check eligibility and establish compensation rates.

Lump sum payments form the obvious alternative compensation payment mechanism. A number of advantages can be ascribed to this method. First, its "severance pay" appearance gives it political palatability. Second, it has potentially lower administrative costs. Third, the one-time payment mechanism does not encourage the existing tendency in government programmes to tax-back transfer payments during subsequent employment spells. Avoidance of the negative economic efficiency effects that arise out of the work disincentives of tax-back policies (see Section 4.2.4) may be the strongest reason for advocating a lump sum payment mechanism. If a monthly compensation programme can be implemented, without tax-back provisions, however, then this mechanism does allow ease of estimation of the compensation payments by means of a schedule of percentage rates and more administrative control over the programme to avoid abuse.

The alternative to setting up a schedule of percentage compensation rates would be the establishment of a mechanism to replicate the estimation procedures used in this study to estimate the income loss for each worker or group of workers. The wage and proportion of time employed before layoff could be obtained from actual data. The expected alternative wage and time spent employed would have to be estimated. This would require more sophisticated and costly estimation procedures than are administratively desirable. But is is only based on these more sophisticated procedures, and by broadening the existing empirical foundation,

that the sound underpinnings of a simpler and more administratively feasible procedure for estimating compensation payments (such as the suggested "percentage of the previous wage" method) can be established.

Table 4.1

Estimated Income Loss for Average Individual in Labour Force Tracking Survey Samples.

Company	Company X (Owen Sound)	Company Y (Sherbrooke)
Present value of average income loss over 3 years (1977 $)	$4797	$2115
Monthly installment: 1) Dollar amount 2) Percentage of previous wage	$ 142 14.9	$ 63 9.9

The compensation schedules can be set up to vary the compensation rate according to the individual characteristics of the worker, the prevailing labour demand conditions and regional market differences. This allows the compensation payments to approximate more closely the expected income loss for each individual. In that the expected income loss is estimated as the average for a group of workers, some workers will in fact do better and others worse than average. Varying the compensation according to the characteristics of the worker attempts to include some of this variation about the mean behaviour. A further advantage of varying the income compensation payments according to the characteristics of the individual is to prevent the inequitable exclusion of persons through arbitrary eligibility criteria. Programmes are frequently targeted at "worst case" situations which are often defined by arbitraty cut-off points. For example, in the Canadian Adjustment Assistance Benefits programme for the

older textile, clothing, footwear and tanning workers with long industry attachment, cut-off points were established at 54 years of age and 10 out of the last 15 years spent in the industry. This has resulted in both few persons being declared eligible and inequitable treatement of those who miss the cut-off points, particularly if this is only by a narrow margin. Varying the benefits along with the eligibility criteria has the merit of including more persons as well as allowing the benefit levels to approximate more closely what they deserve in terms of the objectives of the programme.

Age stands out as being the most obvious individual characteristic on which to establish inter-individual discrimination. Age is correlated with numerous factors that affect the speed and costs of adjustment. Such factors include marriage, home-ownership and the establishment of community ties all of which tend to decrease geographic mobility. A shorter remaining working life reduces the attractiveness of retraining from the perspective of both the worker and future employer. Older workers are also more likely to be stable workers who have developed job specific skills that earn them rents that cannot be re-captured in alternative jobs. Age is also an attractive varaible on which to key the magnitude of compensation because it does not result in perverse or unintended incentives as individuals cannot alter their age in order to alter the level of eligible compensation. This contrasts, for example, with the effects that would arise from having higher compensation payments for separated persons. Such a policy would tend to encourage divorce. Although sex as a policy variable does not have these adverse incentive problems and has been shown to have consistent and significant

effects on worker re-employment performance, it is ruled out because of its political unattractiveness for forming the basis for discriminating amongst persons. Other variables that merit consideration for forming the basis for compensation variations are the skill level, occupation or education level of the individual.

The unemployment rate is the obvious candidate to indicate the prevailing labour market conditions. The Canadian prime age (25-54 years) male unemployment rate is used here given its good properties in indicating demand conditions. The Canadian rate could be replaced by prime age male unemployment rates for policy purposes.

Regional labour market structures can also be expected to affect income losses. A worker can expect a higher income loss if laid off in a regional labour market characterised by high average durations of unemployment and low proportions of time spent at work in the temporary sector.

The effects of age and the unemployment rate on the estimated income loss of displaced workers is illustrated in Tables 4.2.A and B. These tables show the sensitivity of the expected income loss (expressed as a percentage of the previous wage) to changes in age and the unemployment rate. Income losses rise with higher unemployment rates and age. Furthermore, the increased losses at higher ages are more pronounced the higher the unemployment rate.

Consistent with expectations, the Sherbrooke area with is proportionately larger temporary sector and higher average duration of unemployment displays higher levels of income loss relative to previous wage than the Owen Sound area. The temporary sector of a labour market comprises those workers whose employment episodes last less than a year. The proportion of jobs and

Table 4.2

Sensitivity of the Estimated Income Loss for Regional Labour Market Samples. (Skill is held constant at 0.25 equivalent years of specific vocational preparation and the effect of recalls is excluded.)

A. Sherbrooke Area

Monthly Installment as Percentage of Previous Wage			
		Age	
		25	55
Unemployment Rate	3	0.6%	6.2%
	5	2.8%	15.8%

B. Owen Sound Area

Monthly Installment as Percentage of Previous Wage			
		Age	
		25	55
Unemployment Rate	3	*	1.8%
	5	1.1%	8.9%

* Negligibly small amount.

workers with these characteristics in a region remains reasonably stable over the long-run. As the regional labour market samples are based on ROE/UIC claim data they are representative of the behaviour of the temporary sector worker. These regional labour market samples, therefore, contain fewer long-term stable employees who could have previously commanded high job-specific rents than would be expected in a plant shut-down sample such as that for the Co.X (Owen Sound) comapny. As a result the average level of income loss is lower for these temporary sector workers. An indication of this difference is obtained by comparing the income loss for the average Owen Sound area temporary sector worker (Table 4.2,B) with that for those laid off from Co.X (Table 4.1). The average age of the Co.X sample was about 45 years and the unemployment rate a little over 4%. The major difference between the two samples appears to be the degree of permanency of employment and wage rates; both of these are significantly higher for the Co.X sample than the Owen Sound regional averages.

Based on the evidence of this study it seems that an income compensation programme, where payments are estimated as a percentage of the previous wage rate and variations are made in these percentages on the basis of age and unemployment rates, is both a reasonable and feasible recommendation. It is, however, also recommended that further empirical investigation be conducted to establish better the levels at which compensation should be paid to the average trade-affected worker and the degree to which regional labour market differences should be taken into account. More extensive analysis of layoffs from complete plant shutdown cases would assist with the former problem. Such shut-down cases are available on the ITC labour

force tracking survey data base. Further analysis of the UIC administrative regional data base would resolved the latter question.

In practice the estimation of income compensation installments could be made from the information available from Record of Employment (ROE) forms issued to laid-off workers along with the age of the worker. Age data could be supplied by the firm at the time of establishing the lists by Social Insurance Number (SIN) of designated workers. The only other problem with the information on the ROE form is that the actual wage rate would not be known for workers earning above the insurable earnings limit. These data would therefore have to be supplied separately by the firm.[10]

Estimations of the expected income loss have been made excluding severance payments, supplementary unemployment benefits or other receipts from a former employer.[11] With an income compensation policy in place it can be expected that such private payments would be reduced. To the extent that unions can nevertheless still negotiate such agreements for laid off workers, these payments can be expected to go mainly to the higher seniority and higher paid workers who can also be expected on average to be those workers who will be undercompensated by the recommended income compensation policy. It is these workers who were probably earning specific rents through their specialized skills in these jobs. To the extent that they are unable to recapture these rents in alternative jobs, they will suffer higher income losses than the average displaced worker.

A final consideration in the estimation of compensation payments is the effect of inflation on the income loss of a worker. All calculations on income have been made in constant dollars. Furthermore, all estimations of monthly equivalent payments, which are equal in value to the present

value of the expected income loss, have been made on the basis of zero expected rates of inflation. An average expected inflation rate of 6% over the 3 years following layoff would imply that monthly installments should be increased by 9.5% assuming a real discount rate of 4%. That is, if the monthly installment would have been calculated as 10% of the previous wage without inflation, then with a 6% expected inflation rate it would be 10.95% of this wage.[12]

4.2.4 The Work Disincentives of Tax-back Provisions

It is strongly recommended that no tax-back provisions that attempt to recapture the compensation payments once the worker becomes re-employed or in any way attempt to limit future earnings, be included in the income compensation programme. This recommendation is based on the following reasons:

a) The amount of compensation is estimated based on the expected future earned income of the worker. The fact that the worker becomes re-employed is therefore no basis for attempts to recapture these payments.

b) The amount of money involved in the compensation programme is relatively small, hence the decrease in government expenditures gained through any tax-backs would not be large. Furthermore, added real resources would be tied up in the administration of any such programme.

c) Tax-back provisions increase the marginal tax rate faced by the displaced worker. This would tend to discourage re-employ-

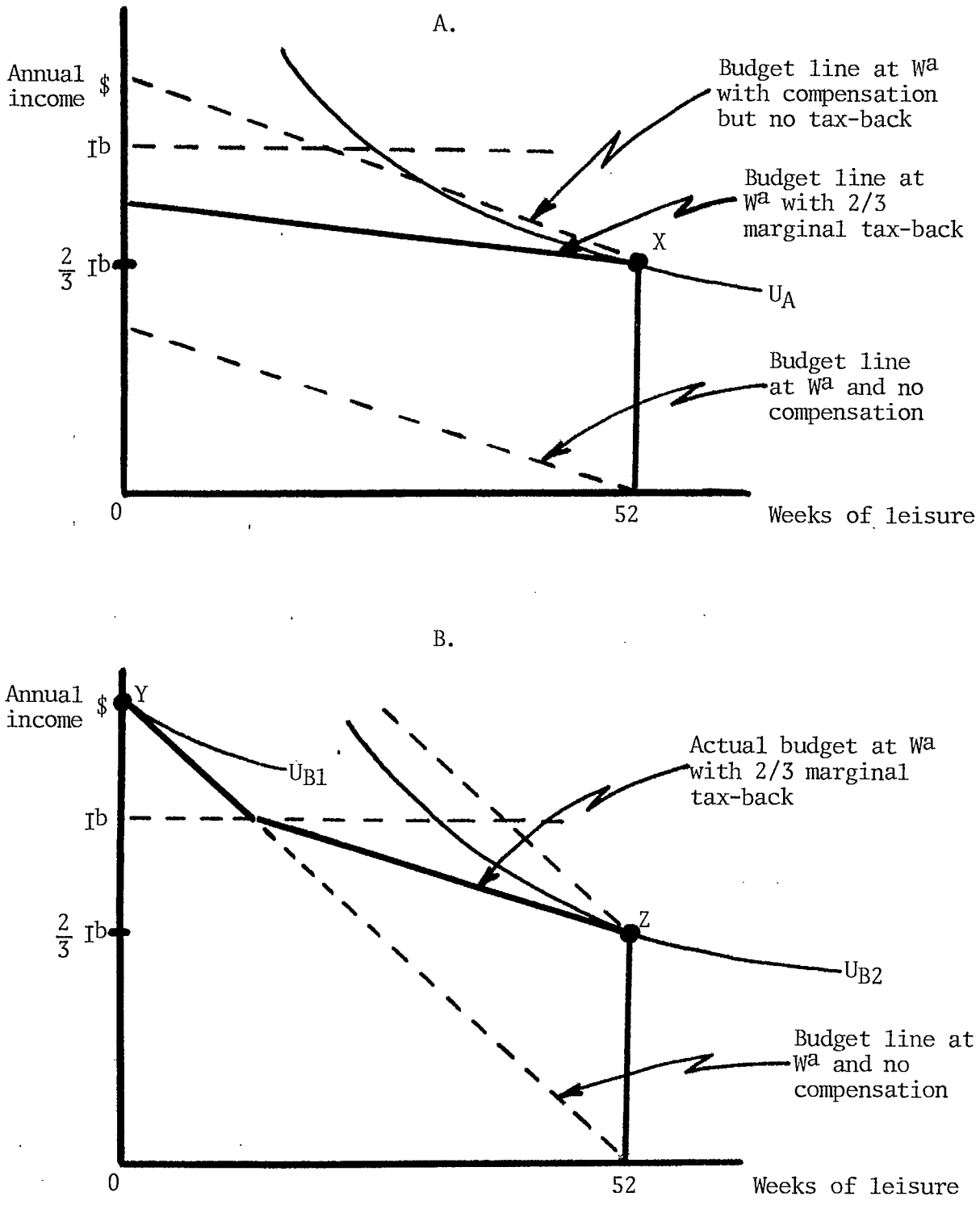
ment and increase the economic costs that would otherwise have been associated with the adjustment process of labour to trade liberalization.[13] Such an efficiency loss would be reflected by an increase in net government expenditures.

Any government regulation or policy that leads to a decrease in the net monetary benefit that can be gained by working an additional amount of time results in less work being done. An extreme example is the Adjustment Assistance Benefit Programme for older textile, leather and tanning workers (see Chapter 1.5), which pays designated workers at a rate of two-thirds their former income until they reach 65 (an amount which appears to be far in excess of their actual expected income losses based on the evidence of this study), and then imposes a two-thirds marginal tax rate on any earned income up to the point where the former earnings level is reached. It is not surprising that very few of the persons on this programme have taken up alternative employment. The disincentives in this programme can be graphically illustrated with traditional indifference curve diagrams. See Figure 4.2. The slope of the budget line measures the weekly real wage rate. Figure A shows the case where the alternative weekly wage rate (W^a) facing the worker is lower than the previous wage rate such that without compensation, even working a full 52 weeks would not generate the income level earned before (I^b). Given the gentleness of the slope of the budget line facing such an individual it seems very improbable that any labour services would be offered. Hence position X on indifference curve U_A seems the likely optimal point for this person: 52 weeks of leisure and 2/3 of his/her former income level. Figure B illustrates the case where W^a is sufficiently high that the individual could in fact earn more than I^b without compensation. Depending on the tastes of the

individual, (s)he could be at or close to Y if U_{B1} applies (indicating a willingness to trade-off a large amount of leisure for a relatively small gain in monetary income); or at or close to Z for the opposite tastes (U_{B2}). It is, however, expected that Case A is the more typical one for the older worker who tends to face a lower alternative wage rate. This explains the small proportion of persons on the Adjustment Assistance Benefits Programme who have taken up alternative employment.[14] If these individuals were not faced by such high marginal tax rates, then more of them would seek alternative employment. This would make these individuals better off. All other Canadians would also be better off at least to the extent that their alternative employment generates more income tax revenues.

Most conceivable tax-back provisions will be variants of the one illustrated in Figure 4.2, but they will all have the same result of tending to discourage employment. The severity of the disincentive will increase with the tax-back rate and the amount that it aims to recover. As a general principle, in order to avoid any adverse efficiency effects it is best not to include any tax-tack provisions that reduce the net wage facing a worker.

Figure 4.2
Work Disincentives in Adjustment Assistance Benefit Programme



4.3 Employment Subsidy Programme[15]

4.3.1 Policy Outline

Any firm hiring a worker who is designated as having been permanently laid off as a result of the MTN will be eligible to receive a subsidy. The amount of the subsidy will equal a proportion of the gross weekly wage paid by the new employer for each week of employment received during the three years following the permanent layoff of the worker from the original firm (i.e., the firm employing the worker in the programme announcement date). The programme start and stop dates, the worker's eligibility and the certification process will be exactly the same as those for the Income Compensation Programme. (See Section 4.2.) The original firm will not be eligible for wage subsidy payments if the designated worker is rehired within 6 months of the layoff which initiates eligibility or the worker for adjustment assistance benefits. When a designated worker is permanently laid-off and makes application for income compensation payments, the worker will be issued with documentation indicating the schedule of subsidy rates available to subsequent employers. Lower subsidy rates will be paid to employers still receiving high levels of effective trade protection after the trade liberalization provisions have been implemented. On employing such a worker, the employer will submit a copy of this documentation to the government in order to confirm both the eligibility of the worker and the wage subsidy rate to be received by the firm, and to set up the procedure for making subsidy payments to the

firm. Executive control over the programme will be centred in the Department of Industry, Trade and Commerce, while the benefit delivery will be administered by the Department of Employment and Immigration.

4.3.2 Estimating the Economic Benefits and Subsidy Rate

The gross economic benefits of the wage subsidy programme result from a reduction in the economic costs associated with the displacement of labour. These benefits can be achieved by displaced workers getting a job sooner and/or keeping a job longer. It is important to note that these economic benefits are different from and probably considerably less than the gross labour externality that can be gained by retaining workers in their former jobs. (See Chapter 3 or Section 4.4.2). The marginal social product of employed time when a re-employment policy is being considered for workers who have already suffered displacement depends on the wage rate in alternative jobs and not the one that was paid in the firm from which the labour has been displaced. Further, as is shown in the general equilibrium model in Chapter 3, the retention of workers in base sector jobs can also be credited with the saving of the value of jobs that would otherwise have been lost through multiplier effects.

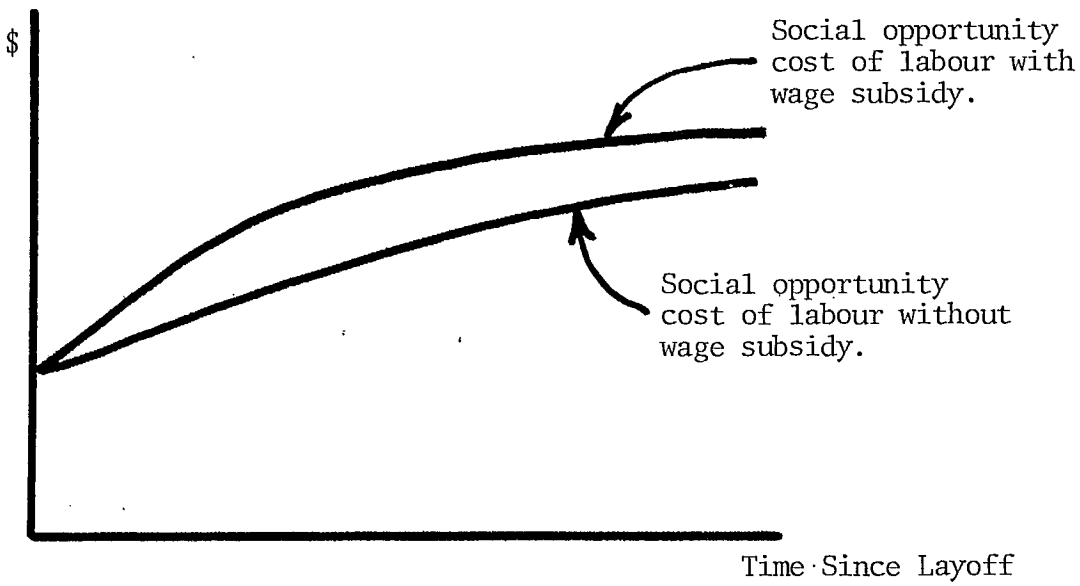
The gross economic benefits are measured as the present value of

the difference between the social opportunity cost of labour with and without the subsidy programme in place. See Figure 4.3. The model used to estimate these economic benefits depends on the nature and extent of the proposed programme in terms of both the proportion of workers involved and the duration of the programme. The Employment Subsidy Programme, as conceived here, is to be targeted at a specific and limited groups of workers for a limited time period. The designated MTN affected workers are generally expected to form less than 10% of the workers in a regional labour market. Any designated worker is eligible for wage subsidies for a period limited to 3 years.

This programme structure lends itself to the use of a partial equilibrium model for estimation purposes. In this model the wage subsidy has no effect on the market wage rate and the indirect effects on unsubsidized labour and capital are negligibly small.[16] This implies that the wage subsidy serves to decrease the wage bill incurred by those employing designated workers. The increase in the proportion of time that a designated worker is employed over the three years following layoff is therefore taken to be a function of the subsidy rate and the wage elasticity of demand for the subsidized labour. For relatively small subsidy rates (less than 20%) the increase in the social value of the output of labour can be considered to be directly proportional to the product of the subsidy rate and the wage elasticity of demand for subsidized labour (i.e., to the proportional increase in their employment.)[17] This decrease in employed time represents added labour output, but it also means an equivalent decrease in leisure time.

Figure 4.3

Economic Benefits of Wage Subsidy Policy



Short-run multiplier effects can also be expected to result from the added expenditures in the region related to the wage subsidies. The added employment arising from the multiplier effects can be included in the estimate of the gross economic benefits associated with labour re-employment promotion through the wage subsidy programme.

A brief outline of the model used to estimate the gross economic benefits of added employment is now presented.[18] As already indicated, the wage subsidy is expected to increase the proportion of time that a subsidized worker spends employed after layoff. This employed time is valued from an economic perspective at the gross-of-tax wage rate. (See Chapter 3.1). A corresponding decrease in the proportion of time spent unemployed must therefore also result. This is valued at the non-monetary value of leisure time. The gross economic benefits associated with labour at any point in time during the subsidization period that results from the direct employment effects can be expressed as follows.

$$GDEB_t = (P_t^s - P_t^{ns})\ W^g + \left((1 - P_t^s) - (1 - P_t^{ns})\right) V$$

$$= (P_t^s - P_t^{ns})(W^g - V) \qquad (4.1)$$

where $GDEB_t$ = gross direct economic benefit per subsidized worker at time t;

P_t^s = proportion of time spent employed at time t after layoff with the subsidy programme in place;

P_t^{ns} = proportion of time spent employed at time t after layoff without the subsidy programme (P_t^{ns} is the same as P_t^a in Chapter 2);

W^g = gross-of-tax wage rate in new job;

V = non-monetary value of leisure (which is estimated according to equation (3.3) in Chapter 3).

As the market wage rate for unsubsidized labour is unaffected by the wage subsidy, the increase in the proportion of time worked, $(P^s - P^{ns})$, depends only on the wage elasticity of demand for subsidized labour. This relationship is expressed as follows.

$$(P_t^s - P_t^{ns}) = P_t^{ns} \; S \; n_{sl}^D \qquad (4.2)$$

where S = subsidy rate or the relative decrease in the wage rate the employer has to pay (defined negatively);

n_{sl}^D = wage elasticity of demand for subsidized labour (defined negatively

Substituting (4.2) into (4.1) the gross direct economic benefits from the employment subsidy become

$$GDEB_t = (W^g - V) \; P_t^{ns} \; S \; n_{sl}^D \qquad (4.3)$$

The social value of the added employment arising from the multiplier effects can be shown to be proportional to the increase in the proportion of time a subsidized worker is employed. The gross economic benefits per subsidized worker at any point in time can therefore be expressed as:

$$GEB_t = (W^g - V + M_t) \; P_t^{ns} \; S \; n_{sl}^D \qquad (4.4)$$

where GEB_t = gross economic benefits per subsidized worker at time t;

M_t = increase in social value of the output of labour as a result of multiplier effects per added amount of employed time of subsidized workers in time t.

The actual subsidy payments that would have to be made to the new employer of the designated worker in time t equal:

$$SP_t = S\ W^g\ P_t^s$$

$$= S\ W^g\ P_t^{ns}\ (1 + S\ n_{s1}^D) \qquad (4.5)$$

where SP_t = subsidy payment per subsidized worker in time t.

The gross economic benefits per subsidized worker per dollar of subsidy payment in time t can therefore be found from (4.4) and (4.5). This can be expressed as

$$GBPW_t = \left((W^g - V + M_t)/W^g\right)\left(n_{s1}^D/(1 + S\ n_{s1}^D)\right) \qquad (4.6)$$

where $GBPW_t$ = gross economic benefit per dollar of subsidy payment.

The total gross economic benefit per subsidized worker is found by estimating the present value of the gross economic benefits generated over the three year period following layoff. The present value is found by discounting these benefits back to the layoff date by the social discount rate (which has been estimated to be at least 10%[19]). As with the income compensation payments (see Section 4.2.3), the present value of the gross economic benefits can be expressed as monthly equivalent benefits over the three year period.

Based on this model for estimating the gross economic benefits of the Employment Subsidy Programme, estimates were made for the workers in the labour force tracking survey samples for the two case study companies. Values for the proportions of time spent employed at different times from layoff, wage rates, multipliers and labour market distortions are the same as those developed in Chapters 2 and 3. The results are given in Table 4.3.1. These estimates have been made for a 10% wage subsidy rate and a wage elasticity of demand for subsidized labour of -1. The inclusion of

the multiplier effects over the 3 year period resulted in an estimated 6% increase in the gross economic benefit. If the programme were to be extended to cover a longer post-layoff period than 3 years, the multiplier effects would play a more important, though not a major, role. From equation (4.6) it can be seen that the multiplier effect over the short-run is a function of time since the layoff. As a result, the gross economic benefits per dollar of subsidy payments will also be a function of time. Hence, this ratio is estimated at a particular point in time, viz., 1.5 years from layoff.

The wage elasticity of demand for subsidized labour, n_{s1}^{D}, plays a key role in the determination of the gross efficiency gains from the Employment Subsidy Programme. (See equations (4.4) and (4.6).) For values of n_{s1}^{D} around -1, an approximately one-to-one relationship between the efficiency gain and the wage subsidy payment is estimated. The efficiency gain increases the higher is the wage elasticity of demand for subsidized labour. What has not been estimated in this study, however, is that even if n_{s1}^{D} is -1 for a group of subsidized workers, how would n_{s1}^{D} vary with the characteristics of the workers such as age, sex or skill level (holding all over determinants constant.) The estimates of the effects of such worker characteristics on the probability of being at work made in this study (see Chapter 2) represent combined supply and demand effects for labour. For example, it was found that these combined effects resulted in older workers being employed on average for a smaller proportion of time after layoff than younger workers. Now the question is whether or not a similar relationship holds for the pure demand effect. In other words, if the wage

Table 4.3

Estimates of the Gross Economic Benefits from the Employment Subsidy Programme for the Average Worker in the Two Labour Force Tracking Samples.[a]

	Company X (Owen Sound Area)	Company Y (Sherbrooke Area)
Present value of the gross economic benefits over 3 years (1977 $)	$1,812	$1,085
Monthly equivalent of total gross economic benefits	$59	$35
Gross economic benefit per dollar subsidy payment[b]	.94	.94

a. These estimates are for a 10% wage subsidy rate and for the wage elasticity of demand for subsidized labour equal to -1.

b. The ratio of the economic benefit to the subsidy payment is estimated for the 18th month after layoff.

elasticity of demand for a group of subsidized workers is -1, does this imply that all workers in this group are employed for 10% longer for a 10% wage subsidy, or is the increase in employment of the younger workers in this group more than 10%, while that for older workers is less than 10%, when all other determinants are held constant.[20] The importance of this distinction depends upon the goals of the Employment Subsidy Programme. If the goal is only to maximize the gross economic benefit, then all the programme expenditures would be directed towards those workers for whom the wage elasticity of demand is the highest. This may mean subsidizing younger workers in preference to older workers if all their characteristics were the same (including the wage rates they could command in the market). If on the other hand, income compensation considerations also enter the

objectives of the programme, then a bias towards older workers may be justified, but at the possible expense of some forgone economic benefits.

A major concern with wage subsidy programmes targeted at a limited group of workers is the impact of the programme on the workers excluded from the programme. Do the subsidized workers benefit from the programme only at the expense of the excluded workers? Two points should be considered here. First, what is the impact of the programme on labour employment in general? Second, waht is the impact on the unsubsidized workers in particular? First, a wage subsidy programme will lead to an increase in the demand for labour in general. This is particularly the case when the programme is directed at workers who are concentrated in the lower wage brackets. Second, the impact of the wage subsidy on the excluded workers depends on two effects. The one is known as the scale effect. In that the wage subsidy reduces the total costs of production it will cause an expansion of output proportional to the price elasticity of demand for the product. The other effect depends on the degree of substitutability or complementarity between subsidized and unsubsidized workers. If a high degree of substitutability exists between workers, this effect offsets the scale effect, while complementarity (such as exists between skilled and unskilled workers) reinforces the scale effect. In general, it is expected that the scale effect just offsets of exceeds a substitution effect. Whatever the balance between these two effects, their net effect on the demand for unsubsidized workers depends on the share that the wages of the subsidized workers form of

the total production costs in the region. Is it expected that the net effect on the demand for workers excluded from the limited programme suggested here will fall between a small positive and negligible effect.

A further consideration in designing a wage subsidy programme is that, from an economic perspective, one is not indifferent as to where the displaced worker finds re-employment and, hence, which productive activity gets the benefit of the subsidy. To the extent that some industries producing importables will still be receiving relatively high rates of effective protection even after the MTN trade liberalization programmes have been implemented, greater economic benefits can be achieved by directing the labour towards the industries with low or no remaining protection. The social value of the output of a firm producing goods that would otherwise have been imported is the foreign exchange saved by this domestic production. This foreign exchange saving in incremental output is lower the higher the rate of effective protection. The wage subsidy rate should therefore be lower the higher the level of effective protection received by a firm. (See Chapter 3.5). Based on calculated rates of effective tariff and non-tariff trade protection such a variation according to sector could be built into the schedule of wage subsidies appearing on the documentation supplied to the designated worker at the time the worker is permanently laid off.[21]

As is readily evident, close linkages exist between the income compensation and wage subsidy programmes. Both depend on the identification of the same group of workers; both operate over similar time periods; both depend on ex ante estimation of the size and variation of the policy parameters; and both are administratively simple once the inital calculations and decisions as to the final details of the programmes have been made.

4.4 Loan Forgiveness Policy

4.4.1 Policy Outline

This policy will be incorporated into the Enterprise Development Programme as a provision that the present value of the efficiency gain of retaining workers designated as being MTN affected will be deducted from the value of the principal of any loan raised by a designated firm under this programme if the firm would otherwise have shut down or laid off these workers in the absence of this government assistance. The loan or loan guarantee will be given at market interest rates; only the principal will be decreased. Any firm receiving a loan or loan guarantee under such conditions will be required to employ each of these designated workers for at least 40 weeks in each of the following 5 years. Workers and firms will be designated as stated in the Income Compensation Programme certification process. (See Section 4.2.3.)

If the Employment Subsidy Programme is not implemented, then any firm receiving a loan under the Enterprise Developemnt Programme would be eligible to receive forgiveness of the loan principal up to an amount equal to the present value of the economic benefits from re-employment (as indicated in Section 4.3.2) for each designated worker that the firm would employ through receipt of this government assistance. Furthermore, the firm would be required to employ these workers for at least 40 weeks in each of the following 5 years.

4.4.2 Estimating the Efficiency Gains and the Amount of Loan Forgiveness

Under existing policies, manufacturing and processing firms which experience difficulties as a result of changing international trade

conditions, and which are unable to raise capital from the private sector, can approach ITC in order to apply for government assistance under the General Adjustment Assistance Programme. This programme is designed to help the firm implement a plant conversion that will return it to a profitable footing. Under the proposed Loan Forgiveness Policy the principal of any loan or loan guarantee given to such a firm will be forgiven by an amount based on the number of workers designated as being potentially MTN affected (see Section 4.2.2) who are retained with the firm as a result of the receipt of this government assistance. The amount of the loan forgiveness will be up to a limit established by the present value of the labour externality saved through not laying off these workers if no other major externalities are associated with the operation of the firm. In certain circumstances (as discussed below) it may only be necessary to forgive a lesser amount ot prevent this economic cost and yet keep the firm in business. The methodology for estimating this labour externality is outlined in Chapter 3.

Estimates of the gross economic benefits associated with the displaced labour from the actual closure of company X in the Owen Sound area and the potential closure of company Y in the Sherbrooke area were estimated in Chapter 3. Using the general equilibrium model that includes all the general repercussions on a regional labour market of the loss of job opportunities, upper estimates of the gross economic cost are made. These represent the decline in the social value of the output of labour with the loss of jobs compared to the situation in which these jobs are maintained indefinitely. These estimates have relevance in the policy decision of whether or not the government should assist a company

to stay in business or to retain its previous level of employment. Such government assistance effectively delays the permanent layoff of labour, and hence, delays the costs of adjustment. Preventing the loss of the positive externality that labour generates in these jobs is effectively a gross economic benefit (i.e., it excludes other externalities associated with maintaining the level of operation of the firm). The gains from delaying layoffs increase with the added duration for which it is estimated that the government assistance will maintain these jobs. Estimates of the duration of this delay would be based on expectations of the ability of the firm to survive under expected market developments.

Table 4.4 presents the gross economic benefits that are associated with delaying for different lengths of time the permanent layoff of workers in the two case studying companies. It is interesting to note that, even though the actual dollar amounts of the gross efficiency gains are different for the two comapnies, the ratios of the annuitized gross efficiency gains per worker to the wage bills in the two cases are similar. Numerous factors affect the potential size of the labour externality. Important factors include the wage rates and degree of permanency of employment received by workers in this incremental employment, and the characteristics of the regional labour market. If this employment offers relatively high wages and permanent employment, then this raises the potential benefits from labour employment. If the characteristics of the regional labour market result in the value of the changes in the labour employment and unemployment in alternative opportunities being relatively high, then this lower the benefits. (See Chapter 3.) These two sets of factors, viz., the value

Table 4.4

Upper Bound Estimates of the Gross Economic Benefit from Retaining the Average Worker Employed in the Labour Force Tracking Survey Case Study Companies. (Constant 1977 dollars)

Company	Number of Years by which Layoff is Delayed			
		5	10	20
Company X	Gross economic benefit per worker (a)	$19,170	$31,070	$50,570
	$\frac{\text{Gross economic benefit}}{\text{Wage bill}}$ (b)	.33	.52	.58
Company Y	Gross economic benefit per worker	$15,440	$24,970	$40,630
	$\frac{\text{Gross economic benefit}}{\text{Wage bill}}$	.32	.50	.56

a. The gross economic benefit per worker from delaying the permanent layoff of workers is estimated as the present value of the future gains discounted at the social discount rate (10%).

b. The ratio of the gross economic benefit to the wage bill is estimated as the ratio present value of the gross economic benefit to the present value of the wage bill that would be paid if the layoff was delayed indevinitely (at least 20 years). This ratio is equivalent to the ratio of the annuitized gross economic benefits to the wage bill in any year.

of the output of labour in the particular employment being considered and and social opportunity cost of labour in the region, are key considerations in estimating how the benefit-to-wage ratio varies between cases. In the two case study companies, the characteristics of the regions offset those of the employment such that the ratios are very similar.

The magnitude of the present value of gross economic benefits represent the maximum transfers that the government should make to the firm to keep in business as justified on the grounds of improving economic efficiency. This assumes that there are no other economic externalities generated

by the continuation of operations of this firm. A more sophisticated level of analysis can be applied, however, to ensure that the provision of government assistance to a firm is in fact generating incremental benefits for Canada as a whole, and to determine the minimum amount of assistance that is necessary to keep this firm in business, and hence, generate incremental economic benefits. These economic benefits would include the labour externality of delayed layoffs.

In order to determine whether or not the continued operation of a firm can be expected to generate incremental economic benefits, (i.e., the net present social value of its future operations will be positive) all outputs and inputs involved in its operations have to be valued at their social prices (or their social opportunity costs) rather than their private prices (the prices the firm faces in the market.) Therefore, aside from valuing the labour at its social opportunity cost, adjustments would have to be made to take into account the social oppportunity cost of foreign exchange and capital as well as any distortions due to sales taxes or subsidies in the purchase of material inputs, services of utilities or in the sale of the output of the firm. When all these adjustments have been included in the analysis of the future excepted performance of the firm it may well be found that even though there is a gross economic benefit from retaining workers in a firm, the overall economic performance of the firm may be efficiency negative. In such a case the government has no reason on efficiency grounds for assisting the firm.[22]

If this overall economic analysis of the firm indicates that it would be beneficial to keep it in business but that the firm nevertheless

finds itself in a financially unprofitable position and would close down or contract without government assistance, then this is indeed a case worthy of government intervention. The government then need give the firm only sufficient assistance to keep it in business. Any funding in excees of this amount raises the rate of return the owners of the firm receive on their investment above what they would normally expect. An upper limit to the assistance that is offered is the present value of the net economic externalities the operation of the firm will generate.

Progress is being made in the Enterprise Development Branch to introduce such a combined social and private financial analysis of the firms applying for assistance, particularly through the development of computerized techniques to perform such analyses. To the extent that this full analysis will not be able to be implemented in the short-run, a fall-back position in analyzing potential candidates for the Loan Forgiveness Porgramme is to calculate (i) the amount of assistance the firm would require to keep it in business, (ii) the size of the labour externality and (iii) the negative externalities arising from any continued effective trade protection the firm is receiving from tariffs or quotas. For firms in import-competing sectors (this includes the firms that will be affected by the MTN) the positive externalities from added labour employment and the negative externalities from remaining effective protection are the major considerations in the decision as to whether the economy as a whole will benefit from the continued operation of a firm. For financial weak firms affected by the MTN that approach the government for assistance, a

decision on the probable economic impact of their continued operation can be taken with reasonable confidence on the basis of the trade-off between the labour and trade protection economic externalities. (See Chapter 3.5.) If the continued operation of the firm will be efficiency positive, then the amount of assistance required to keep the firm in business should be estimated. This amount should be at least sufficient to make continued operation a financially attractive proposition to the owners of the firm, but it should not exceed the net economic externalities the firm is expected to generate.

Transferring funds to this firm in any larger amounts than those required to keep it in business may be done on equity grounds if it is estimated that its capital owners suffered unexpected losses in the in-use value of their capital stock as a result of trade liberalization. The government should, however, be careful that it does not get in the business of compensating bad investments rather than unforseeable risks.

If the Employment Subsidy Programme is not implemented, then transferring its provisions to the Loan Forgiveness Programme represents a limited yet worthwhile fall-back position. This would limit the number of potential beneficiaries to that subset of firms that both apply for adjustment assistance and are in a position to hire-up designated workers. The estimation of the gross economic benefits generated by these job creation incentives would be described in Section 4.3.2. The amount of loan forgiveness provided would be equal to the present value of the labour externality less any effective trade protection externalities (unless a lesser amount

can be given to keep the firm in business as has been discussed above.)

To allow a degree of administrative control over the employment behaviour of the firm benefiting from these loan forgiveness provisions, the amount of the total loan forgiveness required can be annuitized over a 5 year period. This allows the programme administrators to discontinue the loan forgiveness if the firm failed to maintain the required level of employment. A disadvantage of this annuitization payment procedure is that it can create short-run cash flow problems for a firm. These should be able to be covered by short-term loans, however, given the commitment the government will have undertaken to eventually reduce the loan principle by the entire amount estimated to be necessary to retain the firm in operation.

4.5 Other Adjustment Assistance Policies

4.5.1 Introduction

This section directs some brief comments at other adjustment assistance policies that are either already implemented in Canada or are presently used in other developed countries and may be under consideration for use in Canada. The purpose of this section is not to provide any analysis of the design or current performance of these policies, but rather to focus on how the analytic framework developed in this study can be used or adapted to the analysis of the economic effects of these policies.

4.5.2 Compensation of Capital Owners and Scrapping Assistance

A detailed outline of the procedures and problems in estimating the amount of compensation that can be paid to capital owners who suffer income losses as a result of changes in effective protection arising out of the MTN is given in Appendix 2.0. Aside from the problems of estimating the in-use value of the physical assets with and without changes in trade policy, there is the major problem of distinguishing between expected and unexpected losses. If the expected decline in the return on net assets is already capitalized into the value of the assets, then the government has no need to compensate the owners. The two key issues in determining whether the loss of value of capital assets was expected are the following:

a) whether the capital assets were purchased before or after any change in market conditions were anticipated, and

b) whether the market ancitipated the timing and extent of the change accurately.

If capital assets were purchased before the change in market conditions was anticipated, then the owners suffer a windfall loss. This loss is experienced as a drop in the market values of their assets when the market begins to anticipate the change. The loss is actually realized by the owners if the capital stock is sold at any point after the market begins to anticipate the change or when the decline in the return begins to occur. Some owners of capital, therefore, may have already realized losses if they have sold productive capital assets the value of which is expected to be affected by the outcome of the MTN!

A number of indicators of whether or not the market is anticipating a decline in an industry due to trade policy changes can be identified. These indicators are based on those aspects of the structure and behaviour of an industry that would encourage the development of expectations in the market and indicate that behaviour to avoid losses has begun. If investigation of these indicators suggests that proper expectations have been formed, that the lead time to the actual market price changes through trade liberalization is long, and that actions to reduce or avoid losses have already begun, then the pressures and justifications for compensation would be reduced. Although capital losses may be suffered (and some probably already have been), the size of the losses will be reduced. These indicators include:

a) The age of the productive assets in an industry:

The older the assets, the less is the potential loss when the trade conditions change as the assets are probably completely written-off. An industry with older assets also has lower fixed costs, and the risks of a highly leveraged position are reduced.[23]

b) The extent of rented equipment used in the industry:

Where the anticipated trade policy changes would make new large investments unprofitable, these firms can often still make a profit using rented equipment in the interim period.[24]

c) Length of the terms of loans in an industry:

Both the borrower and lender would not be interested in long-term loans in an industry anticipating a decline in the near future.

d) Speed of implementation of policy changes and length of warning:

If changes are to be implemented slowly and if a long warning period is given for the changes, then time is available for individuals and firms to adjust their behaviour. This also allows time for the information about the changes to become well known. Steps can be taken that help avoid losses.

Scrapping Assistance

A policy instrument that has been used to assist with industrial adjustments by a number of countries is scrapping assistance.[25] In considering the advisibility of using scrapping assistance programmes it is important to be clear as to the primary gaol of such a policy. A distinction should be drawn between (a) scrapping assistance that is designed to compensate the equity holders of the marginal firm as its contracts its scale of operation or shuts down under changing trade conditions, and (b) scrapping assistance that is desinged to encourage intra-marginal producers (usually the smaller and presumably less competitive) to leave the industry. This latter policy is aimed at facilitating major changes in the structure of an industry rather than compensating for any unexpected loss of income suffered by capital owners. These structural changes are

presumably intended to generate large economic efficiency gains.

Two issues that should be considered if such a programme is ever evaluated are:

1) The recycling of scrapped equipment should be prevented if the purchase price of such equipment would be lowered as a result of the scrapping programme. This effective subsidy would result in a gross efficiency loss rather than gain.

2) A careful evaluation of all the market distortions affecting the industry needs to be undertaken to ensure that such a programme actually would result in economic benefits. This is important if the industry is still being effectively protected. As has been shown in Chapter 3, the higher the remaining level of effective protection, the lower is the social value of any incremental output from that industry, and hence, the lower the probability that such a programme will be generating any economic benefits

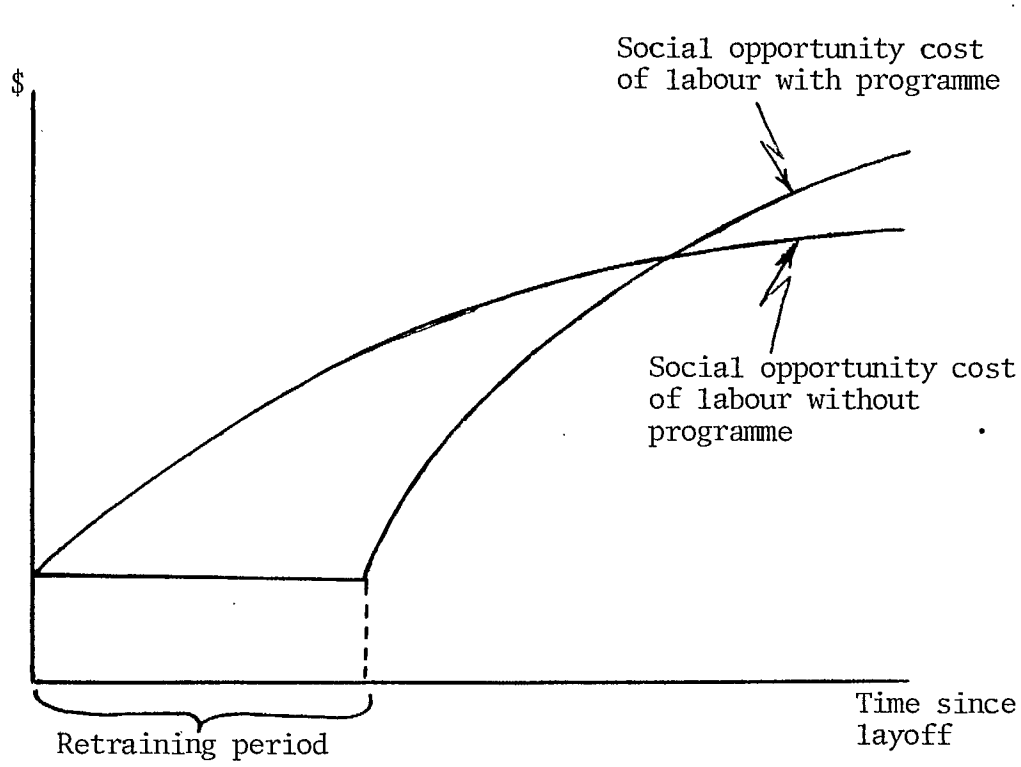
4.5.3 Manpower Programmes

Manpower programmes for adjustment assistance aim at promoting geographical and/or occupational mobility by means of mobility grants, retraining programmes, occupational counselling, and job search assistance. These are basically re-employment promoting programmes aimed at generating efficiency gains. They can be evaluated using the same type of framework as the Employment Subsidy Programme (see Section 4.3).

Any gross economic benefits are measured as the present value of the social opportunity of labour with the programme in place minus the social opportunity cost of labour without the programme (see Figure 4.4) minus the social opportunity cost of the real resources used in the programme. A retraining programme, for example, can raise the wage a worker receives in alternative employment and/or keep a worker employed

Figure 4.4

Gross Economic Benefits from
Labour Retraining Programmes.



for a higher proportion of time. The resource costs incurred include the social values of the fixed physical assets (buildings and equipment), the materials and utilities, and the instructors' time. It is only if the economic benefits exceed the economic costs that a retraining programme can be justified of efficiency grounds.

Mobility grants, which cover the one-time fixed costs of transportation and removal involved in searching for a job and relocating in a new region, can result in economic benefits by (a) increasing the response rate of a regional labour market to changes in the amount of excess unemployment in the region, and (b) raising the social opportunity cost of a migrant. How these two factors would result in increasing the social opportunity cost of labour can be derived from the general equilibrium model of a regional labour market described in Chapter 3. Viewing the economy as a whole, economic benefits would be generated if a mobility grant programme resulted in more people working a greater proportion of their time in regions paying higher wages.

4.5.4 Regional Investment Incentives

In contrast to manpower policies which are designed to promote the movement of workers to jobs, programmes that provide incentives for new investments in specific regions attempt to bring jobs to the worker. Where the displacement of labour resulting from the effects of the MTN is regionally concentrated, provisions are often included to tie these investment incentives to the hiring of specific workers. Such provisions

are included in the suggested Employment Subsidy Programme and the Loan Forgiveness Programme. The former programme aims at reducing the transitional costs of displacement by encouraging employment. It would only be as a second round effect that any incremental capital investment would result from this programme. The latter programme aims at retaining jobs for workers. A regional investment incentives policy attempts to generate incremental economic benefits through the creation of new job opportunities where they otherwise would not have existed. A regional investment incentive programme is similar to the Loan Forgiveness Programme in that incremental benefits can be gained by preventing the loss of existing investments. It is different, however, in that it also aims at promoting new investments, and hence, added job opportunities.

These are subtle differences, but they do change how the net economic benefits of the programmes should be estimated. The estimation of the net economic benefits from a new investment receiving government assistance should be performed using the same rigorous financial and economic evaluations that were suggested for inclusion in the Loan Forgiveness Policy (see Section 4.4.2). In the economic evaluation all the inputs and outputs involved in the project should be valued at their social opportunity costs.

The estimation of the social opportunity cost of the labour employed in a new investment is similar, but not entirely symmetrical, to that used to estimate the social opportunity cost of displaced labour.[26] The source of asymmetry is that workers are hired up from inside and

outside the regional labour market and from both the employed and the unemployed; displaced workers almost always move from a state of employment to unemployment. The effects of new hirings on unemployment and labour migration are therefore different from the effects of layoffs. These differences in estimation techniques would have to be incorporated in any attempt ot estimate the net economic benefit from new regional investments encouraged by government assistance.

If choices between alternative programmes are based on economic evaluation techniques, then from the overall national economic perspective there would be no conflict between regional investment incentives and manpower programmes. Both can generate efficiency gains for the economy. The only conflict between these approaches might arise from values expressed in the political arena that support the maintenance of stable populations in certain regions of Canada. The costs of political commitments to maintain regional employment levels are the losses of any efficiency gains that could be obtained by promoting manpower mobility plus the efficiency losses that might arise from a regional investment programme itself if it provides assistance without the consideration of economic efficiency criteria.

Footnotes

1. The prospect of the removal of trade barriers increases the uncertainty of the incomes that individuals working or owning capital in these protected industries can expect to earn. To the extent that these individuals are risk averse, they will perceive their income losses through trade liberalization as being greater than the estimated expected losses. This will naturally increase their opposition to trade liberalization. This puts an added burden on trade adjustment assistance policies to remove the political opposition from these interest groups in order that all Canadians can reap the benefits of trade liberalization. Trade adjustment assistance policies can serve to compensate for the expected loss and reduce the uncertainty of income in subsequent jobs by promoting re-employment.

2. Richard E. Caves, "The Political Economy of Tariff Structures", prepared for inaugural W.A. Mackintosh Lecture, Queen's University, January 1975.

3. The need to employ compensation programmes to allow the implementation of efficiency promoting proposals has been recognised by many policy analysts. See, for example, Charles L. Schultze, The Public Use of Private Interest, Washington: The Brookings Institute, 1977, Chapter 5; and in the particular case of trade adjustment assistance, Otto R. Reischer, "Trade Adjustment in Theory and Practice", prepared for Subcommittee on Foreign Economic Policy of Joint Economic Committee, Washington, D.C.: U.S.G.P.O., 1961.

4. Harold A. Bratt, "Assisting the Economic Recovery of Import Injured Firms", Law and Policy in International Business, Vol. 6, Nº 1, (1974); Marvin Fooks, "Trade Adjustment Assistance", in "United States International Economic Policy in our Interdependent World", Commision on International Trade and Investment Policy, Vol. I, (1971); See also Chapter 1.6.

5. Two major studies on exisisting levels of effective protection for Canadian industries are presently available. B.W. Wilkinson and K. Norrie, Effective Protection and Return to Capital, Ottawa: Economic Council of Canada, 1975; Roma Dauphin, The Impact of Free Trade in Canada, Ottawa: Economic Council of Canada, 1978.

6. In designating workers problems can arise in multi-product firms where not all products will be MTN affected. Workers in unaffected product lines can be laid-off if workers with high seniority working in affected product lines can "bump" workers in unaffected product lines. Careful inspection of union contracts may be required to ascertain this eventuality. In such cases conditional designation of potential bumpees can be considered.

A further problem arises if a down turn in the profitability of MTN affected product lines results in the closure of the entire firm. Again conditional designation of the MTN unaffected workers can be made. In cases where management is continually shifting labour around its product lines, then the designation of all of these workers (given they have been with the firm for 6 months) would be appropriate as all of these workers have an equal chance of being laid off as a result of MTN.

7. For example, in the United States numerous Bills have recently been introduced not to improve the trade adjustment assistance programmes but to make workers retrospectively eligible for Trade Readjustment Allowances. "Backgrounds Materials on the Trade Adjustment Assistance Programs Under Title II of the Trade Act of 1974", Subcommittee on Trade of the Committee of Ways and Means, U.S. House of Representatives, U.S.G.P.O., May 10, 1977.

8. The recommendation of 20 weeks is based on the current reporting practice on the Record of Employment forms.

9. The income loss is estimated over a three year period as on average this covers the transitional period for the vast majority of workers.

10. The gross wage of the worker is required for the estimation of compensation. This includes all overtime and piece-work pay, vacation pay and other fringe benefits, and should be calculated before pension, union, medical and other deductions are made.

11. The severance payments received by the workers in the Co.X labour force tracking sample averaged \$1,035 $\pm$ 1,232 (standard deviation). It is of further interest to note that the size of this severance pay had no significant effect on the speed of re-employment of these workers. This was determined by checking its effect on the probability of finding work after layoff using the probit model. (See Chapter 2.)

12. The monthly installments are calculated as follows:

$$A = \left[\frac{(r + i)/12}{1 - (1 + (r + i)/12)^{-12n}} \right] P$$

P = Present value of income loss

A = Monthly installment (nominal \$)

r = Interest or discount rate per annum

n = Number of years over which installments are to be paid

i = Expected rate of inflation per annum

13. Samuel A. Rea, Jr., "Trade-offs between alternative income maintenance programs", Federal Subsidy Programs, Joint Economic Committee of Congress, U.S.G.P.O., Washinton, 1974; Martin S. Feldstein, "Unemployment insurance: time for reform", Harvard Business Review, March-April 1975; Gershow Cooper, "Taxation and Incentive in Mobilization", Quarterly Journal of Economics, Vol 66, N° 1, (February 1952).

14. Tony Wohlfarth, "Adjustment Assistance Benefits Program", a situation report, Economic Analysis Directorate, Labour Canada, October 21, 1977.

15. Jonathan R. Kesselman et al, "Tax Credits for Employment rather than Investment", The American Economic Review, Vol. 67, No 3, June 1977, p. 339,349; Peter Mieskowski, "The Indirect Market Effects of Wage Subsidy and Public Employment Programes", Studies in Public Welfare, Paper No 19, Public Employment and Wage Subsidies, prepared for Sub-committee of Fiscal Policy of Joint Economic Committee of Congress, December 30, 1974, U.S.G.P.O., Washington, 1974.

16. A larger programme, subsidizing higher proportion of the labour force in a region for a longer period of time, should be analyzed by means of a general equilibrium model of the labour market. Special consideration should also be given to regional labour markets that are likely to have abnormally high concentrations of MTN affected workers.

17. It can be expected that the direct gross efficiency gains from a wage subsidy rate will eventually reach a point of diminishing (or no) returns if only because at some subsidy level a worker who would have received temporary employment becomes permanently employed. Even though the direct gross efficiency gains can be expected to approach an upper limit, it does not imply, however, that the overall gross efficiency gains will experience diminishing returns. Cross-subsidization can occur between subsidized and unsubsidized workers.

18. The estimation of the gross efficiency gains from a wage subsidy are dealt with in greater detail in a technical appendix under another cover.

19. Glenn P. Jenkins, "Capital in Canada: Its Social and Private Performance 1965-1974", Discussion Paper No 98, Ottawa: Economic Council of Canada, 1977, Chapter 6.

20. The investigation of the interactive effects between the unemployment rate (the prime age male rate acts as an indicator of general labour demand) and other variables such as age and skill will give some indication of the potential importance in the demand variation in terms of these worker characteristics.

21. The effective rate of protection received after the multinational trade negotiations are complete will be higher than at present for those import protected sectors that are exempted to the extent that the protection on their factors of production is lowered.

22. John C. Evans, "A Financial and Economic Framework for Investment Appraisal", a paper for a colloquium of Canadian Regional Planning and Development in Transition, Queen's University, February, 1977.

23. As an illustration of the potentially advanced age of the capital stock of firms in industrial sectors likely to be affected by MTN induced trade liberalization, the average age of the machinery in the plant of company Y in 1977 was 32 years.

24. In the Canadian footwear industry, for example, machinery and capital equipment is mainly leased. "Footwear Industry", Sector Profile, Discussion Paper, Department of Industry, Trade and Commerce, Canada, 1978.

25. The United Kingdom under the Cotton Industry Act of 1959 undertook a major restructuring programme of the textile industry that included scrapping compensation payments. See "Modern Cotton Industry: A Capital Intensive Industry", OECD, Special Committee for Textiles, Paris (1965). Japan also used scrapping assistance in its textile industry restructuring programmes. See Nobuyoshi Namiki, "The Japanese Economy: An Introduction to its Industrial Adjustment Problems", Chapter 7 in Kiyoshi Koyima (Ed.), "Structural Adjustment in Asian-Pacific Trade", The Japan Economic Research Centre, Tokyo (1973); and Seuo Sekiguchi, "Industrial Adjustment Policies in Japan: A Short Review" in Adjustment for Trade: Studies on Industrial Problems and Policies, OECD, Development Centre Studies, Paris (1975).

26. Glenn P. Jenkins and Chun-Yan Kuo, "On Measuring the Social Opportunity Cost of Permanent and Temporary Employment", Canadian Journal of Economics, May 1978

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